

The Farm Management Handbook 2017/18

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SAC Consulting

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Foreword

Agriculture is widely held to be the sector most affected by Brexit. No other industry is controlled, supported and regulated more heavily by EU regulations and institutions than agriculture. With discussions on the UK's future relationship with the EU making very slow progress and the clock ticking towards the EU exit gates in March 2019, the future for agricultural markets and support have scarcely been less certain in the past half century or more. What we do know is that there is the potential over time for a large scale shift in UK and devolved agricultural support systems, payment levels and market access. This makes it more vital than ever that farmers and managers understand the state of their current business and the options for change and restructuring open to them.

To aid this challenging task the 38th edition of the Farm Management Handbook, produced with the support of the Scottish Government's SRDP Farm Advisory Service (FAS) provides a comprehensive and up-to-date source of information for farmers, managers, bankers, accountants, students and all consultants involved in the assessment and planning of farm and rural businesses.

Planning allows returns to be assessed and enterprise mixes adjusted to strike the right balance between risk and return. For this reason the crop and livestock financial data remain central to the Farm Management Handbook. In addition to reviewing all financial margin data, this year we have added more detail to several sections including; grassland and forage, land tenure, new entrants and diversification. We have also added a new section for crofters and small farmers to provide enterprise margins and business information tailored to their needs.

The SAC Farm Management Handbook is a budgeting book. Provision of physical information upon which the financial measures are based enables the user to adjust data, where necessary, to account for differences occurring locally or on individual farms. The Handbook is an annual publication, more regular market and input cost data are provided at www.fas.scot under Farm Business and Agribusiness News topics. Enterprise budgets are expressed to gross margin level. The fixed costs of an individual business should also be taken into account when preparing forward budgets as they can have a significant impact on the profitability and/or success of a business.

The Handbook could not be produced without the help of colleagues and friends throughout the industry. This help, and indeed all comments and suggestions, are very much appreciated.

Kara Craig

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Enterprise Budgeting

The Farm Management Handbook is designed to provide guidelines in preparing forward budgets.

Output

Output is based on anticipated sales prices (adjusted for replacement costs where required) plus enterprise specific subsidies (as applicable). Livestock output prices are based on market forecasts while crop output prices are based on forward sales values for 2018 as set in summer 2017.

All non enterprise specific subsidies, e.g. Basic Payment Scheme (BPS) and Less Favoured Area Support Scheme (LFASS) are excluded from the enterprise gross margins. These subsidies are regarded as whole farm income therefore should be included in whole farm gross margin budget calculations. See Rural Aid Schemes section (pages 426-454) for more information on subsidies.

Variable costs

Variable costs (e.g. feed, seed, fertiliser, vet and medicine and sprays) are specific to an enterprise and vary in proportion to the size of the enterprise. Enterprise gross margins will vary considerably between individual businesses due to differing land quality, climate, production system, yields, prices and managerial abilities. All variable costs are based on projected prices for the year ahead, set in summer 2017.

Gross margins

A gross margin is **not** a profit figure. No account is taken of "fixed" or "overhead" costs such as labour, power and machinery, property upkeep, rent or finance charges.

The gross margin of an enterprise is:

OUTPUT

/less

VARIABLE COSTS

Enterprise performance levels are expressed on a per head and, for land using enterprises, on a per hectare (acre) basis. It is also assumed that the enterprise is in a "steady state" where, for instance, the size of a dairy herd is the same at the start and end of the year.

The gross margin data represents good technical performance at estimated prices for 2017/18 but should not be regarded as industry standards or targets, nor should it be used as actual data for compensation purposes. That is, these are indicative margins that should be customised to the specific requirements of the user.

Fixed costs

Fixed costs (e.g. labour, machinery, general overheads and finance) are costs that cannot readily be allocated to a specific gross margin. Fixed costs are generally unaffected by small changes in enterprise size but can vary from year to year. As a result, they are often referred to as overhead or indirect costs. Depreciation (for property and machinery) is also considered as a fixed cost and it is useful to keep this separate to allow a broad assessment of the capital investment needs of a business. If actual fixed costs are not available for a particular farm type, the figures in the Whole Farm Data section (pages 404-424) can be used.

Rounding

Because of rounding, individual items may not add to sub-totals or totals.

Remember! The gross margins are indicative and are not industry standards or targets. Care should therefore be taken when comparing actual results with values in the handbook or when using this information for budgeting purposes. Data should be adjusted to reflect local physical differences and changes in price.

Should you require assistance in using the Handbook, please contact your local SAC Consulting office or the Rural Business Unit. For contact details see Contacts section (pages 496-501).

Crop Inputs

Introduction

Crop inputs such as fertilisers, organic manures, lime and sprays all have a quantifiable value on farm. This section provides information that many of the crop and grassland gross margins and cost of production data refer to and include.

Fertiliser

Fertiliser levels used in the enterprise data are intended only as a guide for budgeting purposes and should not be regarded as a recommendation. In practice, many factors affect the level of N, P₂O₅ and K₂O required by a specific crop, including previous cropping policy, the quantity of organic manures being used and soil nutrient status. N levels will also require adjustment for Nitrate Vulnerable Zone (NVZ) Action Programme regulations.

Fertiliser prices used are based on typical prices paid in summer 2017. Fertiliser costs used in the gross margins are shown in the table below.

	Fertiliser Price	Nutrient Cost
Nitrogen (Ammonium Nitrate)	£185.00 /t	£0.54/kg N
Phosphate (Triple Super Phosphate)	£280.00 /t	£0.61/kg P ₂ O ₅
Potassium (Muriate of Potash)	£270.00 /t	£0.45/kg K ₂ O

All gross margins assume nutrients are derived from purchased fertiliser. Nutrient inputs for crops should be adjusted to account for organic nutrients which will reduce costs accordingly.

Lime

No charge for share of lime is included in the variable costs of arable, grassland and forage crops. Costs for lime will vary significantly depending on type (e.g. calcium, magnesium), distance from source, type of haulage (artic or 8 wheeler) and spreading contractor's charges. An appropriate annual maintenance charge (including delivery and application) to be included in individual margins could be calculated to suit specific farm practice using the example below:

Cost	Rate	Frequency of application	Annual charge
£30/t	3.7t/ha	4 years	£27.75/ha

Slurry and Manure

Use of slurries or manures has not been considered in the enterprise data but they are a valuable source of major nutrients (N, P₂O₅ and K₂O), secondary nutrients, trace elements and organic matter.

When planning inorganic fertiliser applications for crops and grassland, the total crop requirement should be adjusted to account for any use of slurries and manures.

The table overleaf is an estimated value based on the total nutrients present in the stored slurry and manure prior to application to land.

Manure Type	DM (%)	Total plant nutrient	kg/t or kg/m³	£/kg	Total value (£/t or £/m³)
Cattle FYM (Fresh)	25	N	6.0	0.54	3.22
		P ₂ O ₅	3.2	0.61	1.95
		K ₂ O	8.0	0.45	3.60
					8.77
Cattle Slurry	6	N	2.6	0.54	1.39
		P ₂ O ₅	1.2	0.61	0.73
		K ₂ O	3.2	0.45	1.44
					3.56
Sheep FYM (Fresh)	25	N	7.0	0.54	3.75
		P ₂ O ₅	3.2	0.61	1.95
		K ₂ O	8.0	0.45	3.60
					9.30
Pig FYM (Fresh)	25	N	7.0	0.54	3.75
		P ₂ O ₅	6.0	0.61	3.65
		K ₂ O	8.0	0.45	3.60
					11.01
Pig Slurry	4	N	3.6	0.54	1.93
		P ₂ O ₅	1.8	0.61	1.10
		K ₂ O	2.4	0.45	1.08
					4.11
Layer manure	35	N	19.0	0.54	10.19
		P ₂ O ₅	14.0	0.61	8.52
		K ₂ O	9.5	0.45	4.28
					22.99
Broiler/turkey litter	60	N	30.0	0.54	16.09
		P ₂ O ₅	25.0	0.61	15.22
		K ₂ O	18.0	0.45	8.10
					39.40

Nitrogen availability to crops will be significantly altered by the timing and method of application, and other factors including temperature, rainfall and crop growth stage and health, therefore the financial values above will be depleted. For further guidance on the use of organic manures, refer to SRUC Technical Note 650.

Nutrient Planning

Using the information below, total quantities of slurries and manures produced on farm can be calculated.

Livestock	Typical volume of excreta produced	
	m ³ /day	m ³ /wk
Dairy Cow (annual milk yield > 9,000l)	0.064	0.45
Dairy Cow (annual milk yield 6,000-9,000l)	0.053	0.37
Dairy Cow (annual milk yield < 6,000l)	0.042	0.29
Dairy Heifer (13 months to first calf)	0.040	0.28
Dairy Heifer (3 to 13 months)	0.020	0.14
Beef Cow (> 500kg)	0.045	0.32
Beef Cow (≤ 500kg)	0.032	0.22
Steer/heifer (over 25 months)	0.032	0.22
Steer/heifer (13 to 25 months)	0.026	0.18
Cattle (3 to 13 months)	0.020	0.14
Bull beef (over 3 months)	0.026	0.18
Calf (up to 3 months)	0.007	0.05
Sow (130 to 225kg) & litter	0.011	0.08
Maiden Gilt (90 to 130kg)	0.006	0.04
Breeding Boar (66 to 150kg)	0.006	0.04
Breeding Boar (over 150kg)	0.008	0.06
Weaner (7 to 31kg)	0.001	0.01
Grower (31 to 66kg) - dry fed/liquid fed	0.004/0.007	0.03/0.05
Finisher (66kg to slaughter) - dry fed/ liquid fed	0.006/0.010	0.04/0.07
Ewe (> 60kg)	0.005	0.04
Ewe (≤ 60kg)	0.003	0.02
Lambs (6 months to tupping)	0.002	0.01
Goat	0.003	0.02
Breeding deer	0.006	0.04
Other deer	0.003	0.02
Horse	0.024	0.17
Laying Hens (per 1000, up to 17 wks)	0.040	0.28
Laying Hens (per 1000 caged, > 17 wks)	0.120	0.84
Laying Hens (per 1000 free range, > 17 wks)	0.091	0.64
Broilers (table, per 1000)	0.120	0.84
Broiler (breeders, per 1000, up to 25 wks)	0.040	0.28
Broiler (breeders, per 1000, > 25 wks)	0.120	0.84
Turkeys (per 1000, male)	0.160	1.12
Turkeys (per 1000, female)	0.120	0.84
Ducks (per 1000)	0.100	0.70

When calculating quantities of slurries and manures as part of a farm waste management plan, adjustments for livestock numbers, housing periods and collection of contaminated water and bedding (e.g. straw and sawdust) will be required.

For further information on nutrient planning refer to Nitrate Vulnerable Zones guidance and SRUC Technical Notes 623, 633, 649, 650, 651, 652, 655, and 668 or Nutrient Management Guide (RB209).

For more information on NVZ's across the UK, see:

Scotland -

www.gov.scot/Topics/farmingrural/Agriculture/Environment/NVZintro

England -

<https://www.gov.uk/guidance/nutrient-management-nitrate-vulnerable-zones>

Wales -

<http://wales.gov.uk/topics/environmentcountryside/epq/waterflooding/nitrates-directive/?lang=en>

Northern Ireland -

<https://www.daera-ni.gov.uk/articles/nitrates-directive>

Planet Scotland

PLANET Scotland is a software system designed to help farmers improve their financial and environmental performance through better use of organic and bagged fertilisers. It has been specially developed to take Scottish soils, cropping and growing conditions into account. The practical approach to nutrient management aims to let farmers achieve real win: win results and, with the increasing focus on reducing emissions that contribute to climate change, could also help farms reduce their carbon footprint and so benefit both the business and the wider environment.

PLANET stands for Planning Land Application of Nutrients for Efficiency and the Environment and this outlines the approach that the software takes. Farmers and growers in NVZs will already be familiar with this planning approach and PLANET Scotland will allow NVZ farmers to use information produced by PLANET as part of their NVZ record keeping as well as benefiting from all of PLANET's other features. It will also integrate with standard desktop agronomy packages and therefore will only require key data to be entered once. In addition to fertiliser application, the software will also help with farm gate nutrient balances and with planning slurry storage requirements.

The software is available free of charge to all Scottish farmers and growers and to their consultants. There is a programme of workshops, on-line and PC-based training packages including video material, a helpline for IT and technical enquiries, and a dedicated website available to help users. To find out more, see www.planet4farmers.co.uk.

Residual Values of Fertilisers, Manures and Lime

Many fertilisers and manures have a residual value that needs to be calculated as part of a farm valuation or when a farm transfers between owners or tenants.

Estimates of the residual value of manures can be obtained by a feeding stuff calculation or by calculation of nutrients in manure (FYM) or slurry. The following valuations are based on information taken from SRUC Technical Notes on fertilisers as noted on page 7. Valuers must show discretion in the values used and to vary the values used according to the standard of husbandry, previous cropping, the state of drainage and the effectiveness of crop protection. Values are given in respect to growing seasons, not calendar years.

Compensation for manures using the residual values of feeding stuffs

Residues of feeding stuffs fed to livestock will be recovered in manures or slurries thus giving these organic manures a specific value. The values of nutrients in purchased feeds or feeds produced on the farm which are retained in farmyard manures or slurries can be calculated using the figures in the following table.

Feeding stuff	Average % in feeding stuff			Compensation value (£)	
	N	P ₂ O ₅	K ₂ O	per tonne of food consumed	
				Before 1 growing season	After 1 growing season
Soya bean meal or cake	6.99	1.50	2.68	10.77	5.38
Rapeseed meal or cake	5.77	2.33	1.55	6.95	3.48
Beans	4.53	1.03	1.39	5.82	2.91
Peas	3.52	1.15	1.14	4.82	2.41
Fish meal	10.50	7.63	1.03	7.54	3.77
Wheat	1.75	0.65	0.47	2.09	1.05
Barley	1.78	0.79	0.52	2.31	1.15
Oats	1.48	0.67	0.52	2.22	1.11
Maize	1.42	0.60	0.37	1.68	0.84
Bran & other offals of wheat	2.54	2.36	1.49	6.15	3.08
Maize gluten 60%	9.68	0.58	0.12	2.38	1.19
Brewers' & distillers' grain (wet)	1.07	0.23	0.02	0.33	0.17
Brewers' and distillers' grain (dried)	3.42	1.03	0.06	1.13	0.56
Hay	1.49	0.51	2.16	7.71	3.85

Feeding stuff	Average % in feeding stuff			Compensation value (£) per tonne of food consumed	
	N	P ₂ O ₅	K ₂ O	Before 1	After 1
				growing season	growing season
Dried grass	2.80	0.73	2.92	10.58	5.29
Grass silage	0.69	0.19	0.79	2.85	1.42
Wheat straw	0.54	0.15	1.07	3.75	1.88
Barley straw	0.58	0.22	1.53	5.33	2.67
Oat straw	0.46	0.18	1.82	6.28	3.14
Straw treated with ammonia	0.96	0.18	1.22	4.35	2.17
Swedes	0.15	0.06	0.24	0.85	0.43
Turnips	0.19	0.08	0.20	0.73	0.37
Potatoes	0.30	0.09	0.58	2.04	1.02
Dried sugar beet					
pulp (molasses)	1.55	0.15	1.92	6.81	3.41
Pot ale syrup	2.52	2.26	1.25	5.31	2.66
Molasses (sugar cane)	0.65	0.20	3.42	11.72	5.86
Compound cakes & meals					
for each 1% crude protein	0.16	0.08	0.06	0.25	0.13
Feed additives containing					
urea for each 1% crude					
protein	0.16	0.00	0.00	0.03	0.02

For further feeding stuffs see PLANET (www.planet4farmers.co.uk).

The calculation of nutrients in FYM or slurry from feeding stuffs depends on the following principles:

- The proportions of nutrients present in FYM and slurry will under ideal conditions be 35% for N, 45% for P₂O₅ and 75% K₂O.
- Where storage conditions are sub-optimal then these percentages should be reduced by up to half.
- For slurry the percentage given in a) for N should only be used for spring or summer application. For autumn and winter application the allowances should be reduced by 2/3 and 1/3 respectively.

An example calculation for the value of FYM taken from the nutrients from a feeding stuff is shown in the following table:

e.g. residual value of one tonne of barley fed to livestock.

Plant Nutrient	kg/t	£/kg	Total £/t	%	Value of FYM (£/t)	
					Before 1 growing season	After 1 growing season
N	17.8	0.54	9.54	35	3.34	1.67
P₂O₅	7.9	0.61	4.81	45	2.16	1.08
K₂O	5.2	0.45	2.34	75	1.76	0.88
			16.69		7.26	3.63

In calculating the value of manures, instances occur where records of the feeds fed to livestock are not available. In this case the value of stored farmyard manure or slurry can be estimated on the basis of the average nutrient content as shown in the following tables whilst also considering, in the case of slurry, the season of application.

Residual value of fertilisers and manures

The current value of the major plant nutrients, the principal forms used in agriculture and estimates of the proportions for which compensation in appropriate are detailed in the following table:

Source		Proportion of applied plant nutrients available for crop use after (growing season)		
		1	2	3
N	(a) Inorganic fertilisers, dried blood, dried poultry manure and liquid digested sludge	nil	nil	nil
	(b) Other organic manures	1/5	1/10	nil
P₂O₅	All fertilisers and manures	1/2	1/4	1/8
K₂O	All fertilisers and manures	nil	nil	nil

Storage and application principals, as per those stated in the previous section, will affect the value of manures. In the following examples, the proportion of nutrients available in the three growing seasons following application as a compound fertiliser (for example 20:10:10), fresh cattle FYM and cattle slurry, are valued.

e.g. application of 1 tonne of 20:10:10 compound fertiliser.

Plant Nutrient	kg/t	£/kg	Total £/t	Value of fertiliser (£/t) after (growing season)		
				1	2	3
N	200	0.54	107.25	nil	nil	nil
P₂O₅	100	0.61	60.87	30.43	15.22	7.61
K₂O	100	0.45	45.00	nil	nil	nil
			213.12	30.43	15.22	7.61

e.g. application of 1 tonne of fresh cattle FYM.

Plant Nutrient	kg/t	£/kg	Total £/t	Value of organic manure (£/t) after (growing season)		
				1	2	3
N	6.0	0.54	3.22	0.64	0.32	nil
P₂O₅	3.2	0.61	1.95	0.97	0.49	0.24
K₂O	8.0	0.45	3.60	nil	nil	nil
			8.77	1.62	0.81	0.24

e.g. application of 1 tonne of fresh cattle slurry.

Plant Nutrient	kg/m ³	£/kg	Total £/t *	Value of organic manure (£/t) after (growing season)		
				1	2	3
N	2.6	0.54	0.93	0.19	0.09	nil
P₂O₅	1.2	0.61	0.73	0.37	0.18	0.09
K₂O	3.2	0.45	1.44	nil	nil	nil
			3.10	0.55	0.28	0.09

* N adjustment for winter application timing.

Residual value of lime

The loss of lime from soils varies over time and for specific field circumstances (e.g. soil type, annual rainfall, high use of nitrogen) however, the average rate of loss from the soil is equivalent to about 0.35 tonnes of calcium oxide (CaO) per hectare per annum.

Considering this, there is a residual value for lime applications which may be useful when valuing farm assets in a farm valuation or a farm transfer between owners or tenants.

Compensation for lime residues should be based on the neutralising value (NV) of the lime applied, normally reduced by 0.35 tonnes of calcium oxide per hectare or by one-seventh, whichever is the greater for each growing season since the time of application. Compensation for lime should be calculated on the basis of the current price (delivered and spread) for the residual quantity.

An appropriate calculation of residual quantity of liming materials is set out in the following table:

Quantity applied (NV %) t/ha	CaO equiv. applied t/ha	Annual loss of CaO equivalent t/ha	Residual quantity of CaO equivalent (t/ha) after (growing season)						
			1	2	3	4	5	6	7
7.0 (50%)	3.50	$\frac{1}{7}(0.50)$	3.0	2.5	2.0	1.5	1.0	0.5	nil
4.4 (46%)	2.02	0.35	1.67	1.32	0.97	0.62	0.27	nil	nil

Pesticide Use

For each of the arable and forage gross margins, pesticides (including herbicides, insecticides, fungicides, nematicides, adjuvants and plant growth regulators where applicable) are included as appropriate for each crop. Chemical product prices used are only an indication of industry prices and do not account for volume/group discounts and regional variances.

Read the label before you buy, and use pesticides safely. Care must be taken to choose a brand of a pesticide product which has been authorised for use on the crop it is intended to spray. Not all brands of a particular pesticide are authorised for the same uses or similar crops e.g. winter wheat and spring wheat.

A full list of pesticides can be found in The UK Pesticide Guide 2017 and on www.plantprotection.co.uk.

The use of pesticides is controlled under the Food and Environment Protection Act 1985, and subsequent Regulations.

Anyone who uses a pesticide must take “reasonable precautions” to protect human health or the environment. Anyone with the need to use a professional pesticide product in the course of their business or employment may not use that pesticide or give instruction to others on the use of that pesticide unless they have received adequate instruction, training and guidance in the correct use of that pesticide. They must hold a Chemicals Regulation Directorate (CRD) recognised Certificate of Competence unless they are working under the direct supervision of someone who holds a certificate (i.e. they are being trained). Those previously operating under ‘grandfathers rights’ (i.e. born before 31 December 1964) must, since 26th November 2015 also have a Certificate of Competence.

Everyone who purchases a professional pesticide product must ensure that the intended user holds a Certificate of Competence.

Those who hold a Certificate of Competence approved by the CRD for the safe application of pesticides can join the National Register of Spray

Operators (NRoSO). The scheme ensures that operators participate in ongoing continuous professional development (CPD). UK quality assurance schemes such as Scottish Quality Cereals generally require that the NRoSO membership number of the operator making spray applications to quality assured crops is recorded for each spray application.

Currently, the recognised Certificate of Competence for the use of pesticides are issued by the National Proficiency Tests Council (Tel: 02476 857 300) and the Scottish Skills Testing Service (Tel: 0131 339 8739).

Off-label use

Use of any chemical in accordance with an Extension of Authorisation for Minor Use (EAMU) is entirely at growers' risk, and growers must obtain and read the appropriate document for that particular authorisation and the general Guidance Notes on off-label uses before using it (available at <https://secure.pesticides.gov.uk/offlabels/search.asp>). Pesticide product authorisations may be reviewed, amended, suspended or revoked at anytime.

Pesticides no longer authorised

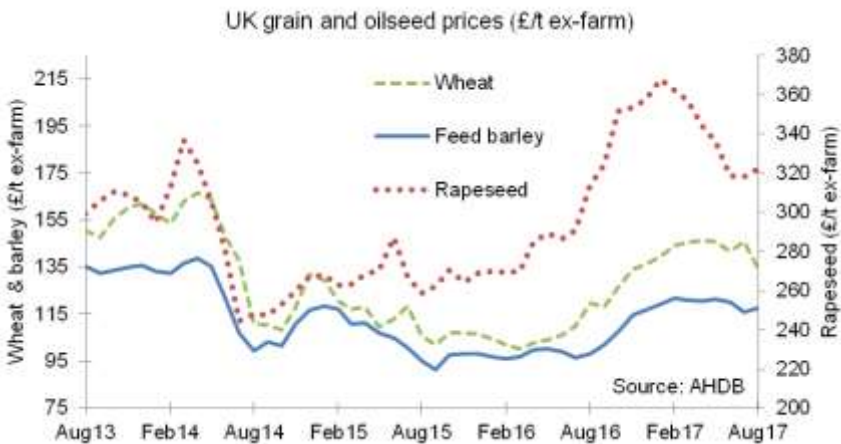
A number of pesticides have been withdrawn from use. It is an offence to use a pesticide no longer authorised. To check if a pesticide product is still authorised, take a note of the MAPP number from the label, then go to <https://secure.pesticides.gov.uk/pestreg/ProdSearch.asp> to check the authorisation status of that product.

Arable

Introduction

Markets and price drivers

In 2017 the world is expected to see the first decline in world grain stocks for five years due to a smaller anticipated global grain crop, particularly maize. Whilst this is a potentially positive indication that world grain prices could recover, stocks remain at relatively high levels and much will depend on the actual harvest obtained. World oilseed prices have declined recently due to rising soya, rapeseed and palm oil crop estimates. The situation for cereals in the UK is perhaps more supportive to prices given that the relatively tight supply situation expected in wheat in 2017. Forward grain prices for 2018 are currently around £25/t higher than equivalent values one year ago, offering potentially better margins for 2018 harvest if locked in today. A weaker sterling recently has supported UK grain prices but also brings the risk of further rises to input costs and this may encourage forward selling at sowing time to cover these essential variable costs.



Some of the crops sown in autumn 2017 to be harvested in 2018 may be marketed beyond March 2019 and therefore into a post-Brexit trading environment. It is impossible at this stage to say what the outcome of the UK's trade talks with the EU will be and how this will affect cereal markets. However, wheat can already be sold for May 2019 beyond the UK's planned EU exit so it is possible to start securing prices for crops during what may be a particularly uncertain period.

Livestock feed followed by milling, malting, distilling and exports are the main UK markets. In Scotland, the whisky sector uses around half of total Scottish grain output. Scotch whisky output reached record levels in 2013 before falling to a low in 2016 that was 20% lower for grain whisky and 8% lower for malt whisky. Rising whisky exports in 2016 are expected to continue in 2017 aided by a weak sterling and a global economic recovery. As a result demand for malting barley and wheat for distilling are both expected to rise (modestly) in 2017. With a relatively

low area of spring barley expected for harvest 2017, any further weather problems following the very dry spring could leave Scotland with a shortfall in distilling malting barley come harvest.

Marketing

Achieving a satisfactory grain price is essential for profitable cereal production. Grain and oilseed producers benefit from well developed futures markets which make for transparent pricing and enable crops to be bought and sold up to two years ahead of harvest. Given that prices readily swing £50 to £100/t between seasons arable farmers should consider spreading sales to achieve a satisfactory average. It is essential that arable farmers set their own target prices based on their costs.

Premium crops such as malting barley and milling oats are generally grown on contract as there can be little or no spot trade at harvest, particularly in Scotland. Contract conditions vary widely but will require that specific standards are attained such as moisture, germination, nitrogen levels and screenings. Many contracts offer growers flexibility in the pricing, through use of min-max or LIFFE wheat futures as a base.

Margins

Crop returns are highly sensitive to the yield and market price. Differences in fixed costs, particularly machinery, can have the greatest impact on profitability while variations in input costs such as fertiliser and sprays are relatively small between farms. Higher straw prices in the north and west can result in a good return from straw than in otherwise more marginal cereal cropping areas.

Variety choice

Crop varieties should be selected to match the farm conditions, the chosen agronomic strategy and intended end use. Feed markets are less demanding but may require some parameters to be met such as minimum specific weight. For home use other characteristics such as straw length can be important. Premium markets such as malting barley and milling wheat have very specific requirements and lists of approved varieties. See links below to relevant market and variety information:

Scottish varieties; www.sruc.ac.uk/downloads/120312/crop_publications

UK recommended varieties; <https://cereals.ahdb.org.uk/varieties.aspx>

Malting requirements and varieties; www.ukmalt.com/

Milling requirements; www.nabim.org.uk/wheat/wheat-varieties/

Subsidies and support

All eligible farmers receive area related direct support under the CAP's Basic Payment Scheme. To ensure eligibility arable farmers have to meet rules for Crop Diversification, requiring at least three crops to be grown on arable areas of over 30ha and adherence to the Ecological Focus Areas with 5% of eligible land in appropriate land uses. (See the Rural Aid Scheme section on pages 426-454 for full details).

Wheat - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 230 kg/ha (1.83 cwt/acre).

(b) Fertiliser

200 : 67 : 83 kg/ha N : P₂O₅ : K₂O (160 : 54 : 66 units/acre).

(c) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broad leaved weeds.

Fungicides Four fungicide applications at GS25-30, GS31-32, GS39 and GS59 to cover eyespot, septoria and head diseases, including growth regulation.

Additional treatments to the basic programme could include:

Wheat bulb fly £180/t for seed treatment.

Take all £155/t for seed treatment.

Mildew £10.35/ha

Aphids £4.25/ha

Wild oats £27.60/ha

Slugs £7.75/ha per application.

Annual meadow grass £24.10/ha (spring control).

Black grass £37.90/ha

Bromes £25.00/ha

Desiccant £4.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Wheat - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	6.0	(2.4)	8.0	(3.2)	10.0	(4.0)
Straw yield: t/ha (t/acre)	3.2	(1.3)	4.2	(1.7)	5.2	(2.1)
OUTPUT			£/ha (acre)			
Grain @ £145/t*	870		1,160		1,450	
Straw @ £40/t	128		166		208	
	<u>998</u>	(404)	<u>1,326</u>	(537)	<u>1,658</u>	(671)
VARIABLE COSTS						
Seed @ £370/t	85		85		85	
Fertiliser	185		185		185	
Sprays	133		133		133	
Other expenses	10		13		17	
	<u>413</u>	(167)	<u>416</u>	(168)	<u>420</u>	(170)
GROSS MARGIN	<u>585</u>	(237)	<u>910</u>	(369)	<u>1,238</u>	(501)

GRAIN PRICE SENSITIVITY

£125 /t	465	(188)	750	(304)	1,038	(420)
£160 /t	675	(273)	1,030	(417)	1,388	(562)
£175 /t	765	(310)	1,150	(465)	1,538	(622)

* Feed price (milling premium £15-40/t, biscuit premium £5-15/t)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Wheat - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 220 kg/ha (1.75 cwt/acre).

(b) Fertiliser

150 : 52 : 71 kg/ha N : P₂O₅ : K₂O (136 : 42 : 57 units/acre).

(c) Sprays

Herbicides One application for spring germinating broadleaved weeds.

Fungicides Two applications for leaf diseases at GS31-32 and GS39-49.

Additional sprays to the basic programme could include:

Mildew £10.35/ha

Wild oats £27.60/ha

Desiccant £4.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Wheat - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.5	(1.8)	6.5	(2.6)	8.5	(3.4)
Straw yield: t/ha (t/acre)	2.5	(1.0)	3.6	(1.4)	4.7	(1.9)
OUTPUT			£/ha (acre)			
Grain @ £145/*	653		943		1,233	
Straw @ £40/t	99		143		187	
	<u>752</u>	(304)	<u>1,086</u>	(439)	<u>1,420</u>	(575)
VARIABLE COSTS						
Seed @ £400/t	88		88		88	
Fertiliser	144		144		144	
Sprays	38		38		38	
Other expenses	8		11		15	
	<u>278</u>	(112)	<u>281</u>	(114)	<u>285</u>	(115)
GROSS MARGIN	<u>474</u>	(192)	<u>805</u>	(325)	<u>1,135</u>	(460)

GRAIN PRICE SENSITIVITY

£125 /t	384	(155)	674	(273)	965	(391)
£160 /t	541	(219)	902	(365)	1,262	(511)
£175 /t	609	(246)	999	(404)	1,390	(563)

* Feed price (milling premium £15-40/t, biscuit premium £5-15/t)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Barley - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 220 kg/ha (1.75 cwt/acre). Alternatively, hybrid 6 row sown at 145 kg/ha (1.16cwt/ac). Conventional seed price used.

(b) Fertiliser

180 : 67 : 83 kg/ha N : P₂O₅ : K₂O (144 : 54 : 66 units/acre).

(c) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broadleaved weeds.

Fungicides Three fungicide applications at GS25-30, GS31 and GS49 for rhynchosporium, mildew and other leaf diseases.

Additional sprays to the basic programme could include:

Wild oats £27.60/ha

Aphids £4.25/ha

Desiccant £4.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Barley - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	6.0	(2.4)	7.5	(3.0)	9.0	(3.6)
Straw yield: t/ha (t/acre)	3.3	(1.3)	4.1	(1.7)	5.0	(2.0)
OUTPUT			£/ha (acre)			
Grain @ £125/t*	750		938		1,125	
Straw @ £45/t	149		186		223	
	<u>899</u>	(364)	<u>1,124</u>	(455)	<u>1,348</u>	(546)
VARIABLE COSTS						
Seed @ £365/t	80		80		80	
Fertiliser	175		175		175	
Sprays	118		118		118	
Other expenses	11		13		16	
	<u>384</u>	(155)	<u>386</u>	(156)	<u>389</u>	(157)
GROSS MARGIN	<u>515</u>	(209)	<u>738</u>	(299)	<u>959</u>	(389)

GRAIN PRICE SENSITIVITY

£105 /t	395	(160)	587	(238)	779	(315)
£140 /t	605	(245)	850	(344)	1,094	(443)
£155 /t	695	(281)	962	(389)	1,229	(497)

* Feed price (malting price approx. £10-20/t higher)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Barley - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

130 : 52 : 71 kg/ha N : P₂O₅ : K₂O (104 : 42 : 57 units/acre).

(c) Sprays

Herbicides Post emergence herbicide to control broadleaved weeds.

Fungicides Two applications at GS31 and GS45 for rhynchosporium, mildew and other leaf diseases.

Additional sprays to the basic programme could include:

Mildew £12.75/ha

Wild oats £27.60/ha

Aphids £4.25/ha

Desiccant £4.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Barley - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.0	(1.6)	5.5	(2.2)	7.5	(3.0)
Straw yield: t/ha (t/acre)	2.1	(0.8)	2.9	(1.2)	3.9	(1.6)
OUTPUT			£/ha (acre)			
Grain @ £125/*	500		688		938	
Straw @ £45/t	94		129		176	
	<u>594</u>	(240)	<u>817</u>	(331)	<u>1,114</u>	(451)
VARIABLE COSTS						
Seed @ £385/t	73		73		73	
Fertiliser	133		133		133	
Sprays	64		64		64	
Other expenses	7		9		12	
	<u>277</u>	(112)	<u>279</u>	(113)	<u>282</u>	(114)
GROSS MARGIN	<u>317</u>	(128)	<u>538</u>	(218)	<u>832</u>	(337)

GRAIN PRICE SENSITIVITY

£105 /t	237	(96)	427	(173)	681	(276)
£140 /t	377	(153)	620	(251)	944	(382)
£155 /t	437	(177)	702	(284)	1,056	(427)

* Feed price (malting price approx. £15-50/t higher)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oats - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

140 : 53 : 104 kg/ha N : P₂O₅ : K₂O (112 : 42 : 83 units/acre).

(c) Sprays

Herbicides Autumn herbicide to control annual broadleaved weeds.

Fungicides Two sprays for mildew and crown rust at GS31 and GS49 including growth regulation.

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Oats - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	5.0	(2.0)	7.5	(3.0)	9.0	(3.6)
Straw yield: t/ha (t/acre)	3.2	(1.3)	4.7	(1.9)	5.7	(2.3)
OUTPUT			£/ha (acre)			
Grain @ £148/t*	740		1,110		1,332	
Straw @ £40/t	126		189		227	
	<u>866</u>	(350)	<u>1,299</u>	(526)	<u>1,559</u>	(631)
VARIABLE COSTS						
Seed @ £390/t	74		74		74	
Fertiliser	154		154		154	
Sprays	83		83		83	
Other expenses	10		15		18	
	<u>321</u>	(130)	<u>326</u>	(132)	<u>329</u>	(133)
GROSS MARGIN	<u>545</u>	(220)	<u>973</u>	(394)	<u>1,230</u>	(498)

GRAIN PRICE SENSITIVITY

£128 /t	445	(180)	823	(333)	1,050	(425)
£163 /t	620	(251)	1,085	(439)	1,365	(552)
£178 /t	695	(281)	1,198	(485)	1,500	(607)

* Milling price

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oats - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

100 : 53 : 104 kg/ha N : P₂O₅ : K₂O (80 : 42 : 83 units/acre).

(c) Sprays

Herbicides Typical weed control for annual broadleaved weeds.

Fungicides Two sprays at GS25-30 and GS49 for mildew and crown rust including growth regulator.

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £19-21/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £6-10/t. Ammonia treatment for feeding straw will cost £23-26/t straw. Treatment costs exclude grain processing and straw tubelining (see pages 348-349 for these costs).

Oats - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.5	(1.4)	5.0	(2.0)	6.5	(2.6)
Straw yield: t/ha (t/acre)	2.1	(0.8)	3.0	(1.2)	3.9	(1.6)
OUTPUT			£/ha (acre)			
Grain @ £148/*	518		740		962	
Straw @ £40/t	84		120		156	
	<u>602</u>	(244)	<u>860</u>	(348)	<u>1,118</u>	(452)
VARIABLE COSTS						
Seed @ £400/t	76		76		76	
Fertiliser	133		133		133	
Sprays	60		60		60	
Other expenses	7		10		12	
	<u>276</u>	(112)	<u>279</u>	(113)	<u>281</u>	(114)
GROSS MARGIN	<u>326</u>	(132)	<u>581</u>	(235)	<u>837</u>	(338)

GRAIN PRICE SENSITIVITY

£128 /t	256	(104)	481	(195)	707	(286)
£163 /t	379	(153)	656	(265)	934	(378)
£178 /t	431	(174)	731	(296)	1,032	(418)

* Milling price

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Triticale

PHYSICAL DATA

(a) Seed

230 kg/ha (1.83 cwt/acre).

(b) Fertiliser

180 : 52 : 71 kg/ha N : P₂O₅ : K₂O (144 : 42 : 57 units/acre).

(c) Sprays

Herbicides Pre-emergence application.

Fungicides Two sprays at GS31 and GS39-45 including growth regulation.

(d) Other crop expenses

For baling straw, costs for net wrap at 50-77p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Triticale

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.0	(1.6)	6.0	(2.4)	8.0	(3.2)
Straw yield: t/ha (t/acre)	2.6	(1.1)	3.9	(1.6)	5.2	(2.1)
OUTPUT			£/ha (acre)			
Grain @ £135/t	540		810		1,080	
Straw @ £30/t	78		117		156	
	<u>618</u>	(250)	<u>927</u>	(375)	<u>1,236</u>	(500)
VARIABLE COSTS						
Seed @ £415/t	95		95		95	
Fertiliser	160		160		160	
Sprays	56		56		56	
Other expenses	8		12		17	
	<u>319</u>	(129)	<u>323</u>	(131)	<u>328</u>	(133)
GROSS MARGIN	<u>299</u>	(121)	<u>604</u>	(244)	<u>908</u>	(367)

GRAIN PRICE SENSITIVITY

£115 /t	219	(89)	484	(196)	748	(303)
£150 /t	359	(145)	694	(281)	1,028	(416)
£165 /t	419	(170)	784	(317)	1,148	(465)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oilseed Rape - Winter

PHYSICAL DATA

(a) Seed

Oil 45%
Seed rate Hybrid - 4kg/ha : Conventional - 5kg/ha
Conventional seed price used.

(b) Fertiliser

200 : 49 : 38 + 75 kg/ha N : P₂O₅ : K₂O + SO₃
(160 : 39 : 30 + 60 units/acre)

(c) Sprays

Herbicides Pre-emergence herbicide to control annual meadow grass and broadleaved weeds.

Fungicides Autumn and spring fungicides for sclerotinia, light leaf spot or phoma.

Desiccation Desiccation has largely replaced swathing. If swathing is used over desiccation, reduce spray costs by £19.40/ha. For swathing costs see page 348.

Additional sprays to the basic programme could include:

Slugs £7.75/ha per application.

Sclerotinia £27.13/ha (high risk situations)

Rape winter stem weevil and pollen beetle £4.25/ha

Volunteer cereals £12.24/ha

Mayweed £27.13/ha

Pod sticker £9.00/ha

(d) Other crop expenses

Assuming straw has been chopped. If baling, include costs for net wrap at 50-77p/bale for round straw bales, average weight 200 kg.

Oilseed Rape - Winter

GROSS MARGIN DATA

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	-	(0.0)	-	(0.0)	-	(0.0)

OUTPUT

			£/ha (acre)			
Grain @ £295/t	885		1,180		1,475	
Straw @ £0/t	-		-		-	
	<u>885</u>	(358)	<u>1,180</u>	(478)	<u>1,475</u>	(597)

VARIABLE COSTS

Seed @ £11/kg	55		55		55	
Fertiliser	154		154		154	
Sprays	140		140		140	
Other expenses	-		-		-	
	<u>349</u>	(141)	<u>349</u>	(141)	<u>349</u>	(141)
GROSS MARGIN	<u>536</u>	(217)	<u>831</u>	(337)	<u>1,126</u>	(456)

GRAIN PRICE SENSITIVITY

£245 /t	386	(156)	631	(255)	876	(355)
£345 /t	686	(278)	1,031	(417)	1,376	(557)
£395 /t	836	(338)	1,231	(498)	1,626	(658)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm price including oil bonus. An average oil content of 43% has been assumed resulting in a bonus of 4.5% above the base price. The oil bonus comprises a 1.5% increase in the price for every 1% rise in oil content above 40%.

Oilseed Rape - Spring

PHYSICAL DATA

(a) Seed

Oil	45%
Seed rate	5 kg/ha

(b) Fertiliser

100 : 28 : 22 + 40 kg/ha N : P₂O₅ : K₂O + SO₃
(80 : 22 : 18 + 32 units/acre)

(c) Sprays

Herbicides Pre-emergence herbicide for problem weeds such as shepherds' purse.

Fungicides One spray to control pollen beetle.

Desiccation Desiccation has largely replaced swathing. If swathing is used over desiccation, reduce spray costs by £14.55/ha. For swathing costs see page 348.

Additional sprays to the basic programme could include:

Volunteer cereals £12.24/ha

Sclerotinia £36.00/ha

Pod sticker £9.00/ha

(d) Other crop expenses

Assuming straw has been chopped. If baling, include costs for net wrap at 50-77p/bale for round straw bales, average weight 200 kg.

Oilseed Rape - Spring

GROSS MARGIN DATA

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	1.8	(0.7)	2.5	(1.0)	3.0	(1.2)
Straw yield: t/ha (t/acre)	-	(0.0)	-	(0.0)	-	(0.0)

OUTPUT

			£/ha (acre)			
Grain @ £295/t	531		738		885	
Straw @ £0/t	-		-		-	
	<u>531</u>	(215)	<u>738</u>	(299)	<u>885</u>	(358)

VARIABLE COSTS

Seed @ £12/kg	60		60		60	
Fertiliser	81		81		81	
Sprays	38		38		38	
Other expenses	-		-		-	
	<u>179</u>	(72)	<u>179</u>	(72)	<u>179</u>	(72)

GROSS MARGIN	<u>352</u>	(143)	<u>559</u>	(227)	<u>706</u>	(286)
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GRAIN PRICE SENSITIVITY

£245 /t	262	(106)	434	(176)	556	(225)
£345 /t	442	(179)	684	(277)	856	(346)
£395 /t	532	(215)	809	(327)	1,006	(407)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm price including oil bonus. An average oil content of 43% has been assumed resulting in a bonus of 4.5% above the base price. The oil bonus comprises a 1.5% increase in the price for every 1% rise in oil content above 40%.

Spring Field Beans

PHYSICAL DATA

(a) Seed

250 kg/ha (1.99 cwt/acre).

(b) Fertiliser

0 : 40 : 40 kg/ha N : P₂O₅ : K₂O (0 : 32 : 32 units/acre).

(c) Sprays

Herbicides Pre-emergence herbicide and control of annual meadow grass and broadleaved weeds.

Fungicide Two applications to control chocolate spot and downy mildew.

Desiccation Cost included.

Additional sprays to the basic programme could include:

Volunteer cereals £12.24/ha

(d) Other crop expenses

Additives can be used to preserve pulses for feeding livestock. Cost will vary depending on product used, length of storage period and moisture of pulses at treatment. For pulses harvested at 20% moisture for long term storage, add £9-13/t grain treated with propionic acid, excluding processing (see page 348 for processing costs).

Spring Field Beans

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	2.5	(1.0)	5.0	(2.0)	6.0	(2.4)
OUTPUT			£/ha (acre)			
Grain @ £175/t	438		875		1,050	
	<u>438</u>	(177)	<u>875</u>	(354)	<u>1,050</u>	(425)
VARIABLE COSTS						
Seed @ £420/t	105		105		105	
Fertiliser	47		47		47	
Sprays	120		120		120	
Other expenses	-		-		-	
	<u>272</u>	(110)	<u>272</u>	(110)	<u>272</u>	(110)
GROSS MARGIN	<u>166</u>	(67)	<u>603</u>	(244)	<u>778</u>	(315)

GRAIN PRICE SENSITIVITY

£145 /t	91	(37)	453	(183)	598	(242)
£190 /t	203	(82)	678	(274)	868	(351)
£205 /t	241	(98)	753	(305)	958	(388)

Basis of data:

Sale price 2018 harvest, November ex-farm price. Deductions for field beans, which do not meet minimum quality standards, can reduce the price considerably.

Spring Peas

PHYSICAL DATA

(a) Seed

250 kg/ha (1.99 cwt/acre).

White/Large Blue Compounding Pea

(b) Fertiliser

0 : 20 : 30 kg/ha N : P₂O₅ : K₂O (0 : 16 : 24 units/acre).

(c) Sprays

Herbicides A pre-emergence herbicide to control annual and broadleaved weeds.

Fungicide Two sprays at flowering for downy mildew and botrytis control.

Insecticide Aphid control.

Desiccation A desiccant is included.

(d) Other crop expenses

Additives can be used to preserve pulses for feeding livestock. Cost will vary depending on product used, length of storage period and moisture of pulses at treatment. For pulses harvested at 20% moisture for long term storage, add £9-13/t grain treated with propionic acid, excluding processing (see page 348 for processing costs).

Spring Peas

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	2.5	(1.0)	4.0	(1.6)	5.5	(2.2)
OUTPUT			£/ha (acre)			
Grain @ £175/t	438		700		963	
	<u>438</u>	(177)	<u>700</u>	(283)	<u>963</u>	(390)
VARIABLE COSTS						
Seed @ £470/t	118		118		118	
Fertiliser	26		26		26	
Sprays	108		108		108	
Other expenses	-		-		-	
	<u>252</u>	(102)	<u>252</u>	(102)	<u>252</u>	(102)
GROSS MARGIN	<u>186</u>	(75)	<u>448</u>	(181)	<u>711</u>	(288)

GRAIN PRICE SENSITIVITY

£145 /t	111	(45)	328	(133)	546	(221)
£190 /t	223	(90)	508	(206)	793	(321)
£205 /t	261	(106)	568	(230)	876	(355)

Basis of data:

Sale price estimate for 2018 harvest, November ex-farm price. Deductions for protein peas, which do not meet minimum quality standards, can reduce the price considerably. Bad weather at harvest can result in very high loss levels.

Timothy - Hay, Greencut

PHYSICAL DATA

(a) System

As practised on the Carse of Stirling and Clackmannan.

(b) Yield

Average between 7 t/ha (2.8 t/acre) and 8 t/ha (3.2 t/acre) with some aftermath grazing (or alternatively round bale silage).

Price rises usually as the season progresses but hay also loses weight with storage - as much as 15% over a winter, depending upon the conditions of storage.

(c) Seed

Annual charge: assumes a 10-year sward life and that 'Basic' seed will be sown to keep open the option of a seed crop.

Seed rate: 13-18 kg/ha.

(d) Fertiliser

Standard practice would see only N applied annually, usually as sulphate of ammonia, supported by periodic dressings of phosphate and potash.

The fertiliser costs overleaf consider an application of the rates below.

kg/ha (units/acre)	Average	Premium
N	80 (64)	120 (96)
P ₂ O ₅ (annual allocation)	40 (32)	50 (40)
K ₂ O	48 (38)	60 (48)

(e) Sprays

Annual nominal charge to cover a range of circumstances.

(f) Other crop expenses

Net wrap cost is costed on the basis of 5-6 round bales/t and assuming one roll of net will wrap 410 bales.

Timothy - Hay, Greencut

GROSS MARGIN DATA

Average yield: t/ha (acre)	7.0	(2.8)	8.0	(3.2)
OUTPUT		£/ha (acre)		
Hay (ex-field or early store) @ £100/t	700		800	
Aftermath grazing let @ £40/ha	40		40	
	<u>740</u>	(299)	<u>840</u>	(340)
VARIABLE COSTS				
Seed (annual charge)	9		9	
Fertiliser	89		122	
Sprays (annual charge)	5		5	
Other expenses	15		17	
	<u>118</u>	(48)	<u>153</u>	(62)
GROSS MARGIN	<u>622</u>	(251)	<u>687</u>	(278)

Stubble to Stubble Arable Operations

The costs of stubble to stubble operations for winter wheat, winter barley, spring barley and winter oilseed rape are illustrated below. These calculations should be adapted and adjusted for site specific circumstances.

Assumptions:

- Yield data taken from crop gross margins on pages 19, 23, 25 and 33.
- All straw is assumed to be baled.
- Contractors assumed to undertake all cultivation, sowing, crop maintenance, harvesting and carting to store. See pages 347-350 for contractor costs.
- Machinery fuel use (l/ha) and fuel cost on page 344.
- Drying costs based on costs on page 351.

	Winter wheat	Winter barley	Spring barley	Winter OSR
Yield - grain (t /ha)	8.0	7.5	5.5	4.0
Yield - straw (t /ha)	4.2	4.1	2.9	-
Grain MC at harvest (%)	18	16	15	10
	£/ha			
Cultivation costs				
<i>Plough and cultivate</i>	106	106	106	106
<i>Sow</i>	38	38	38	38
<i>Roll and destone</i>	18	18	18	18
<i>Spray</i>	64	51	38	51
<i>Fertilise</i>	32	21	21	21
<i>Fuel</i>	41	39	38	39
	299	273	260	273
Harvest costs				
<i>Harvest</i>	88	88	88	89
<i>Bale/stack</i>	57	56	39	-
<i>Carting</i>	8	12	8	4
<i>Dry grain</i>	88	53	-	36
<i>Fuel</i>	14	12	10	7
	255	220	146	137
Total cost (£/ha)	554	493	407	410
Total cost (£/ac)	224	200	165	166
Cost per t grain (£/t)	69	66	74	102

Equivalent Grain Weights at Varying Moisture Contents

The formula for converting wet grain weight to dry grain weight is:

$$\text{Weight loss} = \frac{W_1 (M_1 - M_2)}{100 - M_2}$$

where: W_1 = starting weight of grain.
 M_1 = starting moisture of grain.
 M_2 = final moisture of grain.

This formula accounts only for weight change due to moisture loss only.

100t at Moisture Content %	Final moisture content %								
	20	19	18	17	16	15	14	13	12
	Dried grain - t								
35	81.25	80.25	79.27	78.31	77.38	76.47	75.58	74.71	73.86
33	83.75	82.72	81.71	80.72	79.76	78.82	77.91	77.01	76.14
31	86.25	85.18	84.15	83.13	82.14	81.18	80.23	79.31	78.41
29	88.75	87.65	86.59	85.54	84.52	83.53	82.56	81.41	80.68
27	91.25	90.12	89.02	87.95	86.90	85.88	84.88	83.91	82.95
25	93.75	92.59	91.46	90.36	89.29	88.24	87.21	86.21	85.22
23	96.25	95.06	93.90	92.77	91.67	90.59	89.53	88.51	87.50
21	98.75	97.53	96.34	95.18	94.05	92.94	91.86	90.80	89.77
19	-	100.00	98.78	97.59	96.43	95.30	94.19	93.10	92.41
17	-	-	-	100.00	98.81	97.65	96.51	95.40	94.32
15	-	-	-	-	-	100.00	98.84	97.70	96.59

Further information on storage requirements for grain can be found on page 372, costs of grain storage are found on page 382 and costs of grain drying on pages 351.

Futures and Options Markets

The futures markets offer a means to manage price risk in a wide range of agricultural commodities. In the UK the most relevant markets are the UK LIFFE feed wheat futures (www.theice.com) and the Paris European Rapeseed futures and Milling Wheat futures (www.euronext.com). Contracts for futures (forward prices) and options (price insurance) are available in both of these markets. Further details on the market, lists of registered brokers and how to trade can be found at the website above.

On a global basis the most important agricultural futures market is the Chicago Board of Trade which offers contracts on wheat, maize, oats, soyabeans, soyameal and others, see www.cmegroup.com. AHDB Cereals and Oilseeds has detailed market information on their website which provides a guide to price risk management, futures and options. See <https://cereals.ahdb.org.uk/markets.aspx>.

Potatoes

Introduction

Markets and price drivers

The potato market in the UK is split between seed, ware for fresh market and ware for processing. The market was generally buoyant in 2016/17 with tight supplies helping maintain good prices. An overall 4% increase in the GB planted area was counteracted by a below average yield per hectare resulting in a restricted supply and therefore a good demand for all potatoes. This demand was helped and maintained by a reduced yield in other EU countries. In 2017 higher prices may encourage an increase in plantings but the restricted supply of seed could help hold area. An early spring meant a very early start to planting in almost ideal conditions especially for ware crops which had a great start to the growing season. Recently consumer trends indicate a stabilisation or increase in potato consumption which will be important to sustain if longer term prices are to remain supported.

The UK processed potato market is increasing at the expense of the fresh potato market and accounts for most potato consumption. The bulk of raw supply is grown on contract in England though an increasing amount of frozen processed product is being imported as well as raw material. Sterling's weakness against the Euro may encourage greater use of home produced potato products provided supply is available.

UK seed production is confined to Scotland and areas of higher altitude in England. The market for export of high grade seed has nearly doubled recently. As export is mainly to non EU countries the even greater weakness of Sterling against the US dollar has stimulated export demand. The natural perishability of the potato is the largest threat to this market so the maintenance of high health standards is imperative.

Marketing

Contracts have been a standard feature of the processing market for a long time where factories need to procure supplies well in advance and ensure that their growers attain a sustainable price. The fresh market is far more volatile and complex with growers utilising cold storage to lengthen their supply season and take advantage of higher prices later into the new year. In these recent seasons of oversupply, contracts have become more popular where growers have tried to lock in a proportion of crop to a known price. However, in a season of undersupply growers will hold onto uncontracted stocks as long as possible to negotiate higher prices. The grower's hand is also strengthened by producing potatoes free from damage, disease and skin blemish as aesthetics are a major selling point in the fresh potato sector.

The seed market is virtually all done on contract where growers multiply seed stocks in partnership with the seed houses. Growers must attain high standards of crop health, seed purity and hygiene, good yields of the

correct size band and timely and accurate supply. Reputation and reliability will gain growers more higher quality contracts.

Margins

Crop returns are highly sensitive to the net (packed out) yield achieved which also affects the price. Therefore attention to crop health and damage minimisation are critical. Differences in fixed costs, particularly machinery, have the greatest impact on profitability. Seed costs are variable with growers looking to multiply their own seed where they can. Fertiliser costs can be adjusted according to market with savings on nitrogen and potash for new, salad and seed potato growers. Sprays are quite uniform across the board but the need for nematicides to combat Potato Cyst Nematode (PCN) is a significant outlay.

Variety Choice

The most important factor when selecting a potato variety is suitability for the end market. For crisps, tubers with good shape, high dry matter, resistance to damage and yellow flesh are required. For chips, oval tubers with good uniformity and low reducing sugar content are best. For the fresh packing market, taste and resistance to disease causing skin blemishes are important. The most popular variety is Maris Piper which can be boiled, chipped or roasted equally well, and even commands brand loyalty. Salad varieties are becoming more popular as they can be boiled within 20 minutes without peeling and chopping, which makes them competitive with pasta and rice.

Resistance to pests and diseases is becoming increasingly important due to the loss of key chemical active ingredients. The most valuable traits are resistance to PCN (which also helps to reduce the viable population of PCN in the field), blackleg, powdery scab and blight. Gross yield as with wheat and barley is not as important as net/sold yield is to potatoes with greater emphasis being given to quality over quantity in the pursuit of profitability.

Potatoes - Loose New (Covered and Open)

PHYSICAL DATA

Machine harvested

(a) Seed

Nominal planting rate of 3.5 t/ha. No charge included for chitting. Bought in seed. Cost varies with variety, e.g. Rocket, Epicure, seed size and classification grade. Seed rate also varies with variety and seed size.

(b) Fertiliser

90 : 150 : 110 kg/ha N : P₂O₅ : K₂O (72 : 120 : 88 units/acre).

(c) Sprays

Seed treatment Half seed rate treatment for rhizoctonia.

Herbicides Residual herbicide tank mix with multiple active ingredients.

Blight control 3-5 spray program with protectant and tuber blight control chemicals. Cost may be higher in high blight pressure years.

Desiccation Haulm destruction by pulverizing. No chemical cost. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs are included.

25 kg bags (£9.00-9.50/t of crop) could be an *additional* item, depending on circumstances.

Includes cost of fleece material and labour cost of covering, uncovering and general maintenance during the season.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr (assumes lifting and grading done at the same time) at the rates below:

Lifting (by harvester)		20 hr/ha
Grading	low yield	25 hr/ha
	medium yield	38 hr/ha

Potatoes - Loose New (Covered and Open)

GROSS MARGIN DATA

	Covered		Open	
Yield: t/ha (t/acre):				
Ware	14	(5.7)	20	(8.1)
Stockfeed	-	(0.0)	-	(0.0)
OUTPUT	£/ha (acre)			
Ware @ £475/t	6,650		-	
Ware @ £300/t	-		6,000	
Stockfeed @ £0/t	-		-	
	<u>6,650</u>	(2,691)	<u>6,000</u>	(2,428)
VARIABLE COSTS				
Seed @ £305/t	1,068		1,068	
Fertiliser	189		189	
Sprays	264		239	
Other expenses	918		43	
	<u>2,439</u>	(987)	<u>1,539</u>	(623)
GROSS MARGIN	<u>4,211</u>	(1,704)	<u>4,461</u>	(1,805)
WARE PRICE SENSITIVITY				
£200 /t	361	(146)	2,461	(996)
£350 /t	2,461	(996)	5,461	(2,210)
£500 /t	4,561	(1,846)	8,461	(3,424)
£650 /t	6,661	(2,696)	11,461	(4,638)
£800 /t	8,761	(3,546)	14,461	(5,852)

Potatoes - Baby New

PHYSICAL DATA

Machine harvested

(a) Seed

Nominal planting rate of 5 t/ha. Bought in seed. Variety e.g. Maris Peer, Gemson etc. Cost varies with variety and seed size.

(b) Fertiliser

90 : 170 : 110 kg/ha N : P₂O₅ : K₂O (72 : 136 : 88 units/acre).

(c) Sprays

Seed treatment Half rate seed treatment for rhizoctonia.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Nematicide Assumption of 50% of the area treated with an in furrow fungicide for blackdot control. Assumption of 20% of area treated with reduced rate nematicide for free living nematode control.

Blight control 8-9 spray program including protectant, curative and tuber blight control chemicals. Cost may be higher in high blight pressure years.

Desiccation Pulverizing followed by reduced rate chemical desiccation. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs and an average period of 6 months cold storage are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr (assumes lifting and grading done at the same time) at the rates below:

Lifting (by harvester)		20 hr/ha
Grading	low yield	25 hr/ha
	medium yield	38 hr/ha

Potatoes - Baby New

GROSS MARGIN DATA

	Off-field		Ex -store	
Yield: t/ha (t/acre):				
Ware	27	(10.9)	27	(10.9)
Stockfeed	-	(0.0)	-	(0.0)
OUTPUT	£/ha (acre)			
Ware @ £215/t	5,805		-	
Ware @ £245/t	-		6,615	
Stockfeed @ £0/t	-		-	
	<u>5,805</u>	(2,349)	<u>6,615</u>	(2,677)
VARIABLE COSTS				
Seed @ £230/t	1,150		1,150	
Fertiliser	201		201	
Sprays	469		469	
Other expenses	43		1,015	
	<u>1,863</u>	(754)	<u>2,835</u>	(1,147)
GROSS MARGIN	<u>3,942</u>	(1,595)	<u>3,780</u>	(1,530)
WARE PRICE SENSITIVITY				
£100 /t	837	(339)	-135	-(55)
£175 /t	2,862	(1,158)	1,890	(765)
£250 /t	4,887	(1,978)	3,915	(1,584)
£325 /t	6,912	(2,797)	5,940	(2,404)
£400 /t	8,937	(3,617)	7,965	(3,223)

Potatoes - Early Set Skin Pre-Pack Bakers (Covered and Open)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 2.4 t/ha with bought in seed. Cost varies with variety, e.g. Marfona, Osprey etc, seed size and classification grade.

(b) Fertiliser

170-180 : 130 : 200 kg/ha N : P₂O₅ : P : K₂O (136-144 : 104 : 160 units/acre).

(c) Sprays

Seed treatment Reduced rate seed treatment for Rhizoctonia control.

Nematicide Assumption of 15-20% of the area treated with nematicide for free living nematode or PCN control.

Herbicides Cover crops residual herbicide tank mix. Uncover crops contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 8-9 spray program including protectant, curative and tuber blight protection chemicals.

Slug control 3-4 applications.

Desiccation Pulverising followed by 2-3 spray chemical desiccation program. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs and fleece for covered crop included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)		20 hr/ha
Grading (half the grading done by regular labour)	low yield	44 hr/ha
	high yield	50 hr/ha

Potatoes - Early Set Skin Pre-Pack Bakers (Covered and Open)

GROSS MARGIN DATA

	Covered		Open	
Yield: t/ha (t/acre):				
Ware	42	(17.0)	47	(19.0)
Stockfeed	-	(0.0)	-	(0.0)
OUTPUT	£/ha (acre)			
Ware @ £170/t	7,140		-	
Ware @ £135/t	-		6,345	
Stockfeed @ £0/t	-		-	
	<u>7,140</u>	(2,890)	<u>6,345</u>	(2,568)
VARIABLE COSTS				
Seed @ £305/t	732		732	
Fertiliser	260		266	
Sprays	548		523	
Other expenses	918		43	
	<u>2,458</u>	(995)	<u>1,564</u>	(633)
GROSS MARGIN	<u>4,682</u>	(1,895)	<u>4,781</u>	(1,935)
WARE PRICE SENSITIVITY				
£50 /t	-358	-(145)	786	(318)
£100 /t	1,742	(705)	3,136	(1,269)
£125 /t	2,792	(1,130)	4,311	(1,745)
£175 /t	4,892	(1,980)	6,661	(2,696)
£200 /t	5,942	(2,405)	7,836	(3,171)
£250 /t	8,042	(3,255)	10,186	(4,122)

Potatoes - Pre-Pack Salads

PHYSICAL DATA

Machine harvested

(a) Seed

Nominal planting rate of 5 t/ha. Bought in seed. Variety e.g. Charlotte etc. Cost varies with variety and seed size.

(b) Fertiliser

90 : 170 : 110 kg/ha N : P₂O₅ : K₂O (72 : 136 : 88 units/acre).

(c) Sprays

Seed treatment Half rate seed treatment for Rhizoctonia.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Nematicide Assumption of 50% of the area treated with an in furrow fungicide for blackdot control. Assumption of 20% of area treated with reduced rate nematicide for free living nematode control.

Blight control 8-9 spray program including protectant, systemic, curative and tuber blight control chemicals. Cost may be higher in high blight pressure years.

Slug control 2 reduced rate application of slug pellets.

Desiccation Pulverizing followed by reduced rate chemical desiccation. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs and an average period of 6 months cold storage are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr (assumes lifting and grading done at the same time) at the rates below:

Lifting (by harvester)		20 hr/ha
Grading	low yield	25 hr/ha
	medium yield	38 hr/ha

Potatoes - Pre-Pack Salads

GROSS MARGIN DATA

Yield: t/ha (t/acre):		
Ware	37	(15.0)
Stockfeed	4	(1.6)
	<u>41</u>	(16.6)
OUTPUT	£/ha (acre)	
Ware @ £255 /t	9,435	
Stockfeed @ £20 /t	80	
	<u>9,515</u>	(3,851)
VARIABLE COSTS		
Seed @ £280/t	1,400	
Fertiliser	201	
Sprays	458	
Other expenses	1,519	
	<u>3,578</u>	(1,448)
GROSS MARGIN	<u>5,937</u>	(2,403)

WARE PRICE SENSITIVITY

£75 /t	-723	-(293)
£150 /t	2,052	(830)
£200 /t	3,902	(1,579)
£250 /t	5,752	(2,328)
£300 /t	7,602	(3,076)
£375 /t	10,377	(4,200)

Potatoes - Maincrop Ware (Pre-Pack Bakers)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 2.4 t/ha (can range from 2.0-3.0 t/ha for 35-55 mm seed depending on variety). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

200 : 130 : 200 kg/ha N : P₂O₅ : K₂O (160 : 104 : 160 units/acre).

Reduce N by 33% for indeterminate varieties, e.g. Vales Sovereign.

(c) Sprays

Seed treatment Reduced rate seed treatment for rhizoctonia control. 50% of the area treated with in furrow fungicide for control of blackdot.

Nematicide Assumption of 15-20% of area treated for free living nematode or PCN control.

Herbicides Contact plus reduced rate residual herbicide tank mix.

Blight control 12 spray blight program for moderate blight pressure including protectant, systemic, curative and tuber blight protection chemicals.

Slugs control 2-3 applications.

Desiccation 2-3 spray chemical desiccation program.

(d) Other crop expenses

Levy costs and costs for average cold storage period of 6 months are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)		20 hr/ha
Grading (half the grading done by regular labour)	low yield	55 hr/ha
	high yield	70 hr/ha

Potatoes - Maincrop Ware (Pre-Pack Bakers)

GROSS MARGIN DATA

Yield: t/ha (t/acre):

Bakers	16	(6.5)	24	(9.7)
Pre-pack	26	(10.5)	31	(12.5)
Outgrades	8	(3.2)	10	(4.0)
	<u>50</u>	(20.2)	<u>65</u>	(26.3)

OUTPUT

£/ha (acre)

Bakers @ £195/t	3,120		4,680	
Pre-pack @ £100/t	2,600		3,100	
Outgrades @ £30/t	240		300	
	<u>5,960</u>	(2,412)	<u>8,080</u>	(3,270)

VARIABLE COSTS

Seed @ £300/t	720		720	
Fertiliser	276		276	
Sprays	517		517	
Other expenses	1,843		2,383	
	<u>3,356</u>	(1,358)	<u>3,896</u>	(1,577)

GROSS MARGIN

	<u>2,604</u>	(1,054)	<u>4,184</u>	(1,693)
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WARE PRICE SENSITIVITY

£50 /t	1,304	(528)	2,634	(1,066)
£130 /t	3,384	(1,369)	5,114	(2,070)
£210 /t	5,464	(2,211)	7,594	(3,073)
£290 /t	7,544	(3,053)	10,074	(4,077)

Note:

Many packers will split grade the pack size (e.g. 45/50-65/70 mm) from the baker (65/70-85 mm), paying a flat rate for all sizes above the 45/50 mm bottom riddle.

Potatoes - Maincrop Ware (Pre-Pack Premium Varieties)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 1.9 t/ha (varies with variety e.g. Maris Piper, Desiree, King Edward etc). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

180 : 130 : 200 kg/ha N : P₂O₅ : K₂O (144 : 104 : 160 units/acre).

(c) Sprays

Seed treatment Reduced rate seed treatment for rhizoctonia control. Treated with in furrow fungicide for control of blackdot.

Nematicide Assumption of 15-20% of area treated for free living nematode or PCN control.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals.

Slugs control Comprehensive reduced dose season program.

Desiccation 3 spray chemical desiccation program.

(d) Other crop expenses

BPC levy, average cold storage period of 6 months and sprout suppression are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)		20 hr/ha
Grading (half the grading done by regular labour)	low yield	55 hr/ha
	high yield	70 hr/ha

Potatoes - Maincrop Ware (Pre-Pack Premium Varieties)

GROSS MARGIN DATA

Yield: t/ha (t/acre):				
Pre-pack	45	(18.2)	57	(23.1)
Outgrades	5	(2.0)	8	(3.2)
	<u>50</u>	(20.2)	<u>65</u>	(26.3)
OUTPUT				
	£/ha (acre)			
Pre-pack @ £150/t	6,750		8,550	
Outgrades @ £30/t	150		240	
	<u>6,900</u>	(2,792)	<u>8,790</u>	(3,557)
VARIABLE COSTS				
Seed @ £300/t	570		570	
Fertiliser	266		266	
Sprays	557		557	
Other expenses	1,890		2,444	
	<u>3,283</u>	(1,329)	<u>3,837</u>	(1,553)
GROSS MARGIN	<u>3,617</u>	(1,463)	<u>4,953</u>	(2,004)

WARE PRICE SENSITIVITY

£50 /t	-883	-(357)	-747	-(302)
£100 /t	1,367	(553)	2,103	(851)
£150 /t	3,617	(1,464)	4,953	(2,004)
£200 /t	5,867	(2,374)	7,803	(3,158)
£250 /t	8,117	(3,285)	10,653	(4,311)

Note:

Many packers will split grade the pack size (e.g. 45/50-65/70 mm) from the baker (65/70-85 mm), paying a flat rate for all sizes above the 45/50 mm bottom riddle.

Potatoes - Maincrop Ware (Processing - Chips)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 3.0 t/ha with 35/55mm seed (varies depending on variety, e.g. Maris Piper, Markies, etc). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

180 : 130 : 300 kg/ha N : P₂O₅ : K₂O (144 : 104 : 240 units/acre).

Organic manures may be best avoided for processing crops – late and variable release of N could affect fry quality.

(c) Sprays

Seed treatment None unless rhizoctonia infection present on seed.

Nematicide Assumption of 15-20% of area treated for free living nematode or PCN control.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals. Blight sprays include chemical for alternaria control for Markies.

Slug control Comprehensive reduced dose season program.

Desiccation 3 spray chemical desiccation program.

(d) Other crop expenses

Levy costs, storage and sprout suppressant costs are included. Chip processing in Scotland is mainly for chip shops, so costs of bags need to be included (£9.00-9.50/t of crop for 25 kg bags).

(e) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)	20 hr/ha
Grading (half the grading done by regular labour)	40 hr/ha

Potatoes - Maincrop Ware (Processing - Chips)

GROSS MARGIN DATA

	Off-field		Ex-store	
Yield: t/ha (t/acre):				
Ware	52	(21.0)	52	(21.0)
Stockfeed	5	(2.0)	5	(2.0)
	<u>57</u>	<u>(23.1)</u>	<u>57</u>	<u>(23.1)</u>
OUTPUT	£/ha (acre)			
Off-field @ £130/t	6,760		-	
Ex-store @ £170/t	-		8,840	
Stockfeed @ £20/t	100		100	
	<u>6,860</u>	<u>(2,776)</u>	<u>8,940</u>	<u>(3,618)</u>
VARIABLE COSTS				
Seed @ £225/t	675		675	
Fertiliser	311		311	
Sprays	478		478	
Other expenses	43		1,006	
	<u>1,507</u>	<u>(610)</u>	<u>2,470</u>	<u>(1,000)</u>
GROSS MARGIN	<u>5,353</u>	<u>(2,166)</u>	<u>6,470</u>	<u>(2,618)</u>
WARE PRICE SENSITIVITY				
£50 /t	1,193	(483)	230	(93)
£110 /t	4,313	(1,745)	3,350	(1,356)
£170 /t	7,433	(3,008)	6,470	(2,618)
£230 /t	10,553	(4,271)	9,590	(3,881)

Note:

Prices quoted include typical bonus additions for good dry matter, low tuber count, good size (length), good fry colour and low defect levels.

Potatoes - Maincrop Ware (Processing - Crisps)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 3.0 t/ha. 35/55mm seed, varies depending on variety, e.g. Hermes, Saturna, Lady Rosetta, Lady Claire, etc. Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

200 : 130 : 300 kg/ha N : P₂O₅ : K₂O (160 : 104 : 240 units/acre).

Organic manures may be best avoided for processing crops – late and variable release of N could affect fry quality.

(c) Sprays

Seed treatment None unless rhizoctonia infection present on seed.

Nematicide Assumption of 15-20% of area treated for free living nematode or PCN control.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals.

Slug control 3 applications.

Desiccation 3 spray chemical desiccation program.

(d) Other crop expenses

Levy costs, processing storage for a 4 month period and sprout suppressant costs are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)	20 hr/ha
Grading (half the grading done by low yield regular labour)	44 hr/ha
	high yield 55 hr/ha

Potatoes - Maincrop Ware (Processing - Crisps)

GROSS MARGIN DATA

	Off-field		Ex-store	
Yield: t/ha (t/acre):				
Ware	44	(17.8)	44	(17.8)
Stockfeed	4	(1.6)	4	(1.6)
	<u>48</u>	<u>(19.4)</u>	<u>48</u>	<u>(19.4)</u>
OUTPUT	£/ha (acre)			
Off-field @ £90/t	3,960		-	
Ex-store @ £150/t	-		6,600	
Stockfeed @ £20/t	80		80	
	<u>4,040</u>	<u>(1,635)</u>	<u>6,680</u>	<u>(2,703)</u>
VARIABLE COSTS				
Seed @ £265/t	928		928	
Fertiliser	321		321	
Sprays	482		482	
Other expenses	43		854	
	<u>1,774</u>	<u>(718)</u>	<u>2,585</u>	<u>(1,046)</u>
GROSS MARGIN	<u>2,266</u>	<u>(917)</u>	<u>4,095</u>	<u>(1,657)</u>
WARE PRICE SENSITIVITY				
£50 /t	506	(205)	-305	-(123)
£110 /t	3,146	(1,273)	2,335	(945)
£170 /t	5,786	(2,342)	4,975	(2,013)
£230 /t	8,426	(3,410)	7,615	(3,082)
£300 /t	11,506	(4,656)	10,695	(4,328)

Potatoes - Seed (Low and High Number Varieties)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 4.8 t/ha (can range from 3.5-6.1 t/ha for 35/55 mm seed depending on variety and top riddle size on which daughter crop will be sold). Half bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

80 : 170 : 110 kg/ha N : P₂O₅ : K₂O (64 : 136 : 88 units/acre).

Reduce N by 25% for indeterminate varieties, e.g. Cara and Hermes.

(c) Sprays

Seed treatment Multipurpose seed treatment applied at grade plus reduced rate fungicide applied for rhizoctonia.

Nematicide Assumption of no treatment applied. Application may be required in field and varieties at risk of spraing.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 8-9 spray program with protectant, systemic, curative and tuber blight protection products for moderate-high blight pressure.

Aphid control Up to 8 applications of a program.

Slug control 2 applications.

Desiccation Pulverising followed by chemical desiccation. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs, SGRPID field inspection fees, roguing and labels are included. Positive ventilation and cold storage. Other costs may include bags (£7.50-11.20/t of crop), chemical treatment at storage time and royalties (which will depend on variety).

(e) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr at the rates below:

Lifting (by harvester)	20 hr/ha
Grading (half the grading done by regular labour)	40 hr/ha

Potatoes - Seed (Low and High Number Varieties)

GROSS MARGIN DATA

	Low		High	
Yield: t/ha (t/acre): seed	25	(10.1)	35	(14.2)
Yield: t/ha (t/acre): ware	6	(2.4)	6	(2.4)
Yield: t/ha (t/acre): s/feed	<u>2</u>	(0.8)	<u>2</u>	(0.8)
	<u>33</u>	(13.4)	<u>43</u>	(17.4)
OUTPUT	£/ha (acre)			
Seed @ £220/t	5,500		-	
Ware @ £45/t	270		-	
Stockfeed @ £20/t	40		-	
Seed @ £190/t	-		6,650	
Ware @ £45/t	-		270	
Stockfeed @ £20/t	-		40	
	<u>5,810</u>	(2,351)	<u>6,960</u>	(2,817)
VARIABLE COSTS				
Seed @ £360/t	1,728		1,440	
Fertiliser	196		196	
Sprays	515		501	
Other expenses	<u>2,645</u>		<u>3,405</u>	
	<u>5,084</u>	(2,057)	<u>5,542</u>	(2,243)
GROSS MARGIN	<u>726</u>	(294)	<u>1,418</u>	(574)
SEED PRICE SENSITIVITY				
£150 /t	-1,024	-(414)	18	(7)
£250 /t	1,476	(597)	3,518	(1,424)
£300 /t	2,726	(1,103)	5,268	(2,132)

Potatoes - Dual Purpose (Seed and Ware)

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 3.8 t/ha (can range from 3.5-5 t/ha for 35x55 mm seed depending on variety. Half bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

150 : 150 : 200 kg/ha N : P₂O₅ : K₂O (120 : 120 : 160 units/acre).

(c) Sprays

Seed treatment Multipurpose seed treatment applied at grade plus reduced rate fungicide applied for rhizoctonia. Fungicide incorporated into soil on 50% area for powdery scab control.

Nematicide Assumption of no treatment applied. Application may be required in field and varieties at risk of spraing.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Blight control 8-9 spray program with protectant, systemic, curative and tuber blight protection products for moderate blight pressure.

Aphid control Up to 8 applications of a program.

Slug control 2-3 applications.

Desiccation Pulverising followed by chemical desiccation. For pulverising costs, see page 349.

(d) Other crop expenses

Levy costs, SGRPID field inspection fees; roguing and labels and positive ventilation and cold storage are included. Other costs may include bags (£7.50-£11.20/t of crop), chemical treatment at storage time and royalties (which will depend on variety).

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr as per labour rates on page 62 for low yields.

Potatoes - Dual Purpose (Seed and Ware)

GROSS MARGIN DATA

Yield: t/ha (t/acre): seed	22	(8.9)
Yield: t/ha (t/acre): ware	19	(7.7)
Yield: t/ha (t/acre): s/feed	4	(1.6)
	<u>45</u>	<u>(18.2)</u>
OUTPUT	£/ha (acre)	
Seed @ £150/t	3,300	
Ware @ £90/t	1,710	
Stockfeed @ £20/t	80	
	<u>5,090</u>	<u>(2,060)</u>
VARIABLE COSTS		
Seed @ £210/t	798	
Fertiliser	262	
Sprays	591	
Other expenses	3,512	
	<u>5,163</u>	<u>(2,089)</u>
GROSS MARGIN	<u>-73</u>	<u>-(29)</u>

WARE PRICE SENSITIVITY

£50 /t	-833	-(337)
£110 /t	307	(124)
£170 /t	1,447	(586)
£230 /t	2,587	(1,047)

Grassland

Introduction

This section covers basic technical and financial cost data related to grassland production.

The variable cost data tables for grass, silage and hay provide the basis of the forage costs for the livestock enterprise gross margin figures.

Potential dry matter yields (kgDM/ha) at different N levels/ha

kg N/ha	Yield (kgDM/ha)	Cow grazing days /ha	Stocking density (LU/ha)
0	3,000	240	0.46
75	4,200	335	0.64
125	5,500	439	0.84
175	7,000	559	1.07
250	8,000	639	1.23
310	10,000	799	1.53

The values above assume a Perennial Ryegrass (PRG) dominant sward with low (<20%) clover content. *Note: PRG + 30% white clover swards produce ~7,500-8,000 kgDM/ha at zero N.*

Grazing system and utilisation rate

The following table outlines the potential increase in utilised grass DM that is achieved by adopting rotational (3-8 fields) or paddock (more than 8 paddocks) grazing systems. In addition to the extra yield produced more grass is utilised by either grazing (higher stocking rates) or by identifying surplus grass for conservation. In addition, a rotational grazing system will also generally mean grazing grass at a more digestible stage leading to a higher ME content and higher livestock performance.

System	Annual Yield (t DM/ha)	Utilisation (%)	Usable yield (t DM/ha)	Percentage increase on set stocking
Set stocking	8.5	50	4.3	-
Rotational	10.2	65	6.6	56%
Paddock	10.2	80	8.2	92%

Livestock units

The livestock unit (LU) system is a reflection of the energy requirements of different classes of stock. The following table is a guide to LUs along with annual ME requirements and possible kgDM required (depending on forage quality).

This information along with data on grass production and utilisation can be used to calculate potential stocking rates for land. Adjustments must be made for any rough grazing, length of time stock are on the farm and

the contribution of purchased feed, e.g. 1 tonne of barley @ 86% DM with 12.5ME provides 10,750 MJ ME.

Class of stock	LU	MJ ME /year	kgDM @ 10.5ME
750 kg dairy cow producing 9,000 litres milk	1.60	76,500	7,286*
625 kg dairy cow producing 4,500 litres milk	1.00	48,000	4,571
650 kg beef cow plus calf to weaning	0.75	36,000	3,429
Beef heifer 300 kg to calving at 2	0.60	28,800	2,743
Bulls	0.65	31,200	2,971
Cattle 0-12 months	0.34	16,320	1,554
Cattle 12-24 months	0.65	31,200	2,971
Cattle over 24 months	0.80	38,400	3,657
Breeding ewe 60 kg	0.09	4,320	411
Breeding ewe 70 kg	0.10	4,800	457
Breeding ewe 80 kg	0.11	5,280	503
Rams	0.08	3,840	366
Lambs birth to weaning/sale	0.04	1,920	183
Ewe lambs - weaning to 2 yrs	0.06	2,880	274

* will require significant concentrate supplementation

More detail on LUs can be found on page 108.

Stocking rate

Stocking rate is expressed as grazing livestock units, GLU per effective (adjusted) hectare where:

- 2.5 GLU/ha (1 per acre) is very intensive (very high N input)
- 2.0 GLU/ha is intensive (high N input)
- 1.5 GLU/ha is semi intensive (moderate N input or high clover %)
- 1.0 GLU/ha is extensive (low N input/clover based)
- 0.5 GLU/ha is very extensive (very low/no N inputs)

Choice of seed mixtures

The seed mixture should be chosen using recommended varieties tested in Scotland by SRUC, England & Wales by NIAB-TAG or Northern Ireland by DARD. Grass swards will contain mainly PRG, white clover and timothy and the varieties chosen should be compatible and chosen according to the farm system, the use of the ley (silage, hay, dual purpose), special requirements such as disease resistance and winter hardiness, and the blend of ingredients.

Swards that are worn out with a low percentage of sown species remaining will have a lower yield potential and will have a much lower response to nitrogen. If sward performance is not sufficient to maintain stocking rates, or requires additional purchased feed, then renewing the sward by a variety of methods is recommended.

Sward Improvement

Options for sward improvement range from full ploughing (reseeding/replacement) to overseeding (renovation). The approximate costs of different improvement methods are outlined in the following table. These include variable costs as well as the cultivation costs.

Assumptions:

- A long-term seed mixture at full rate, 37kg/ha, for ploughing and direct drilling, and half rate, 18kg/ha, for oversowing.
- Fertiliser inputs (for grassland establishment in plough and direct drill options only) are based on moderate P and K soil status. pH is assumed to be ideal thus no cost for lime is included.
- Chemical costs for the destruction of the old sward prior to cultivation have been assumed for ploughing and direct drilling options. Other pesticides may be required for specific circumstances.
- Cultivation methods are assumed to be carried out by contractors. Contractor costs can be found on pages 347-350.
- Machinery fuel use (l/ha) and fuel cost on page 344.

	Plough	Direct drill	Over sow
Reliability	High	Mod/High	Moderate
Speed of improvement	Moderate	Moderate	Rapid
Loss of grass production	High	High	Low
	£/ha (acre)		
Variable costs			
Seed	150	150	73
Fertiliser	80	80	-
Sprays	8	8	-
	238 (96)	238 (96)	73 (30)
Cultivation costs			
Spray	13	13	-
Plough	62	-	-
Power harrow/subsoil	51	-	-
Harrow	-	-	23
Roll and destone	18	-	-
Sow	30	55	30
Roll	24	24	24
Fertilise	11	11	-
Fuel cost	43	14	9
	251 (102)	117 (47)	87 (35)
Total costs	490 (198)	355 (144)	160 (65)
No. of years per cultivation	7	7	7
Total cost per annum	70 (28)	51 (21)	23 (9)

Preserved Grass Production Costs

The following table shows the cost of producing preserved grass as silage or hay.

Assumptions:

- Yield and N fertiliser use based on crop variable cost data.
- Establishment costs based on figures on page 72.
- Annual variable costs are based on variable cost data (less annual share of seed) shown on pages 77 and 79.
- Annual production costs are assumed to be carried out by contractors. Contractor costs can be found on pages 347-350.
- Machinery fuel use (l/ha) and fuel cost on page 344.
- Other crop expenses for ensiled silage are based on using plastic sheets. For baled silage, this includes net wrap and plastic wrap as described on pages 77. For hay, the cost for net wrap is included in the annual variable costs.
- Land rent and maintenance or a finance charge associated with a silage clamp have not been included in the calculations.
- Yield potential will vary and no account has been taken for wastage in the preserved state and at feeding.

	Silage 1 cut ensiled	Silage 1 cut bales	Hay 1 cut bales
N fertiliser use (kgN/ha)	125	125	125
Yield (t FW/ha)	20	20	7
Yield (t DM/ha)	6	6	6
Bale weight (round 4' x 4' - kg)	-	650	250
		£/ha	
Establishment costs (annual share)	70	70	70
Annual variable costs	131	131	142
Annual production costs			
<i>Spray</i>	13	13	13
<i>Fertilise</i>	11	11	11
<i>Mow</i>	29	29	29
<i>Rake</i>	13	-	41
<i>Lift, cart and clamp crop</i>	113	-	-
<i>Bale, wrap and stack</i>	-	148	56
<i>Other crop expenses</i>	3	116	-
<i>Fuel</i>	33	15	20
	215	331	169
Total cost per annum (£/ha)	416	532	381
Cost per t FW (£/t)	21	27	54
Cost per t DM (£/t)	69	89	64
Cost per bale (£/bale)	-	17	14

Grassland - Grazing

PHYSICAL DATA

(a) System

Assume a 7 year sward life.

Establishment costs described on page 72.

(b) Yield

See page 70 for the dry matter yield and stocking rate (LU/ha) assumptions for varying Nitrogen application rates.

(c) Seed

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly):

Mixture	£/ha
One year	100-125
Two-three years	110-160
Four-six years	120-165
Permanent	125-175

(d) Fertiliser

kg/ha (units/acre)/annum										
N	75	(60)	125	(100)	175	(140)	250	(200)	310	(250)
P ₂ O ₅	30	(24)	30	(24)	40	(32)	50	(40)	60	(48)
K ₂ O	30	(24)	30	(24)	40	(32)	50	(40)	60	(48)

(e) Sprays

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles and nettles.

Grassland - Grazing

VARIABLE COST DATA

Fertiliser kg N/yr	75 (60)	125 (100)	175 (140)	250 (200)	310 (248)
VARIABLE COSTS *	£/ha (acre)				
Seeds	21	21	21	21	21
Fertiliser	72	99	136	187	230
Sprays	13	13	13	13	13
Other expenses	-	-	-	-	-
	<u>106 (43)</u>	<u>133 (54)</u>	<u>170 (69)</u>	<u>221 (89)</u>	<u>264 (107)</u>

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	7 (3)	12 (5)	18 (7)	25 (10)	31 (13)
10 p/kg P ₂ O ₅	3 (1)	3 (1)	4 (2)	5 (2)	6 (2)
10 p/kg K ₂ O	3 (1)	3 (1)	4 (2)	5 (2)	6 (2)

* The cost per tonne of dry matter grown varies and should also include a share of reseedling costs (contractor/machinery upkeep/fuel). Cost will also depend on the actual response to nitrogen (see page 70), and grazing utilisation.

Grassland - Silage and Aftermath Grazing

PHYSICAL DATA

(a) System

Assume a 7 year sward life.

Establishment and harvest costs are described on page 72 and 73.

(b) Yield

Settled silage (kg fresh weight) at 22%DM.

Fertiliser N kg/ha (units/acre)/annum	125	(100)	220	(176)	275	(220)	300	(240)
Silage t/ha (t/acre)								
1st cut	20	(8.1)	22	(8.9)	25	(10.1)	21	(8.5)
2nd cut	-	-	9	(3.6)	13	(5.3)	13	(5.3)
3rd cut	-	-	-	-	-	-	9	(3.6)
Total	<u>20</u>	<u>(8.1)</u>	<u>31</u>	<u>(12.5)</u>	<u>38</u>	<u>(15.4)</u>	<u>43</u>	<u>(17.4)</u>

Apportionment - the following yield ratios are suggested:

Silage	50	80	80	95
Aftermath	50	20	20	5

(c) Seed

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly):

Mixture	£/ha
One year	100-125
Two-three years	110-160
Four-six years	120-165
Permanent	125-175

(d) Fertiliser

Neither P₂O₅ nor K₂O is assumed for aftermaths, although their use would be recommended subject to nutrient management planning.

Silage cuts	kg/ha (units/acre)/annum							
For silage	One	Two	Two	Three				
N	80 (64)	180 (144)	220 (176)	300 (240)				
P ₂ O ₅	40 (32)	65 (52)	90 (72)	115 (92)				
K ₂ O	60 (48)	110 (88)	150 (120)	200 (160)				
For aftermath								
N	45 (36)	40 (32)	55 (44)	-	-			

Grassland - Silage and Aftermath Grazing

VARIABLE COST DATA

Fertiliser kg N/ha

(units/acre)/annum 125 (100) 220 (176) 275 (220) 300 (240)

Silage cuts One Two Two Three

VARIABLE COSTS

£/ha (acre)

Seeds	21	21	21	21
Fertiliser	118	207	270	321
Sprays	13	13	13	13
Other expenses	-	-	-	-
	<u>152</u>	(62) <u>241</u>	(98) <u>304</u>	(123) <u>355</u> (144)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	13	(5)	22	(9)	27	(11)	30	(12)
10 p/kg P ₂ O ₅	4	(2)	7	(3)	9	(4)	11	(4)
10 p/kg K ₂ O	6	(2)	11	(4)	15	(6)	20	(8)

(e) Sprays

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles and nettles.

(f) Other crop expenses

Heavy duty silage covers cost approximately £1.73/m² (7-10 year lifespan). Associated gravel bags cost approximately £1.40/bag. Silage sheets cost approximately £0.18/m² for top sheets and 0.37/m² for wall liners. Clamp film is approximately £0.11/m². If baling, include costs for net wrap at 50-77p/bale for large round bales and bale wrap at £1.70-3.00/bale depending on number of layers of net and wrap and size of bales.

The use of an inoculant will typically add £1.15-1.60/t depending on the product chosen and its rate of application.

Grassland - Hay and Aftermath Grazing

PHYSICAL DATA

(a) System

Assume a 7 year sward life.

Establishment and harvest costs are described on page 72 and 73.

(b) Yield

Fertiliser N kg/ha (units/acre)/annum	70 (56)	125 (100)	200 (160)
Hay t/ha (t/acre)	6 (2.4)	7 (2.8)	8 (3.2)

Apportionment - a yield ratio of 75 : 25, hay : aftermath should be used.

To prevent heating in store, aim to bale hay at 15-20% moisture and leave to stand in field until heating ceases.

(c) Seed

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly):

Mixture	£/ha
One year	100-125
Two-three years	110-160
Four-six years	120-165
Permanent	125-175

(d) Fertiliser

Neither P_2O_5 nor K_2O is assumed for aftermaths, although their use would be recommended subject to nutrient management planning.

		kg/ha (units/acre)/annum					
For hay	N	70	(56)	85	(68)	100	(80)
	P_2O_5	30	(24)	40	(32)	50	(40)
	K_2O	40	(32)	60	(48)	80	(64)
For aftermath	N	-	-	40	(32)	100	(80)

(e) Sprays

A nominal annual charge (assume a 7 year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles and nettles.

(f) Other crop expenses

Net wrap cost is costed on the basis of 5-6 round bales/t and assuming one roll of net will wrap 410 bales.

Grassland - Hay and Aftermath Grazing

VARIABLE COST DATA

Fertiliser kg N/ha						
(units/acre)/annum	70	(56)	125	(100)	200	(160)
VARIABLE COSTS			£/ha (acre)			
Seeds	21		21		21	
Fertiliser	74		118		174	
Sprays	13		13		13	
Other expenses	10		11		13	
	<u>118</u>	(48)	<u>163</u>	(66)	<u>221</u>	(89)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	7	(3)	13	(5)	20	(8)
10 p/kg P ₂ O ₅	3	(1)	4	(2)	5	(2)
10 p/kg K ₂ O	4	(2)	6	(2)	8	(3)

Forage Crops

Introduction

There are various home-grown forage crops that offer alternatives to grass. Short term yields will be competitive with well managed grass, but costs of establishment are higher with a shorter lifespan. Yield, quality and utilisation are key to cost-effective forage crop production. Increasing the amount of grazed forage in the diet reduces reliance on expensive purchased feeding.

Forage crops can be useful in both arable and grazing rotations; they make a good break crop between grass to grass re-seeds and provide time to correct deficiencies in pH, P and K, soil compaction and weed control. They can also be used as a pioneer crop in uncultivated areas.

Crops can be either full season crops or catch crops. To ensure high DM yields and to justify the cost of production and length of time taken out of production a full season crop should ideally be grown on good land with full cultivations and correct agronomy. A catch crop can be grown after silage or wholecrop cereal to give a bonus crop of forage and allow an early re-seed the following spring.

Wholecrop silage

Wholecrop silage can provide a high-starch, high-fibre feed, replacing some or all of the grass silage in the ration. It is high yielding; therefore production costs per kilogram of dry matter (DM) are competitive with other forages, although the crude protein can be lower, unless using a legume. The earlier harvest reduces risk of bad weather at harvest time and provides time for winter cropping. Compared with grass silage, managing consistent quality is easier.

Brassicas and root crops

Brassica crops such as kale, forage rape, rape/kale hybrids, grazing turnips and swedes and stubble turnips can also provide nutritious, cost effective feeds. Out-wintering on brassicas can extend the grazing season or to fill a forage gap in dry summers and also allows more animals to be kept, with minimal extra capital investment in buildings.

Leafy brassicas are generally high in protein while roots/bulbs are higher in energy. Fodder beet is the highest energy yielding crop, allowing high stocking densities – some farmers will manage up to 1000 ewes on 6.5 ha (16 acres) for around two and a half months (Jan – Mar).

Forage brassica and root crops should only be fed to livestock up to 70% of the total DM intake and a grass runback and fresh water should always be provided. Another source of forage should be supplied, for example straw for dry cows, silage or hay for more productive stock. For lamb finishing, concentrates can also provide additional nutrition and provide minerals and trace elements. Correct mineral/trace element supplementation is important when using forage crops.

The use of an electric fence is advisable to encourage stock to eat the whole crop evenly thus ensuring high utilisation. It is important to assess the yield of the crop (by cutting and weighing several 1m² sections) and then accurately working out the area the group of stock require each day. To assess the yield make a frame that is 1m² and cut several representative samples of the crop. Place the sample in a bag and weigh using a spring balance. Multiply the average of your samples by 10,000 to give a fresh weight per hectare then again by the DM% (from the table overleaf) to give DM yield/ha. The crop can then be rationed to the stock based on their nutritional requirements, taking into account the likely utilisation % and other forages that are also being fed to the stock.

Brassica Crop Technical Data

The following tables provide technical data that can be used in conjunction with the variable cost data for all the crops illustrated later in the section.

Variable costs include seed, chemical and fertiliser as per variable cost data for each crop. Costs of establishment are not included and will vary enormously depending on previous cropping, whether it is a full season or catch crop and past experience of the various methods of establishment. Machinery costs on pages 347-350 can be referred to for typical ploughing, cultivation and drilling costs.

	Kale	Forage rape	Kale/rape hybrid	Chicory
Sown	May- Jul	Apr- Aug	Apr-Aug	May-Jul
Utilised	July-Mar	Aug- Dec	Jun-Jan	Mar-Nov
Variable cost (£/ha)	305	113-142	106-305	98
Grazings	1	1	1-2	Several
DM (%)	15-17	10-14	12-15	12
ME (MJ/kgDM)	10.5	10.5	10.5	12
CP (%)	14-17	19-20	18-19	18
% utilisation	80	80	80	80
Av DM yield (t/ha)	7.5	4.5	6	10
Cow graze days/ha ¹	1,260	756	1,008	-
ha/50 cows/100days ¹	4.0	6.6	5.0	-
Lamb graze days/ha ²	6,000	3,600	4,800	8,000
ha/250 lambs/100days ²	4.2	6.9	5.2	3.1

	Swede	Turnips	Stubble turnips	Fodder beet
Sown	Mar-May	Apr- Jun	May-Aug	Mar-Jun
Utilised	Oct-Apr	Sep-Apr	Aug-Dec	Oct-Jun
Variable cost (£/ha)	310	322	153	449
Grazings	1 or lifted	1	1	1
DM (%)	11-15	12-15	12-15	13-16
ME (MJ/kgDM)	12.5	10.5	10.5	13
CP (%)	10-11	17-18	17-18	6-8
% utilisation	80	80	80	80
Av DM yield (t/ha)	8	5	4	10
Cow graze days/ha ¹	1,600	840	672	-
ha/50 cows/100days ¹	2.6	4.6	7.9	-
Lamb graze days/ha ²	6,400	4,000	3,200	8,000
ha/250 lambs/100days ²	3.9	6.3	7.8	3.1

¹ Cows getting 50MJ/day from crop and the rest from other forage.

² Lambs allowed 1kg DM/day of crop.

Dry cow wintering example - A herd of dry suckler cows require 75MJ/hd/day ME. On a diet of kale and straw, 50MJ is expected to come from kale. At 7.5tDM/ha, 10.5ME and 80% utilisation each m² of kale will contain 6.3 MJ. Therefore the herd of 50 cows require 397m² of kale per day.

Lamb grazing example - 250 store lambs are given an allowance of 1kgDM of forage rape per head/day. With a yield of 4.5tDM/ha and utilisation of 80% then the group of lambs will require 694m²/day or approximately 0.49ha (1.2ac) per week.

Preserved Forage Crop Technical Data and Production Costs

The following table shows the cost of preserving forage crops including arable silage, forage maize and wholecrop wheat.

Assumptions:

- All crops ensiled.
- Yield potential will vary depending on site, timing, weather conditions and wastage at feeding.
- For breakdown, see variable cost data for each individual crop.
- Establishment and production costs based on contractor charges on pages 347-350, and fuel use (l/ha) and fuel cost on page 344.
- Total cost per annum does not include land rent and maintenance or finance charge associated with a silage clamp. The true cost will be higher due to wastage.

	Arable silage	Forage maize	Wholecrop ferm'd	crack'd
	pea/ cereal mix ensiled	under plastic ensiled	winter wheat ensiled	winter wheat ensiled
Yield (t FW/ha)	30	40	25	15
Yield (t DM/ha)	8	15	10	12
ME (MJ/kgDM)	10	10.5	10.5	10.5
CP (%)	16	9	9.5	9.5
		£/ha		
Variable costs	230	457	340	524
Establishment costs				
<i>Plough</i>	62	62	62	62
<i>Sow</i>	55	121	55	55
<i>Roll and de-stone</i>	18	18	18	18
<i>Fuel</i>	40	40	40	40
	174	241	174	174
Production costs				
<i>Spray</i>	13	13	38	38
<i>Fertilise/Slurry/FYM</i>	11	13	32	32
<i>Lift, cart and clamp crop</i>	152	168	152	152
<i>Other crop expenses</i>	3	3	3	3
<i>Fuel</i>	15	34	18	18
	193	230	243	243
Total cost per annum (£/ha)	598	927	758	941
Cost per t FW (£/t)	20	23	30	63
Cost per t DM (£/t)	75	62	76	78

Forage Peas and Pea/Cereal Mixtures (Arable Silage)

PHYSICAL DATA

(a) System

Forage peas (sown Mar-Jun) are grown as a catch crop to be grazed *in situ*, zero-grazed or ensiled/baled (harvested at flowering when pods have formed but not yet filled and wilted for 1-2 days). Peas can be grown alone, or in mixtures with barley or oats and undersown with grass for arable silage. Peas are highly palatable to livestock so must be introduced gradually and monitored to prevent bloat. Total production costs including establishment and harvest are described on page 85.

(b) Yield (in 12-16 weeks)

	Fresh t/ha (t/acre)	Dry matter t/ha (t/acre)
Forage peas	20-30 (8-12)	6-8 (2.4-3.2)
Arable silage	20-35 (8-14)	6-10 (2.4-4.0)

(c) Seed rates (kg/ha)

Forage peas:		Arable silage undersown with grass:	
direct drill	125	peas	40-60
(broadcast	150)	cereal	60-80
		total	100-140

Seed mixtures cost (p/kg):

Cereal	38.5
Peas	57

(d) Fertiliser – kg/ha (units/acre)

	Forage peas		Undersown arable silage at sowing		after harvest	
N	0	(0)	40-60	(32-48)	50	(40)
P ₂ O ₅	50	(40)	90	(72)	25	(20)
K ₂ O	50	(40)	90	(72)	25	(20)

Apportionment of the cost of fertiliser in the seed bed and the residual value of nitrogen to the subsequent crop may be justified.

(e) Sprays

Pre emergence herbicide for forage peas can be used at a cost of £56.25/ha. There are no broad spectrum post emergence herbicides available for this crop. Varietal tolerance to a proposed spray should be ascertained.

A silage additive (£1.00-1.60 per tonne silage – depending on the product chosen and its rate of application) is recommended for silages with a high pea content.

Forage Peas and Pea - Cereal Mixtures (Arable Silage)

VARIABLE COST DATA

VARIABLE COSTS	Forage Peas		Arable silage undersown £/ha (acre)	
Seed	71		55	
Fertiliser	53		175	
Sprays	-		-	
Other expenses	-		-	
	<u>124</u>	(50)	<u>230</u>	(93)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	0	(0)	10	(4)
10 p/kg P ₂ O ₅	5	(2)	12	(5)
10 p/kg K ₂ O	5	(2)	12	(5)

Forage Maize

PHYSICAL DATA

(a) System

Forage maize is ensiled and the clamp should be monitored for overheating. Introduce gradually in to the animal's diet, ensuring there is an adequate source of long fibre in the ration and protein supplementation is essential. Contractor costs for establishment and harvest are described on page 85.

(b) Yield

	Without plastic	With plastic
Fresh (t/ha)	40	50
DM (t DM/ha)	12	15

(c) Seed

Target established plant density 100,000 plants/ha; sow at 15% above target plant density. Do not sow too early (soil temperature 8-10°C, 10 cm depth for 7 days).

Seed cost based on £65.35/pack (45,000 seeds).

(d) Fertiliser

	kg/ha	(units/acre)
N	120	(96)
P ₂ O ₅	60	(48)
K ₂ O	165	(132)

Maize sown under plastic will have no placement fertiliser and will rely on nutrients from slurry only.

(e) Sprays

Pre-emergence herbicide, then later before 8 leaf stage (without plastic).

In some years, slugs can be a problem. Pellets will cost in the region of £7.75/ha per application.

Forage Maize

VARIABLE COST DATA

	Without plastic		With plastic	
VARIABLE COSTS			£/ha (acre)	
Seed	167		167	
Fertiliser	175		-	
Sprays etc.	60		54	
Other expenses	-		236	
	<u>402</u>	(163)	<u>457</u>	(185)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	12	(5)	-
10 p/kg P ₂ O ₅	6	(2)	-
10 p/kg K ₂ O	17	(7)	-

Whole Crop Cereal - Winter Wheat

PHYSICAL DATA

(a) System

Whole cropping of wheat provides an alternative feed to silage providing a good source of starch and fibre. The crop can be harvested at various growth stages creating different products. Additives can be used for improving preservation and feed quality. See page 18 for more detail.

(b) Yield

	Fermented whole crop	Cracked whole crop
Fresh (t/ha)	29	14
DM (t DM/ha)	10	12

(c) Seed

Certified seed second generation (C2) sown at the rate of 220 kg/ha.

(d) Fertiliser

	kg/ha	(units/acre)
N	200	(160)
P ₂ O ₅	67	(54)
K ₂ O	83	(66)

(e) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broad leaved weeds.

Fungicides Two applications at GS31-32 and GS39 for eyespot, leaf diseases (e.g. septoria).

For sprays against other hazards see page 18.

(f) Other crop expenses

Fermented whole crop wheat can be made successfully without an additive, but the use of additives can improve aerobic stability. Additive costs range from £1.00-1.60 per tonne - depending on the product chosen and its rate of application. Refer to page 77 for other crop expenses such as plastic covers.

Whole Crop Cereal - Winter Wheat

VARIABLE COST DATA

	Fermented whole crop		Cracked whole crop	
VARIABLE COSTS		£/ha (acre)		
Seed @ £370/t	81		81	
Fertiliser	185		185	
Sprays etc.	74		74	
Other expenses	-		184	
	<u>340</u>	(138)	<u>524</u>	(212)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	20	(8)	20	(8)
10 p/kg P ₂ O ₅	7	(3)	7	(3)
10 p/kg K ₂ O	9	(4)	9	(4)

Rye for Early Grazing

PHYSICAL DATA

(a) System

A catch crop of winter rye sown after early harvested cereal (Sep/Oct) and followed by light grazing at the end of the calendar year and subsequent cropping.

(b) Yield

Can be variable but, given early sowing, dry matter yields of up to 0.75t DM/ha in autumn and 2.25t DM/ha in spring can be achieved. Total dry matter yields up to 5.5t DM/ha can be achieved.

Forage rye can provide early spring grazing for 15-20 cows or 50-60 sheep per hectare over a three-week period.

(c) Seed

Rate – 185 kg/ha.

Early sowing is important but it is often difficult to obtain good viable seed in August or early September.

(d) Fertiliser

	Seed bed		kg/ha (units/acre)		Total	
			Early spring			
N	-	-	80	(64)	80	(64)
P ₂ O ₅	30	(24)	-	-	30	(24)
K ₂ O	30	(24)	-	-	30	(24)

Rye for Early Grazing

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)	
Seed	93	
Fertiliser	75	
Sprays etc.	-	
Other expenses	-	
	<hr/>	
	168	(68)
	<hr/>	

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	8	(3)
10 p/kg P ₂ O ₅	3	(1)
10 p/kg K ₂ O	3	(1)

Kale

PHYSICAL DATA

(a) System

System involves strip grazing behind an electric fence (to reduce crop wastage), allowing at least 3m of space per cow and a runback including hay/straw and water.

Kale can also be fed as part of a catch crop mixture which includes kale, stubble turnips and forage rape. Each brassica complements each other by means of nutritional benefits (see pages 83-84). Other benefits include winter hardiness and a prolonged utilisation period of the crop, with some varieties being early maturing and others being late.

(b) Yield

	Fresh		DM t/ha (t/acre)	
Autumn kale	70	(28.3)	8	(3.2)
Winter kale	50	(20.2)	7	(2.8)

Strip-grazed, a suitable daily allowance per cow (3 hr grazing) would be 47kg FW, including 20% wastage.

(c) Seed

Rate (direct drilled ungraded seed) – 4.0 kg/ha at £23/kg.

Seed treated with neonicotinoid which is still approved for animal feed, game and seed.

(d) Fertiliser

	kg/ha	(units/acre)
N	160	(128)
P ₂ O ₅	50	(40)
K ₂ O	170	(136)

Fertiliser rates will vary greatly with circumstances. Some farmers may also choose to top dress some of the N.

(e) Sprays

Herbicides Stale seed bed and a pre emergence herbicide.

Slugs Slug pellets may be broadcast or drilled with the seed at a cost of £7.75/ha.

Flea Beetle Insecticide may be required at a cost of £4.25/ha.

Kale

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)
Seed	92
Fertiliser	193
Sprays etc.	20
Other expenses	-
	<hr/>
	305 (123)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	16	(6)
10 p/kg P ₂ O ₅	5	(2)
10 p/kg K ₂ O	17	(7)

Forage Rape

PHYSICAL DATA

(a) System

Grazed system which must be introduced gradually with an area of runback with alternative forage e.g. grass/hay/straw as well as free access minerals and water.

There are several hybrids (rape/kale) on the market which are quick to establish and can be utilised within 10-12 weeks after sowing. They offer the benefit of early grazing in summer/autumn if other forage supplies are limited.

(b) Yield

Total dry matter yield of approximately 4.5t DM/ha. About 50 Blackface lambs/ha (20 lambs/acre) (starting weight approx. 27 kg) will finish off rape, with a suitable 'run back' on to grass or stubble.

(c) Seed

	kg/ha	(lb/acre)
Drilled	6	(5.3)
Direct drilled/broadcast	8	(7.1)

These rates will need to be varied with soil condition.

Seed cost – £3.50/kg.

Untreated seed as neonicotinoid treatment not now approved for forage rape.

Inclusion of 10 kg Italian ryegrass would add approx. £22.50/ha to the cost.

(d) Fertiliser

	kg/ha (units/acre)	
	Drilled/broadcast	Direct drilled
N	100 (80)	140 (112)
P ₂ O ₅	25 (20)	25 (20)
K ₂ O	35 (28)	35 (28)

Catch crops after early potatoes would probably require no fertilisers and would also have at least 10 kg Italian ryegrass mixed with the rape seed.

(e) Sprays

Burn off land pre drilling for direct drilled crops only.

Insecticide for flea beetle may be required at a cost of £4.25/ha.

Forage Rape

VARIABLE COST DATA

	Broadcast		Drilled		Direct drilled	
VARIABLE COSTS			£/ha (acre)			
Seeds	28		21		28	
Fertiliser	85		85		106	
Sprays etc.	-		-		8	
Other expenses	-		-		-	
	<u>113</u>	(46)	<u>106</u>	(43)	<u>142</u>	(57)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	10	(4)	10	(4)	14	(6)
10 p/kg P ₂ O ₅	2	(1)	2	(1)	3	(1)
10 p/kg K ₂ O	3	(1)	3	(1)	4	(2)

Dutch or Stubble Turnips

PHYSICAL DATA

(a) System

Grazed system which must be introduced gradually with an area of run-back with alternative forage e.g. grass/hay/straw as well as free access to minerals and water. Strip grazing is preferred to reduce wastage.

There are hybrids on the market which are sown in the spring and establish quickly, allowing utilisation in the summer. It is a leafy plant which has the potential to regrow but also to bolt.

(b) Yield

Can be highly variable particularly affected by date of sowing; but drilled crops sown in early July can finish 50-70 lambs/ha (20-28 lambs/acre) (starting weight approx. 27kg), although often requiring cereal supplementation to do so. Total dry matter yield approximately 4t DM/ha.

(c) Seed

Seed rates can be varied to alter the proportions of leaf to bulb.

	kg/ha	(lb/acre)
Direct drilled	3.6	(2.7-5.4)

Untreated seed as neonicotinoid treatment not now approved for stubble turnips.

Seed cost – £4.60/kg

(d) Fertiliser

These rates are variable, the level of N influencing the ratio of leaf to bulb.

	kg/ha (units/acre)			
	Drilled		Direct drilled	
N	90	(72)	90	(72)
P ₂ O ₅	100	(80)	100	(80)
K ₂ O	50	(40)	50	(40)

(e) Sprays

Burn off land pre drilling for direct drilled crops only.

Insecticide for flea beetle may be required at a cost of £4.25/ha.

Dutch or Stubble Turnips

VARIABLE COST DATA

	Drilled		Direct drilled	
VARIABLE COSTS			£/ha (acre)	
Seed	21		21	
Fertiliser	132		132	
Sprays etc.	-		8	
Other expenses	-		-	
	<u>153</u>	(62)	<u>161</u>	(65)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	9	(4)	9	(4)
10 p/kg P ₂ O ₅	10	(4)	10	(4)
10 p/kg K ₂ O	5	(2)	5	(2)

Swedes and Turnips

PHYSICAL DATA

(a) System

The crop allows for two feeding systems, strip grazing by use of electric fencing or lifting and storing in a clamp. Roots must be clean and undamaged to prevent the risk of fungal disease in storage.

(b) Yield

	Swedes		Turnips	
	Fresh	DM	Fresh	DM
	<i>roots, t/ha (t/acre)</i>			
Average	75 (30.4)	8.0 (3.2)	60 (24.3)	5.0 (2.0)
Premium	100 (40.5)	9.5 (3.8)	80 (32.4)	7.5 (3.0)

In addition, turnips will yield 15 to 30 t leaf/ha (1.5 to 3.0 t DM).

(c) Seed

Swede seed graded, dressed and precision sown (15 cm spacing) at 0.4 kg/ha and treated with neonicotinoid which remains approved for swede.

Turnip at 5kg/ha, untreated seed as neonicotinoid treatment not now approved.

Seed cost (p/kg):

Swedes – graded 78

Turnips – treated 11

(d) Fertiliser

	Swedes		Turnips	
	<i>kg/ha (units/acre)</i>			
N	90	(72)	90	(72)
P ₂ O ₅	200	(160)	200	(160)
K ₂ O	150	(120)	125	(100)

(e) Sprays

Pre-emergence herbicide for annual grass and broad leaved weeds.

Insecticide for flea beetle may be required at a cost of £4.25/ha.

Swedes and Turnips

VARIABLE COST DATA

VARIABLE COSTS	Swedes	Turnips
		£/ha (acre)
Seed	31	55
Fertiliser	238	226
Sprays etc.	41	41
Other expenses	-	-
	<u>310</u> (126)	<u>322</u> (130)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	8	(3)	9	(4)
10 p/kg P ₂ O ₅	20	(8)	20	(8)
10 p/kg K ₂ O	15	(6)	13	(5)

Chicory

PHYSICAL DATA

(a) System

Three year ley incorporating chicory, plantain and white clover. The crop is best utilised in a rotational grazed system. This allows for grazing every ~6 weeks to prevent the plant from flowering and crown damage. No winter grazing. The crop should be rested, typically by mid-September, in year of establishment and by November thereafter. Additional animal health benefits should also be considered.

(b) Yield

Can be variable and thrives better in warmer soils. A crop suitable for over 40 lambs/ha (16 lambs/acre) is possible in year of establishment (year 1). Adopt a restricted grazing period in year one. Some 15-30 ewes and twins/ha (6-12 ewes and twins/acre) can be grazed in years 2 and 3, typically from June, and lambs during that autumn.

About 40 lambs/ha (16 lambs/acre) (starting weight of approx. 34kg) will finish off pure chicory within 4 weeks. Crop would then be available to finish a further 12-25 lambs/ha (5-12 lambs/acre).

(c) Seed

Rate – 10 kg/ha.

Sow into a fine, warm and firm seedbed by early June.

Seed costs - £12.50/kg. Includes plantain and white clover. Cost annualised over an assumed three year rotation.

(d) Fertiliser

	kg/ha	(units/acre)
N	50	(40)
K ₂ O	25	(20)
P ₂ O ₅	25	(20)

Little or no fertiliser is required where established on a prime site using white clover as a companion crop.

(e) Sprays

An annual charge to cover pre-drilling stale seed bed preparation.

Otherwise, herbicides must not be used to control weeds in chicory. Poor competitor so good establishment is critical. Only topping should be carried out to control tall weeds post-emergence.

Chicory

VARIABLE COST DATA

VARIABLE COSTS	Direct drilled £/ha (acre)
Seed	42
Fertiliser	53
Sprays etc.	3
Other expenses	-
	<hr/>
	98 (40)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	5 (2)
10 p/kg P ₂ O ₅	3 (1)
10 p/kg K ₂ O	3 (1)

Fodder Beet

PHYSICAL DATA

(a) System

Fodder beet can be grazed behind an electric fence or harvested and fed as chopped or whole. If harvesting the crop soil contamination should be kept to a minimum to prevent further cleaning costs and promote intakes.

(b) Yield

	Roots - t/ha (t/acre)			
	Fresh			DM
Average	60	(24.3)	10	(4.0)
Premium	90	(36.4)	14	(5.7)

In addition, fodder beet will yield 35 t leaf/ha (3 to 4 t DM).

(c) Seed

Pelleted monogerm seed precision drilled at 15 cm spacing in 55 to 65 cm rows (approx. 3-4 kg/ha). Treated seed would add a further £75 to costs.

(d) Fertiliser

	kg/ha	(units/acre)
N	100	(80)
P ₂ O ₅	60	(48)
K ₂ O	150	(120)

Potash level may be reduced to 75 kg/ha where agricultural salt (400 kg/ha) is applied.

All or part of the nutrient requirement can be satisfied with slurry or FYM.

(e) Sprays

Pre-emergence broad leaved weed control and then up to four post emergence applications at low rates.

Fodder Beet

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)
Seed	150
Fertiliser	158
Sprays etc.	141
Other expenses	-
	<hr/>
	449 (182)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	10	(4)
10 p/kg P ₂ O ₅	6	(2)
10 p/kg K ₂ O	15	(6)

Livestock

Livestock Units

	Livestock units		Livestock units
Dairy cows	1.00	Ewes and ewe replacements ³	
Dairy bulls	0.65	Light weight	
Beef cows	0.75	Medium weight	0.08
Beef bulls	0.65	Heavy weight	0.11
Other cattle ¹		Rams	0.08
0-12 months	0.34	Lambs	
12-24 months	0.65	Birth to store	0.04
Over 24 months ²	0.80	Birth to fat	0.04
Barley beef	0.47	Birth to hoggets	0.08
Horses	0.80	Purchased stores	0.04

¹ excluding intensive beef systems

² reduced in proportion to time animal on farm

³ excluding suckling lambs

Notes

1. A Livestock Unit is usually defined in terms of feed requirements. The ratios in the table above are based on metabolisable energy requirements, with one unit being considered as the maintenance of a mature 625 kg Friesian cow and the production of a 40-45 kg calf, and 4,500 litres of milk at 36 g/kg of butterfat and 86 g/kg solids-not-fat.
2. To calculate the stocking density of grazing livestock, allowances should strictly be made for variation in output, e.g. yield per cow or liveweight gain per head, and also for quantities of non-forage feed consumed by each category of stock.
3. To calculate the total livestock units on a farm reduce in proportion the time animals are on farm within any year. The appropriate livestock units should be multiplied by the monthly average livestock numbers, except in the case of lambs and purchased stores where throughput should be used.
4. Because of the range in breed and type of animal within any one category (e.g. Friesian and Jersey dairy cows), the results obtained from the use of these figures must be interpreted with care.
5. Livestock units used by the Scottish Government for calculating stocking densities as part of eligibility for subsidy schemes differ slightly. See page 428 for more detail.

Basis of data: Defra, 'Definitions of Terms used in Agricultural Business Management' (Mar 2010).

Livestock Traceability

Cattle

All cattle are required to have a 'passport'. Without a passport cattle cannot be slaughtered for human consumption.

Cattle are required to be double tagged. Beef calves must have both tags fitted within 20 days of birth. Dairy calves must have one tag fitted within 36 hours of birth and the second tag must be fitted within 20 days of birth. For all calves, births must be registered on the Cattle Tracing System (CTS) within 27 days of birth. Lost tags must be replaced within 28 days of discovery.

Deaths must be reported and passports returned within 7 days. If the animal is over 24 months of age, it must be tested for BSE.

When an animal moves from one holding to another, both off and on movements should be reported to CTS within 36 hours of the movement taking place. For further guidance see www.bcms.gov.uk.

An on-farm record must be retained for all cattle on the holding. All births, deaths and movements need to be recorded in farm records. These records must be retained for a 10 year period.

In Scotland from 1st January 2017 links between holdings no longer apply. To keep cattle you must register each holding that you use (owned, rented or seasonally rented) with ScotMoves. Cattle moving to and from the different holdings (location codes) within a business now have to be recorded with ScotMoves within 48 hours of moving. This can be done by email, online, telephone/fax or paper. ScotMoves is not compulsory and on/off movements can be lodged with BCMS but the keeper must be registered as a keeper of cattle at the receiving holding and no more than one keeper can be registered on that holding. Full details including possible exemptions can be found at www.scoteid.com.

Sheep

To keep sheep you must register each holding that you use (owned, rented or seasonally rented) with your local Rural Payments and Inspections Directorate (RPID) office. It is compulsory for all Scottish sheep born after 31 December 2009 to be tagged with an Electronic Identifier (EID) before they leave the holding of birth (unless under a concession) or are 9 months old, whichever comes first.

There are three types of tag that can be used:

- Slaughter Tags (a single EID tag with a flock mark and no visible individual identifier).
- A matching set of double tags with individual identifiers, one of which must be an EID tag.
- Less commonly an EID bolus and black ear tag.

All sheep that are to be sold or slaughtered by the time they are one year old can be identified with any one of the above tags. However, the most common for sheep under 12 months old are slaughter tags for store and finished lambs.

Any animals kept beyond 12 months of age must have a matching set of double tags with individual numbers – one an EID tag. Any slaughter tagged animals that are to remain on the holding after they are a year old, must be upgraded (provided they are completely traceable) by removing the slaughter tag and replacing with a matching set of double tags with individual identifiers one of which must be an EID tag on or before they are one year old. These must be recorded in the replacement register.

A record of identification must be kept in the flock records with the date the animals were EID tagged and their individual number if double tagged or flock number if slaughter tagged. Batch recording can be used.

Any homebred sheep losing their tags must have them replaced within 28 days of discovery. If they are on the holding of birth you can use your existing double tags one of which must be EID. If the sheep are not on the holding of birth then red replacement EID tags must be used. Replacements must be recorded in the flock records.

The historic ewe flock (born pre 2010) had a dispensation from the EID regulations and this ended on 31st December 2014. This means that all breeding sheep moving off the farm to anywhere (including through a market) other than direct to slaughter from 1st January 2015 will need to have their individual tag number recorded. In practice this means re-tagging older ewes with full EID tags and recording the replacements in the replacement register.

Flock books (Holding Register – orange book) should include a section on identification and replacements and a continuous record must be kept. The register must be retained for three years.

All sheep movements in Scotland must be reported to SAMU (Scottish Animal Movements Unit) within 3 days. Any EID animals moving through Scottish Critical Control points (markets, abattoirs etc) are logged and uploaded to the ScotEID database. These movements can form part of your records. The ScotEID website www.scoteid.com is a source of information on tagging rules and regulations as is Scottish Governments own website at www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/IDtraceability/SheepandGoats

Goats

The rules for goats are identical to sheep except the EID component is not compulsory and tattoos can be used.

Deer

To keep deer you must register each holding that you use (owned, rented or seasonally rented) with your local Rural Payments and Inspections

Directorate (RPID) office. Deer must be identified as required by the Tuberculosis (Deer) Order 1989 (as amended) before moving on or off a holding and before a TB test (unless under 16 weeks old).

The owner/keeper must complete a movement declaration which must be retained on the premises of departure for six months. This can be found at:

www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/MovementRestrictions

Pigs

To keep pigs you must register every holding that you use with your local SGRPID office. From 1st October 2011, all pigs must be identified with an eartag, tattoo or slapmark. If under 12 months old, a temporary mark (paint) can be used. However for movements to a show or exhibition, for breeding purposes, to a semen collection centre or, intra-Community trade or export or under a walking licence, all pigs must also have an eartag or a tattoo with the herd mark and a unique individual identification number. All replacement tags must be cross referenced in the holding register.

Movements must be notified either prior to leaving the holding or on the day of the move. This can be done electronically through www.scoteid.com or by telephone or in writing to the ScotEID information Centre. The receiving keeper must check and confirm receipt of pigs within 3 days of their arrival. The movements also need to be noted in the holding register within 48 hours of the move. These records must be kept for a minimum of 3 years and once a year the pigs on the holding must be recorded. ScotEID can be used for this.

Poultry

Following the Avian Influenza (Preventative Measures) (Scotland) Order 2007 any person keeping more than 50 poultry must register as a keeper. This can be done through <https://www.gov.uk/poultry-registration-scotland>, by post, telephone or email. Movement records must be kept for poultry and/or eggs. Where the breeding, laying or broiler flock has more than 250 birds, salmonella testing records must be kept.

All livestock movements

All movements of cattle, sheep, goats and other ruminating animals (except camelids) and swine are subject to a standstill period (unless an exemption applies). This period of standstill, in effect, does not permit the movement of any animal to a market if it has been presented at a market within the previous 13 days (20 for pigs), or an English or Welsh market within the previous 6 days (20 for pigs), except any animal marketed in a livestock market in any of the Scottish island areas. Many exemptions apply and they can be found at:

www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/MovementRestrictions/ExemptHTML

Animal Health Planning

A health plan should be dynamic and change as production and disease data becomes available. It should be reviewed when key information becomes available and updated accordingly. Crucially, it must be of real benefit to the farm business.

Health plan tools available include:

- Scottish Animal Health Planning System (SAHPS), <http://www.sahps.co.uk/>
- My Healthy Herd (MHH), <http://www.myhealthyherd.co.uk>
- WLBP Animal Health Plan, <https://farmrecords.wlbp.co.uk>

Many vets' practices have devised their own health planning scheme, which reflect particular needs for their practice area. Before committing to any particular health plan scheme, farmers should consult with their vet on the most suitable system available for their farm and requirements.

SAHPS was developed to support vets and farmers involved in farm health planning. SAHPS is free to Scottish veterinary practices and farmers. It is also available to veterinary practices and farmers in England and Wales on a chargeable basis.

SAHPS provides the opportunity for online collaboration between vet, farmer and consultant. All parties can enter information from their individual locations and communicate in real time – resulting in a central data set which is readily accessed and easily reviewed. This process highlights areas where intervention may be required to help maximise herd and flock productivity. It then provides a medium for farmers, vets and consultants to plan and monitor agreed interventions.

Key functions of SAHPS:

- Allows you to create a tailored and comprehensive health plan.
- View and compare production and disease data year on year.
- Compare performance with similar enterprises locally and nationally.
- View and update a calendar of forthcoming events for your enterprise(s), e.g. add a reminder to order drugs, worm the dog or treat an individual animal.
- Upload your documents, e.g. lab and abattoir reports.

In 2016, key performance data taken from SAHPS highlighted that:

- Cattle herds in the upper quartile weaned 26% more calves than the lower quartile and had 15% fewer barren cows.
- Sheep flocks in the upper quartile weaned 39% more lambs than the lower quartile and had 7% fewer barren ewes.

By maximising livestock health, welfare and productivity the end result will be increased business profitability and an overall reduction in the carbon footprint per kg of beef/lamb produced. For more information on carbon footprints see page 386.

Premium health schemes

SAC Consulting seeks to identify herds and flocks free from certain diseases and to offer a control programme for those herds/flocks in which the diseases occur.

Diseases covered by the Premium Cattle Health Scheme (PCHS):

- Bovine Virus Diarrhoea (BVD)
- Leptospirosis
- Infectious Bovine Rhinotracheitis (IBR)
- Johne's Disease
- Neospora

See www.sruc.ac.uk/pchs or www.cattlehealth.co.uk or email: pchs1@btconnect.com for more information.

Diseases covered by the Premium Sheep and Goat Health Scheme (PSGHS):

- Maedi Visna (MV)/Caprine Arthritis Encephalitis (CAE) Accreditation Scheme
- Enzootic Abortion of Ewes (EAE) Accreditation
- Scrapie Genotyping
- Scrapie Monitoring Scheme
- Caseous Lymphadenitis (CLA)

See www.sruc.ac.uk/sghs or email: psghs@sac.co.uk for more information.

In addition to the livestock health schemes mentioned above, SAC Consulting have launched the Premium Assured Strangles Scheme (PASS) supported by the British Horse Society (BHS).

PASS aims to:

- Protect healthy horses and equine yards from infection with Strangles.
- Eliminate Strangles from infected yards by detecting/treating carriers.
- Prevent the spread of disease locally by actively eliminating infection.
- Offer a national control programme to reduce the risk of Strangles for all horses.

For more details, see www.equinehealthscheme.com or email vcedinburgh@sac.co.uk.

Veterinary medicine records

If you are the keeper of food producing animals or treat farm animals intended for human consumption, you must keep the following for 3 years from the date of treatment:

- a record of the proof of purchase and batch numbers of all veterinary medicines bought for these animals.
- a record of all veterinary medicine products administered to them.
- where medicines have not been bought documentary evidence must be kept of how they were acquired.

- the record must include those administered by the vet.
- number of deaths.

Animals can only be sent for slaughter after the end of the withdrawal period. The records are to prove that the product was from a legitimate source and used in accordance with its licence. They must be retained for 5 years.

A keeper must also keep the following record of the disposal of unwanted medicines:

- date of disposal.
- quantity involved.
- how and where it was disposed of.

Nutritive Values and Relative Values (£) of Feedingstuffs

The tables are provided as a general guide and should be used with care. Each foodstuff has been attributed a specific nutritive value and often this will vary, e.g. the nutritive value of draff (see page 115). The relative values of the feedingstuffs are also affected by the rationing situation.

The relative values for ruminants are calculated on an ME (metabolisable energy) and CP (crude protein) basis using barley and rapeseed meal as standard reference foods. The relative values for pigs are calculated on a NE (net energy) and Dig Lys (digestible lysine) basis, using barley and hipo soya as standard reference foods.

If the relative value of a foodstuff is higher than the price then it is good value for money. For ruminants this does not take into account other characteristics of the feedstuff, for example, the high digestible undegradable protein (DUP) content of soya bean meal for ewes in late pregnancy or digestible fibre properties of sugar beet pulp. For pigs relative value does not take into account the content of other amino acids and for both types of animal the negative characteristics such as low palatability.

Nutritive values of feedingstuffs-ruminants

	Dry matter (g/kg)	ME (MJ/kg DM)	CP (g/kg DM)
Rapeseed meal	900	12.0	400
Barley	860	13.2	115
Hay (average)	850	8.6	85
Hay (good)	860	9.2	100
Silage (average)	240	10.6	130
Silage (good)	240	11.2	140
Barley straw	860	6.3	35
Oats	870	12.0	100
Wheat	860	13.6	115
Maize	860	13.8	95
Brewers grains (draff)	230	11.1	200
Wheat dark grains	900	13.5	340
Malt dark grains	900	12.2	265
Maize gluten (20%)	880	12.9	220
Soya bean meal (47%)	890	13.3	530
Potatoes	210	13.3	90
Swedes	105	14.0	90
Molassed sugar beet feed	890	12.5	100

Relative values (£) of feedingstuffs-ruminants

	£/t					
	200		230			
BARLEY	110	120	130	110	120	130
Hay (average)	65	70	75	67	72	77
Hay (good)	75	80	85	78	83	88
Silage (average)	25	28	29	28	29	31
Silage (good)	28	30	32	30	32	33
Barley straw	36	39	43	35	39	43
Oats	96	105	114	96	105	113
Wheat	113	123	135	113	123	134
Maize	108	120	132	106	117	129
Brewers grains (draff)	32	33	35	35	36	38
Wheat dark grains	192	196	200	215	218	223
Malt dark grains	155	159	163	171	175	180
Maize gluten (20%)	144	150	158	155	161	168
Soya bean meal (47%)	251	250	247	292	290	289
Potatoes	25	28	30	25	27	30
Swedes	13	15	16	13	14	16
Molassed sugar beet feed	103	113	122	102	112	122

Nutritive values of feedingstuffs-pigs

	NE (MJ/kg as fed)	Dig Lys (g/kg as fed)
Hipro soya bean meal	8.4	26.6
Barley	9.6	2.8
Oats	8.0	3.0
Wheat	10.5	2.5
Wheat feed	7.7	4.6
Wheat bran	6.2	4.0
Maize	11.1	1.8
Wheat dark grains	9.3	5.6
Maize gluten (20%)	7.0	4.0
Peas	9.7	12.5
Beans	8.6	12.8
Molassed sugar beet feed	6.6	2.9
Molasses	7.0	0.1
Biscuit waste	11.7	2.5
Rapeseed meal	6.5	14.0

Relative values (£) of feedingstuffs-pigs

	£/t					
	300		350			
HIPRO SOYA BEAN MEAL						
BARLEY	110	120	130	110	120	130
Oats	97	105	114	100	107	115
Wheat	116	127	138	114	126	137
Wheat feed	108	115	122	113	120	127
Wheat bran	90	95	101	94	100	105
Maize	115	127	139	112	124	136
Wheat dark grains	131	140	148	137	146	154
Maize gluten (20%)	97	103	110	101	107	114
Peas	193	200	206	213	220	226
Beans	185	191	196	207	212	217
Molassed sugar beet feed	84	90	97	86	92	100
Molasses	64	72	80	60	68	76
Biscuit waste	126	139	151	124	137	150
Rapeseed meal	177	179	181	202	204	206

Gestation Table

Date of service		Births due		Date of service		Births due		Date of service		Births due	
Cow	Ewe	Hind	Sow	Cow	Ewe	Hind	Sow	Cow	Ewe	Hind	Sow
01-Jan	12-Oct	30-May	19-Aug	24-Apr	06-May	15-Feb	03-Oct	23-Dec	28-Aug	08-Sep	20-Jun
06	17	04-Jun	24	29	11	20	08	28	02-Sep	13	25
11	22	09	29	04-May	16	25	13	02-Jan	07	18	30
16	27	14	03-Sep	9	21	02-Mar	18	07	12	23	05-Jul
21	01-Nov	19	8	14	26	07	23	12	17	28	10
26	06	24	13	19	31	12	28	17	22	03-Oct	15
31	11	29	18	24	05-Jun	17	02-Nov	22	27	08	20
05-Feb	16	04-Jul	23	29	10	22	07	27	02-Oct	13	25
10	21	09	28	03-Jun	15	27	12	01-Feb	07	18	30
15	26	14	03-Oct	8	20	01-Apr	17	06	12	23	04-Aug
20	01-Dec	19	8	13	25	06	22	11	17	28	09
25	06	24	13	18	30	11	27	16	22	02-Nov	14
02-Mar	12	30	19	24	05-Jul	16	02-Dec	21	27	07	19
07	17	04-Aug	24	29	10	21	07	26	01-Nov	12	24
12	22	09	29	04-Jul	15	26	12	03-Mar	06	17	29
17	27	14	03-Nov	9	20	01-May	17	08	11	22	03-Sep
22	01-Jan	19	8	14	25	06	22	13	16	27	08
27	06	24	13	19	30	11	27	18	21	02-Dec	13
01-Apr	11	29	18	24	04-Aug	16	01-Jan	23	26	07	18
06	16	03-Sep	23	29	09	21	06	28	01-Dec	12	23
11	21	08	28	03-Aug	14	26	11	02-Apr	06	17	28
16	26	13	03-Dec	8	19	31	16	07	11	22	03-Oct
21	31	18	8	13	24	05-Jun	21	12	16	27	08
26	05-Feb	23	13	18	29	10	26	17	21	03-Sep	15
01-May	10	28	18	23	03-Sep	15	31	22	26	03-Sep	15

Note: Refer to the Miscellaneous section for gestation values for the above livestock. Values will change for different breed types.

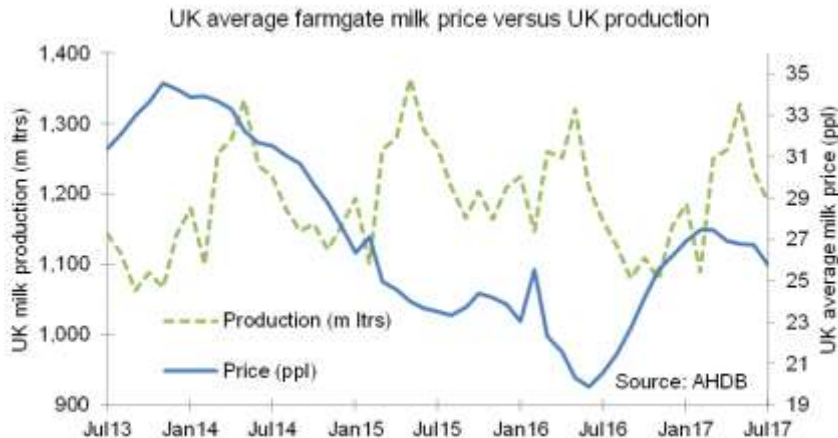
Dairying

Introduction

Farm-gate milk prices and price drivers

UK farm-gate prices started to recover in the second half of 2016 due to falling milk production, both in the UK and globally, and an increase in world demand growth. UK farm-gate milk prices rose to 27.50ppl in March 2017 but still below the peak of 34.55ppl in November 2013.

UK milk production steadily increased in the first quarter of 2017 and by the end of April 2017, production was 2% above the same time last year. Good forage growth in March and April helped boost output leading to several milk buyers cutting their farm-gate prices in May and June.

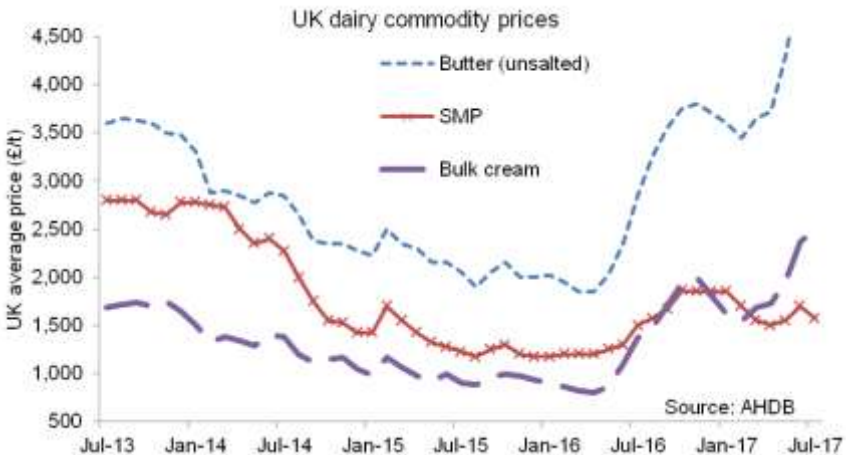


On a global level, the gap between year-on-year milk production is closing but Rabobank expect it will be in the second half of 2017 before global milk production exceeds 2016 levels. World growth is expected to increase from 3.1% in 2016 to 3.5% in 2017 and 3.6% in 2018 boosting demand for dairy products led by China, Asia and Africa. The US is experiencing a 20 year high in cow numbers with milk production to increase 2.3% in 2017. Supply recovery in other areas is thought to be slower, helping to support milk prices in the coming months.

A contraction in supply of the main EU producing countries (Ireland, Germany, France and Netherlands) has been reported in the first half of 2017, on the back of the EU Milk Reduction Scheme and dry conditions. Furthermore, the Netherlands dairy herd is expected to shrink by 11% in 2017 as a result of the government's dairy herd reduction scheme to meet their phosphate reduction target. The Dairy Group predict that milk supply and markets will likely stabilise during summer 2017 until the southern hemispheres' new milk season gets underway.

In the first half of 2017 strong demand for butter and cream has offset weaker cheese and powders, leading industry analysts to predict farm-gate prices may bottom out and there is optimism that milk prices will rise during the second half of 2017. The butter price is currently double the

intervention level (€2,217/t). The strong demand for cream has resulted in a price increase of 120% compared to one year ago. GDT auction results are strengthening and the weighted average price across all eight dairy commodities is at a three year high.



Milk supply contracts

All UK dairy farmers are contracted to supply milk to an individual milk purchaser/processor. Within the last 10 years, however, a number of retailers have offered 'direct' or 'retailer aligned contracts' to a select number of dairy farmers. Farmers who have signed up to these contracts have seen their farm-gate milk prices maintained based on a cost of production formula used by the individual retailers. At the time of writing (May 2017), aligned milk contracts were in the region of 27.22-30.5ppl. The gap between these and the non-aligned contracts has closed significantly. The non-aligned farm-gate milk prices currently range between 26.09ppl and 28.50ppl, which is significantly higher compared to September 2016, where they ranged from 16.3ppl to 25ppl.

The price paid for milk going for manufacturing purposes is based on compositional quality (butterfat and protein percentage). Historically liquid contracts have tended to be poorly rewarded for components compared to manufacturing contracts but this appears to be changing, with better bonus payments particularly for butterfat.

Outlook

Whilst the outlook for UK dairy farmers is more positive than it was this time a year ago, margins remain under pressure due to recent increases in feed, fuel and fertiliser prices. Brexit and its effect on currency will likely have an impact on farm businesses. Whilst milk markets are more stable than they were a year ago, several factors could influence product prices for the remainder of 2017 and into 2018. While there are grounds for optimism and growing demand in 2017 and 2018, rising milk output in the US, NZ and the EU may start to counter this in late 2017 or 2018.

Lactation Curves

The table below is an example of a lactation curve for a cow yielding 5,000 litres and can be used for budgeting purposes.

LACTATION CURVES - % Yield each month for a cow yielding 5,000 litres

Month	Month of calving											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
January	12.3	-	-	4.7	6.4	7.4	8.5	9.6	10.6	11.8	12.9	13.4
February	12.0	11.0	-	-	4.5	5.9	6.8	7.7	8.6	9.7	10.8	11.6
March	13.0	13.5	12.4	-	-	5.3	6.8	7.7	8.6	9.8	10.9	12.0
April	11.9	12.8	13.4	12.4	-	-	5.3	6.7	7.6	8.6	9.8	10.8
May	12.1	13.2	14.3	15.1	14.1	-	-	6.0	7.5	8.6	9.7	10.8
June	10.4	11.7	12.8	13.8	14.6	13.8	-	-	6.0	7.3	8.3	9.4
July	8.7	9.9	11.0	12.0	13.2	14.1	13.1	-	-	5.5	6.9	7.9
August	7.5	8.5	9.4	10.6	11.7	13.0	13.9	12.8	-	-	5.3	6.6
September	6.7	7.5	8.4	9.5	10.8	12.0	13.4	13.9	12.8	-	-	5.3
October	5.4	6.8	7.6	8.6	9.7	11.2	12.5	13.6	14.2	13.1	-	-
November	-	5.1	6.1	7.0	7.9	9.1	10.3	11.5	12.5	13.0	12.1	-
December	-	-	4.6	6.3	7.1	8.2	9.4	10.5	11.6	12.6	13.3	12.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Basis of data: These figures are based on the SAC 'Dairy Herd Forecasting Model' and are broadly applicable to other yield levels.

It should be noted that the figures are intended only as a general guide and that annual yield, lactation number, calving index, feeding regime and geographical area will all affect the actual curve obtained.

Dairy Cow - Summary of Assumptions

(a) Milk Price 2017

The following gross margins include four annual yield levels, based on average production of 1,000,000 litres per annum:

Litres /cow	Calving system	Contract type	Average price (ppl) *
5,000	Spring	Compositional	27.50
7,000	All year round	Compositional	27.50
8,500	All year round	Liquid contract	27.50
10,000	All year round	Liquid contract	27.50

* Use price sensitivity to change gross margins to reflect current milk price.

(b) Feeding

The systems shown are all based on an ad-lib silage feeding regime. As milk yield increases, forage quality becomes more critical. Although high milk yields can be achieved using conventional systems based on grass and concentrates, the inclusion of a second forage will normally enhance performance. Forages such as whole crop cereals, maize silage, fodder beet or purchased 'forage replacers' such as 'grainbeet' along with distillery by-products and potatoes can be considered. Good grassland management and well preserved grass silage with high intake characteristics are necessary to avoid excessive concentrate use.

Many dairy farms have replaced part or all of the compound dairy cake with home mixes. These mixes typically cost £10-20/t less than compound cakes. They do, however, incur greater demand on labour and machinery.

(c) Other livestock expenses

These are taken from commercial dairy herds and include milk recording, bedding, sawdust and dairy detergents.

Dairy Cow - Low Input Spring Calving

PHYSICAL DATA

Calving period	Spring
	/cow
Average annual yield (litres)	5,000
Herd life (years)	5.0
Calving interval (days)	370
Cow size (kg)	500
Feed requirements (kg):	
Silage	7,000
Concentrates	750
Concentrates fed (kg/litre)	0.15
Overall forage area (ha):	
Silage & aftermath grazing	0.20
Grazing	0.27
Total	<u>0.47</u>

Basis of data:

1. A spring calving herd managed on a low input system. Calving between February and April. Maximum utilisation of grazed grass; 150 days winter feeding period. A herd of 200 cows to produce 1m litres assumed at 4.4% BF and 3.4% P.
2. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £111/hd then adjusted for calving interval and mortality. The calf value can be altered by £9.08 for each £10 difference in the sale/transfer price.
3. Cull cow sale price of £416.25/hd has been adjusted for herd life and mortality. The annual share can be altered by £1.95 for each £10 difference in cull cow price.
4. Heifer purchase/transfer price varies according to yield. A purchase price equating to 15ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.04 for each £10 difference in purchase/transfer price.

Dairy Cow - Low Input Spring Calving

GROSS MARGIN DATA

Calving period	Spring /cow
Average annual yield (litres)	5,000
OUTPUT	
Spring milk @ 27.5 p/litre	1,375
Calf value	101
Cull cow (annual share)	83
	<hr/>
	1,559
Heifer replacement (annual share)	153
	<hr/>
	1,406
VARIABLE COSTS	
Concentrates @ £213/t	160
AI	35
Vet & medicines	45
Other livestock expenses	86
	<hr/>
	326
Gross Margin before forage	<hr/>
	1,080
Forage variable costs:	
silage @ £304/ha	61
grazing @ £221/ha	60
	<hr/>
Total Variable Costs	447
GROSS MARGIN £/cow	<hr/>
	959
GROSS MARGIN £/forage ha	<hr/>
	2,040

Sensitivity-Change ±

1 p/litre in milk price
£10/t in concentrate price

Change in Gross Margin/head (£)

50
7

Dairy Cow - 7,000 Litres

PHYSICAL DATA

Calving period	All year
	/cow
Average annual yield (litres)	7,000
Herd life (years)	4.2
Calving interval (days)	390
Cow size (kg)	600
Feed requirements (kg):	
Silage	8,500
Concentrates	1,800
Concentrates fed (kg/litre)	0.26
Overall forage area (ha):	
Silage & aftermath grazing	0.25
Grazing	0.24
Total	<u>0.49</u>

Basis of data:

1. A moderate input system calving all year round; 200 days winter feeding period. A herd of 143 cows to produce 1m litres assumed at 4.0% BF and 3.3% P.
2. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £151/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.61 for each £10 difference in the sale/transfer price.
3. Cull cow sale price of £499.50/hd has been adjusted for herd life and mortality. The annual share can be altered by £2.34 for each £10 difference in cull cow price.
4. Heifer purchase/transfer price varies according to yield. A purchase price equating to 15ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.45 for each £10 difference in purchase/transfer price.

Dairy Cow - 7,000 Litres

GROSS MARGIN DATA

Calving period	All year
	/cow
Average annual yield (litres)	7,000
OUTPUT	
All year milk @ 27.5 p/litre	1,925
Calf value	130
Cull cow (annual share)	120
	<hr/>
	2,175
Heifer replacement (annual share)	257
	<hr/>
	1,918
VARIABLE COSTS	
Concentrates @ £213/t	383
AI	46
Vet & medicines	74
Other livestock expenses	91
	<hr/>
	593
Gross Margin before forage	<hr/>
	1,325
Forage variable costs:	
silage @ £304/ha	76
grazing @ £221/ha	53
	<hr/>
Total Variable Costs	722
GROSS MARGIN £/cow	<hr/>
	1,196
GROSS MARGIN £/forage ha	<hr/>
	2,440

Sensitivity-Change ±

1 p/litre in milk price

£10/t in concentrate price

Change in Gross Margin/head (£)

70

18

Dairy Cow - 8,500 Litres

PHYSICAL DATA

Calving period	All year
	/cow
Average annual yield (litres)	8,500
Herd life (years)	3.6
Calving interval (days)	405
Cow size (kg)	650
Feed requirements (kg):	
Silage	9,200
Concentrates	2,800
Concentrates fed (kg/litre)	0.33
Overall forage area (ha):	
Silage & aftermath grazing	0.25
Grazing	0.23
Total	<u>0.48</u>

Basis of data:

1. A moderate input system calving all year round; 230 days winter feeding period. A herd of 118 cows to produce 1m litres assumed at 3.9% BF and 3.2% P.
2. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £153/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.29 for each £10 difference in the sale/transfer price.
3. Cull cow sale price of £476.19/hd has been adjusted for herd life and mortality. The annual share can be altered by £2.71 for each £10 difference in cull cow price.
4. Heifer purchase/transfer price varies according to yield. A purchase price equating to 15ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.86 for each £10 difference in purchase/transfer price.

Dairy Cow - 8,500 Litres

GROSS MARGIN DATA

Calving period	All year /cow
Average annual yield (litres)	8,500
OUTPUT	
All year milk @ 27.5 p/litre	2,338
Calf value	135
Cull cow (annual share)	133
	<hr/>
	2,606
Heifer replacement (annual share)	364
	<hr/>
	2,242
VARIABLE COSTS	
Concentrates @ £213/t	596
AI	55
Vet & medicines	102
Other livestock expenses	90
	<hr/>
	843
Gross Margin before forage	<hr/>
	1,399
Forage variable costs:	
silage @ £304/ha	76
grazing @ £221/ha	51
	<hr/>
Total Variable Costs	970
GROSS MARGIN £/cow	<hr/>
	1,272
GROSS MARGIN £/forage ha	<hr/>
	2,650

Sensitivity-Change ±

1 p/litre in milk price

£10/t in concentrate price

Change in Gross Margin/head (£)

85

28

Dairy Cow - High Output Housed Year Round

PHYSICAL DATA

Calving period	All year /cow
Average annual yield (litres)	10,000
Herd life (years)	3.0
Calving interval (days)	420
Cow size (kg)	650
Feed requirements (kg):	
Silage	14,600
Concentrates	4,000
Concentrates fed (kg/litre)	0.40
Overall forage area (ha):	
Silage & aftermath grazing	0.40
Grazing	0.00
Total	<u>0.40</u>

Basis of data:

1. A high input, high output system calving all year round; 365 days complete ration. A herd of 100 cows to produce 1m litres assumed at 3.8% BF and 3.1% P.
2. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £137/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.00 for each £10 difference in the sale/transfer price.
3. Cull cow sale price of £476.19/hd has been adjusted for herd life and mortality. The annual share can be altered by £3.11 for each £10 difference in cull cow price.
4. Heifer purchase/transfer price varies according to yield. A purchase price equating to 15ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £3.06 for each £10 difference in purchase/transfer price.

Dairy Cow - High Output Housed Year Round

GROSS MARGIN DATA

Calving period	All year /cow
Average annual yield (litres)	10,000
OUTPUT	
All year milk @ 27.5 p/litre	2,750
Calf value	109
Cull cow (annual share)	150
	<hr/>
	3,009
Heifer replacement (annual share)	459
	<hr/>
	2,550
VARIABLE COSTS	
Concentrates @ £213/t	852
AI	65
Vet & medicines	125
Other livestock expenses	110
	<hr/>
	1,152
	<hr/>
Gross Margin before forage	1,398
Forage variable costs:	
silage @ £304/ha	122
grazing @ £221/ha	-
	<hr/>
Total Variable Costs	1,274
	<hr/>
GROSS MARGIN £/cow	1,276
	<hr/>
GROSS MARGIN £/forage ha	3,190

Sensitivity-Change ±

1 p/litre in milk price
£10/t in concentrate price

Change in Gross Margin/head (£)

100
40

Replacement Heifer Rearing

Fodder requirements of Holstein Friesian heifers

The following tables provide forage data to budget for the cost of replacement heifers. Also see pages 134-135.

		Approx closing lwt (kg)	Cow grazing (days)	Mainly silage ration		
				Conc (kg)	Straw (kg)	Silage (kg)
Early autumn						
(1st Sept)/24 months						
Birth		40	-	-	-	-
0-3	(S-N)	90	-	140	100	-
4-8	(D-A)	200	-	380	800	-
9-14	(My-O)	320	120	150	-	-
15-20	(N-A)	430	-	300	-	5,500
21-24	(My-A)	520	100	120	-	-
Total			<u>220</u>	<u>1,090</u>	<u>900</u>	<u>5,500</u>

Forage (ha) 0.53 - - 0.18

Early spring						
(1st April)/24 months						
Birth		40	-	-	-	-
0-3	(A-J)	90	-	140	100	-
4-8	(J-N)	200	52	380	300	-
9-14	(D-My)	320	-	300	800	-
15-20	(J-N)	430	100	150	-	-
21-24	(D-M)	520	-	150	-	5,500
Total			<u>152</u>	<u>1,120</u>	<u>1,200</u>	<u>5,500</u>

Forage (ha) 0.37 - - 0.18

		Approx closing lwt (kg)	Cow grazing (days)	Mainly silage ration		
				Conc (kg)	Straw (kg)	Silage (kg)
Early autumn						
(1st Sept)/27 months						
Birth		40	-	-	-	-
0-2	(S-O)	90	-	170	100	-
3-8	(N-A)	200	-	450	800	-
9-14	(My-O)	320	100	300	-	-
15-20	(N-A)	430	-	150	-	5,000
21-27	(My-N)	540	170	110	-	1,500
Total			<u>270</u>	<u>1,180</u>	<u>900</u>	<u>6,500</u>

Forage (ha) 0.65 - - 0.21

Early spring						
(1st April)/27 months						
Birth		40	-	-	-	-
0-2	(A-M)	90	-	170	100	-
3-8	(J-N)	200	50	450	800	-
9-14	(D-My)	320	50	300	-	-
15-20	(J-N)	430	80	150	-	3,250
21-27	(D-J)	540	80	100	-	3,250
Total			<u>260</u>	<u>1,170</u>	<u>900</u>	<u>6,500</u>

Forage (ha) 0.63 - - 0.21

Early spring						
(1st Feb)/30 months						
Birth		40	-	-	-	-
0-3	(F-A)	85	-	100	100	-
4-9	(My-O)	170	52	350	800	600
10-16	(N-My)	290	-	350	-	4,000
17-21	(J-O)	390	120	-	-	-
22-28	(N-My)	510	-	200	-	4,500
29-30	(J-J)	540	-	-	-	-
Total			<u>172</u>	<u>1,000</u>	<u>900</u>	<u>9,100</u>

Forage (ha) 0.59 - - 0.29

Replacement Heifer Rearing

PHYSICAL DATA

Time of birth	Early autumn	Early spring	Early autumn	Early spring	Early spring
Age at calving	24 months	24 months	27 months	27 months	30 months
Ration type	Mainly silage	Mainly silage	Mainly silage	Mainly silage	Mainly silage
Milk, whole	litre 20	20	20	20	20
Milk, substitute	kg 38	38	38	38	38
Concentrates:					
starter (proprietary)	kg 130	130	130	130	130
rearing (150 g/kg DCP)	kg 360	360	450	450	350
mainly cereal mix	kg 270	300	300	300	-
straw	kg 250	350	700	700	250
Forage: silage	kg 5,500	5,500	6,500	6,500	9,100
	ha 0.18	0.18	0.21	0.21	0.29
grazing	ha 0.53	0.37	0.65	0.63	0.59
Total forage	ha 0.71	0.55	0.86	0.84	0.88

Basis of data:

- (a) **Quality of forage:** **ME (MJ/kg DM)** **DM (g/kg)** **'Substitution Rate'**
 Silage 10.5 220 3 to 3.5
- (b) The forage hectares shown are derived from the Grassland section for silage (220 kgN, 2 cuts), and grazing (175 kgN). The hectares for silage include a proportion of aftermath grazing, which in turn has been deducted from the grazing requirement.
- (c) Intensification of grazing can save up to 25% of the area allocated.

Replacement Heifer Rearing

GROSS MARGIN DATA

Time of birth	Early autumn	Early spring	Early autumn	Early spring	Early spring	Early spring
Age at calving	24 months	24 months	27 months	24 months	27 months	30 months
Ration type	Mainly silage	Mainly silage	Mainly silage	Mainly silage	Mainly silage	Mainly silage
OUTPUT - Heifer at calving	1,531	1,531	1,531	1,531	1,531	1,531
Less heifer calf	128	128	128	128	128	128
	<u>1,403</u>	<u>1,403</u>	<u>1,403</u>	<u>1,403</u>	<u>1,403</u>	<u>1,403</u>
VARIABLE COSTS						
Milk, whole @ 27.5 p/litre	6	6	6	6	6	6
Milk, substitute @ £1700/t	64	64	64	64	64	64
Concentrates starters @ £300/t	39	39	39	39	39	39
rearing @ £255/t	92	92	115	115	115	89
mainly cereal mix @ £195/t	53	59	59	59	59	-
straw @ £70/t	18	25	49	49	49	18
Vet & medicines	40	40	40	40	40	40
AI & other livestock expenses	67	67	67	67	67	67
	<u>379</u>	<u>392</u>	<u>439</u>	<u>439</u>	<u>439</u>	<u>323</u>
	<u>1,024</u>	<u>1,011</u>	<u>964</u>	<u>964</u>	<u>964</u>	<u>1,080</u>
Gross margin before forage						
Forage variable costs:						
silage @ £241/ha	43	43	51	43	51	70
grazing @ £170/ha	90	63	111	63	107	100
Total Variable costs	<u>512</u>	<u>498</u>	<u>601</u>	<u>498</u>	<u>597</u>	<u>493</u>
GROSS MARGIN (birth to calving)	<u>891</u>	<u>905</u>	<u>802</u>	<u>905</u>	<u>806</u>	<u>910</u>
GROSS MARGIN/forage ha (acre)	1,255 (508)	1,645 (666)	933 (377)	960 (388)	960 (388)	1034 (418)

Note: The calf price of £128 and value of heifer sold of £1655 have been adjusted to allow for mortality (5-10%) and barren and reject heifers (5-10%) respectively.

Contract Dairy Heifer Rearing

Contract rearing dairy heifers by a dedicated rearer allows the farm to focus purely on the milking herd and reduces time and resources previously allocated to youngstock. Contracts are often based on certain targets being met, such as growth rate, age at bulling and age at first calving. Target body weights at different stages throughout the rearing process are the basis of efficient heifer rearing programmes, with a target liveweight and age at first calving being a key requirement of the contract.

Contract rearers tend to take delivery of heifers from between 2 to 4 months of age, returning them to the dairy farmer at 4 to 6 weeks before calving.

There are various types of contract in use:

- Contract payment based on per animal per day. This is where the farmer pays a flat rate fee per head per day based on the actual rearing costs.
- Weight gain on a per kilogram basis contract. The difference between the delivery weight to the rearer and the return weight to the farmer is divided by the number of days to determine growth rate per day. The danger with this type of contract is that the rearer must avoid producing heifers that are over-conditioned.
- Sell and buy-back contract. The rearer buys the calves at an agreed price, with the farmer retaining the right to buy back the heifers 4 to 6 weeks prior to calving. The rearer retains control of the system but is responsible for all losses incurred. The farmer runs the risk of buying back heifers at an age or weight that is not desirable in their system.
- A full contract where the farmer stipulates the rearing policy and covers all costs such as feed, semen and veterinary medicine costs (as well as any losses). The rearer only provides the labour and facilities.

Care must be taken to ensure that both the rearer and the dairy farmer's responsibilities are clearly defined and that the rearer has insurance to cover any third part claims involving the heifers in his care.

Summary of charges are as follows:

	<i>£/day</i>	Charge <i>£/month</i>
From 14 days to 3 or 6 months of age	1.28-1.51	39-46
From 14 days to calving (at 2 years of age)	1.18-1.35	36-41
From 6 months to calving (at 2 years of age)	1.02-1.25	31-38

Total Cost of Production - Dairying

Low Input, Low Output (5,000 Litres)

	Profitability ppl	% of output	/100 cows (@ 5,000)
Milk price (ppl)	27.50	100%	137,500
Concentrates	3.20	12%	16,000
Forage and bulk feed	2.42	9%	12,100
Sundry livestock	1.95	7%	9,765
Net replacement costs	-0.62	-2%	- 3,100
GROSS MARGIN	20.55	75%	102,735
Labour	2.90	11%	14,500
Power & machinery	4.40	16%	22,000
General overheads	1.40	5%	7,000
Depreciation	1.30	5%	6,500
OPERATING PROFIT	10.55	38%	52,735
Property, rent & finance	3.20	12%	16,000
NET PROFIT	7.35	27%	36,735

Medium - High Output (8,500 Litres)

	Profitability ppl	% of output	/100 cows (@ 8,500)
Milk price (ppl)	27.50	100%	233,750
Concentrates	7.01	25%	59,600
Forage and bulk feed	1.49	5%	12,700
Sundry livestock	2.91	11%	24,705
Net replacement costs	1.13	4%	9,600
GROSS MARGIN	14.96	54%	127,145
Labour	2.20	8%	18,700
Power & machinery	3.00	11%	25,500
General overheads	1.10	4%	9,350
Depreciation	1.40	5%	11,900
OPERATING PROFIT	7.26	26%	61,695
Property, rent & finance	1.90	7%	16,150
NET PROFIT	5.36	19%	45,545

The cost structure of a businesses varies considerably between farms and system type. The above is therefore only for illustration.

Source: Milk price, variable and replacement costs (SAC Consulting), fixed costs (AHDB Dairy Evidence Report GB Dairy Herd Performance 2015/16, Top 25% producers by net margin).

Beef Cattle

Introduction

Markets and price drivers

Recent years have seen greater volatility in the market. Reasons range from the effective closure of the EU beef intervention scheme, the horsemeat scare, the recent increased availability of beef from the dairy herd to the competitiveness of sterling. See price movements in the chart below.



Such volatility can be difficult to forecast and represents a relatively new challenge. This is especially important considering beef production's long lead-time and it cannot be turned on or off quickly. With few exceptions, beef is traded on the commodity spot market and therefore producers cannot currently manage risk through forward contracts or other price levelling mechanisms. This is why there is increased interest in integrated supply chain models. Volatility in the market also emphasises a need for strong technical performance and proactive marketing to optimise both profitability and business resilience.

Meeting carcass specification of the intended market is essential and a short period to finish is likely to be most cost effective. Carcass balance issues also influence the producer price, for example, demand for higher value cuts over the BBQ season can lift whole carcass value. Beef demand is equally sensitive to inflation, the competitiveness of beef imports and alternative proteins such as chicken.

Marketing

The majority of prime cattle are marketed deadweight (89%), however a large proportion will be traded at some stage in their lives through the auction system. The live cattle auction provides a valued service, bringing many buyers and sellers together in a transparent free-market system to settle on a price.

The most common method to spread risk, when selling at livestock auctions, is to target large or multiple sales per year. Price can be influenced by gaining feedback from buyers and selling the right type of cattle at the appropriate sales. Similarly, when selling direct to processors, a higher price might be achievable if a large number of in-specification cattle can be delivered at pre-arranged times and/or supply can be spread throughout the year.

Margins

The financial contribution of cattle to farm profitability is inevitably sensitive to the sales price. However, there is only limited opportunity to influence this but potential exists through improving output per hectare and cost control.

The most profitable suckler cow enterprises make a positive net margin before subsidy. Top performing suckler beef systems consistently rear more calves per cow, to heavier weights, using less purchased feed. Grassland management is also better. Furthermore, while fixed costs may be lower they are also diluted by selling more kilos of beef.

The budgeted 2017/18 gross margin for suckler cows looks relatively good, subject to strong technical performance. The finisher's margin has been challenging over recent years due to relatively high store cattle prices coupled with greater price volatility for finished cattle. This year, however, prices look comparatively buoyant which will help mitigate a slight rise in the cost of cereals and purchased feeds.

Other benefits

How the enterprise complements other parts of the business is also important. For example, the share and spread of demand for labour and machinery will affect the success of the enterprise mix in a business. Furthermore, well managed multiple enterprises can spread risk and improve cash flow, having additional and multiple sale dates.

Suckler cows play a significant role in managing upland grazings, providing benefit to biodiversity, landscape management and grazing quality. Mixed livestock grazing systems also contribute to reduced worm burdens for both cattle and sheep. Their manure is also an important source of nutrients for arable cropping as part of a crop rotation. Consequently, any enterprise should not be viewed in isolation.

Subsidies and support

The Scottish Suckler Beef Support Scheme (SSBSS), commenced in 2015. Payment is made on male and female calves, which are at least 75% beef bred, born on your holding and have been kept there for at least 30 days. The net payment rate per eligible calf on the mainland was approximately £91 and £139 on the islands, for last year (2016). Actual payment rates are determined by the number of calves claimed each year and the exchange rate for that year. Payments are confirmed once applications are validated in the Spring following the year of claim.

The Beef Efficiency Scheme (BES) is a five-year scheme focusing on cattle genetics and management practice – aiming to improve genetic selection in respect of growth rates, feed conversion, maternal behaviour, nutrition practice and disease resistance. A payment equivalent to £32 per calf will be available each year for the first three years, paid on an area basis.

For further details on payments and the requirements of these schemes see pages 433 and 438 in the Rural Aid Schemes section.

General Reference Data

Effect of slaughter age on performance of intensively finished Holstein bulls

Slaughter weight (kg)	326	399	456	494
Slaughter age (days)	223	270	301	358
Finishing period (days)	150	185	207	276
Finishing gain (kg)	233	288	331	390
Finishing gain (kg/day)	1.55	1.56	1.60	1.41
Feed intake (kg)	998	1,422	1,653	2,152
FCR (kg feed/kg gain)	4.28	4.94	4.99	5.52
Carcass weight (kg)	172	215	242	267
KO%	52.9%	54.0%	53.0%	54.1%
Saleable meat yield (kg)	127	158	176	193
Saleable meat yield (%)	73.9%	73.2%	72.8%	72.2%

Store cattle valuations

The sale value of store cattle can vary depending on time of sale. This variation has been removed for the gross margins.

The age and weight of calves at sale varies depending on season or month of calving - *be cautious when comparing spring and autumn calving herds.*

Note that an increasing share of fixed costs are attributable as the length of time trading stock spend on farm increases – this is true where other breeding or trading stock could have made use of the farm resources.

Foster calves

To reduce risk of disease, it is assumed that no foster calves are bought to replace dead calves. No cost for replacement calves has been included in the margins thus, if foster calves are bought, the appropriate adjustment should be made to the gross margin.

Liveweight to deadweight-price conversion

In order to calculate the deadweight price divide the liveweight price by the killing out percentage (KO %). For example: 200 p/kg / 0.52 = 385 p/kg deadweight. See following quick reference table:

Liveweight Price (p/kg)	Killing out %					
	50%	52%	54%	56%	58%	60%
	Deadweight price (p/kg)					
160	320	308	296	286	276	267
162	324	312	300	289	279	270
164	328	315	304	293	283	273
166	332	319	307	296	286	277
168	336	323	311	300	290	280
170	340	327	315	304	293	283
172	344	331	319	307	297	287
174	348	335	322	311	300	290
176	352	338	326	314	303	293
178	356	342	330	318	307	297
180	360	346	333	321	310	300
182	364	350	337	325	314	303
184	368	354	341	329	317	307
186	372	358	344	332	321	310
188	376	362	348	336	324	313
190	380	365	352	339	328	317
192	384	369	356	343	331	320
194	388	373	359	346	334	323
196	392	377	363	350	338	327
198	396	381	367	354	341	330
200	400	385	370	357	345	333
202	404	388	374	361	348	337
204	408	392	378	364	352	340
206	412	396	381	368	355	343
208	416	400	385	371	359	347
210	420	404	389	375	362	350
212	424	408	393	379	366	353
214	428	412	396	382	369	357
216	432	415	400	386	372	360
218	436	419	404	389	376	363
220	440	423	407	393	379	367
222	444	427	411	396	383	370
224	448	431	415	400	386	373
226	452	435	419	404	390	377
228	456	438	422	407	393	380
230	460	442	426	411	397	383

Hill Suckler Cows

PHYSICAL DATA

	Spring Feb-Apr	Autumn Sep-Nov
Calving period		
Calves weaned	90%	90%
Month of weaning	October	July
Days to weaning	220	270
Month of sale	October	October
Lwt of calves: at weaning (kg)	235	270
Lwt of calves: at sale/transfer (kg)	235	335
Herd life of cows (years)	7	7
Herd life of bulls (years)	4	4
Cow mortality (%)	1	1
Calf mortality (%)	4.5	4.5
Cow:bull ratio (:1)	35	35
Feeding/cow and calf (winter days):	180	200
silage (t)	5.4	7.5
straw (kg)	-	-
creep feed (kg) (incl. pre sale)	-	250
cow concentrates (kg)	50	200
cow cobs (kg)	50	50
grazing (hill/rough pasture)	>0.5	>0.6
Silage fertiliser (kg N/ha)	125	125
Silage:		
yield (t/ha from 1-cut)	20	20
DM quality (g/kg)	220	220
ME quality (MJ/kg DM)	10	10
Rough grazing (ha)	>0.6	>0.5
Silage & aftermath grazing (ha)	0.27	0.375
Housing system: In cubicles*.		
Straw for general use incl. calving pens	0.33	0.42
Straw bedding (if in bedded courts) (t)	1.25	1.50
Cost @ £87/t based on bought in straw.		

* Amend bedding costs for cows overwintered or housed on straw.

Assumptions:

1. Grazing is assumed to be hill grazing with some improvements, carrying a maintenance charge of £50/grazing livestock unit.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age, and an exchange rate of £0.85/€. For further detail on this scheme see pages 141-142 and 433.

Hill Suckler Cows

GROSS MARGIN DATA

	Spring Feb-Apr £/cow	Autumn Sep-Nov £/cow
Calving period		
OUTPUT		
Calf sales (lwt - 90% crop)		
Steers		
350 kg @ 225 p	-	671
250 kg @ 225 p	471	-
Heifers		
320 kg @ 220 p	-	671
220 kg @ 220 p	471	-
Scottish Suckler Beef Support Scheme	84	84
	555	755
<i>Less: Replacement - cow</i>	104	104
<i>bull</i>	25	25
	426	626
VARIABLE COSTS		
Cow concentrates @ £220/t	11	44
Cow cobs @ £245/t	12	12
Creep feed @ £214/t	-	54
Vet & medicines	27	27
Straw bedding @ £87/t (bought-in)	29	37
Commission, haulage & tags	40	47
	119	221
Gross Margin before forage	308	406
Forage variable costs:		
silage @ £152/ha	41	57
grazing @ £10/grazing livestock unit	11	15
	52	72
Total Variable Costs	171	293
GROSS MARGIN £/cow	256	334

Sensitivity-Change ±

10 p/kg in lwt sale price	
Sale weight ± 10kg	
Herd life ± 1 year	

Change in Gross Margin/head (£)

21	30
20	20
19	19

Replacement Cost prices:

Cull cow	£725	In-calf heifer (purch.)	£1,400
Cull bull	£960	Replacement bull	£4,500

Upland Suckler Cows - Mainly Silage Diets

PHYSICAL DATA

Breed: Commercial cows bred to a range of bulls, mostly continental.

Calving period	Feb-Apr	May-Jun	Aug-Oct
Calves weaned	92%	92%	92%
Month of weaning	October	February	July
Days to weaning	220	270	300
Month of sale	October	April	October
Lwt of calves: at weaning (kg)	260	310	340
Lwt of calves: at sale/transfer (kg)	275	350	400
Herd life of cows (years)	7	7	7
Herd life of bulls (years)	4	4	4
Cow mortality (%)	1	1	1
Calf mortality (%)	4.5	4.5	4.5
Cow:bull ratio (:1)	35	35	35
Feeding/cow and calf (winter days):	180	180	200
silage (t)	5.4	6.4	7.5
straw (t)	0.6	0.5	0.35
calf concentrates (kg)	100	500	350
cow concentrates (kg)	100	150	200
Grazing fertiliser (kg N/ha)	125	125	125
Silage & aftermath fertiliser (kgN/ha)	200	200	200
Silage:			
yield (t/ha from 1-cut)	23	23	23
DM quality (g/kg)	220	220	220
ME quality (MJ/kg DM)	10.5	10.5	10.5
Overall forage area (ha):			
silage and aftermath grazing	0.23	0.28	0.33
grazing	0.30	0.30	0.34
	<u>0.53</u>	<u>0.58</u>	<u>0.67</u>

Housing system: In cubicles*

Straw for general use incl. calving pens	0.33	0.33	0.42
Straw bedding (t)	1.25	1.75	1.50

Cost @ £74/t bought in - adjust if home grown.

* Amend bedding costs for cows overwintered or housed on straw.

Assumptions:

1. Mainly grass farm either buying in all straw and concentrates or growing small amount of cereals. May/June calves weaned in February when on silage diets.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age, and an exchange rate of £0.85/€. For further detail on this scheme see pages 141-142 and 433.

Upland Suckler Cows - Mainly Silage Diets

GROSS MARGIN DATA

Calving period	Feb-Apr	May-Jun	Aug-Oct
OUTPUT	£/cow	£/cow	£/cow
Calf sales (lwt - 92% crop)			
Steers			
290 kg @ 225 p	563	-	-
370 kg @ 225 p	-	717	-
420 kg @ 225 p	-	-	819
Heifers			
260 kg @ 220 p			
330 kg @ 220 p			
380 kg @ 220 p			
Scottish Suckler Beef Support Scheme	85	85	85
	<u>648</u>	<u>802</u>	<u>904</u>
Less: Replacement -	121	121	121
cow			
bull	29	29	29
	<u>498</u>	<u>652</u>	<u>754</u>
VARIABLE COSTS			
Cow concentrates @ £220/t	22	33	44
Calf concentrates @ £204/t	20	102	71
Vet & medicines	29	29	29
Straw feeding & bedding @ £74/t	69	61	57
Commission, haulage, tags & levies	44	49	53
	<u>184</u>	<u>274</u>	<u>254</u>
Gross Margin before forage	<u>315</u>	<u>379</u>	<u>501</u>
Forage variable costs:			
silage @ £152/ha	36	42	50
grazing @ £133/ha	40	40	45
	<u>76</u>	<u>82</u>	<u>95</u>
Total Variable Costs	<u>260</u>	<u>356</u>	<u>349</u>
GROSS MARGIN £/cow	<u>239</u>	<u>297</u>	<u>406</u>
GROSS MARGIN £/ha	<u>447</u>	<u>513</u>	<u>609</u>

Sensitivity-Change ±	Change in Gross Margin/head (£)		
10 p/kg in lwt sale price	26	32	37
Sale weight ± 10kg	21	20	21
Herd life ± 1 year	22	22	22

Replacement cost prices:

Cull cow	£918	In-calf heifer (purch.)	£1,700
Cull bull	£1,080	Replacement bull	£5,200

Lowground Suckler Cows - Mainly Straw Diets

PHYSICAL DATA

Breed: Dairy-beef cross cows bred to range of bulls, mostly continental.

Calving period	Feb-Apr	May-Jun	Aug-Oct
Calves weaned (%)	92%	92%	92%
Month of weaning	October	December	July
Days to weaning	220	200	300
Month of sale	October	April	October
Lwt of calves: at weaning (kg)	260	310	340
Lwt of calves: at sale/transfer (kg)	275	350	395
Herd life of cows (years)	7	7	7
Herd life of bulls (years)	4	4	4
Cow mortality (%)	1	1	1
Calf mortality (%)	4.5	4.5	4.5
Cow:bull ratio (:1)	35	35	35
Feeding/cow and calf (winter days):	190	190	210
silage (t)	1.5	-	-
straw (kg)	1,500	2,200	1,300
calf concentrates (kg)	120	550	400
cow concentrates (kg)	500	550	1,100
Grazing fertiliser (kg N/ha)	175	175	175
Silage & aftermath fertiliser (kg N/ha)	175	-	-
Silage:			
yield (t/ha from 1-cut)	23	23	23
DM quality (g/kg)	220	220	220
ME quality (MJ/kg DM)	10.5	10.5	10.5
Overall forage area (ha):			
silage and aftermath grazing	0.07	-	-
grazing	0.34	0.38	0.40
	<u>0.41</u>	<u>0.38</u>	<u>0.40</u>

Housing system: Straw bedding assumed*

Straw bedding (t)	0.75	1.05	0.90
Cost @ £50/t based on home grown straw - adjust if bought in.			

* Amend bedding costs for cows overwintered or housed elsewhere.

Assumptions:

1. Mixed farm growing sufficient grain to cover concentrate and straw feeding/bedding requirements. Only purchasing protein and minerals. May/June calves weaned earlier to reduce cow wintering costs. Small amount of silage made to cover extra grass growth in early season.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age, and an exchange rate of £0.85/€. For further detail on this scheme see pages 141-142 and 433.

Lowground Suckler Cows - Mainly Straw Diets

GROSS MARGIN DATA

Calving period	Feb-Apr	May-Jun	Aug-Oct
OUTPUT	£/cow	£/cow	£/cow
Calf sales (lwt - 92% crop)			
Steers			
Heifers			
290 kg @ 225 p	260 kg @ 220 p	563	-
370 kg @ 225 p	330 kg @ 220 p	-	717
420 kg @ 225 p	370 kg @ 220 p	-	-
809			
Scottish Suckler Beef Support Scheme	85	85	85
	648	802	894
Less: Replacement - cow	121	121	121
bull	34	34	34
	493	647	739
VARIABLE COSTS			
Cow concentrates @ £170/t (home-mix)	85	94	187
Calf concentrates @ £165/t (home-mix)	20	91	66
Straw (fed) @ £50/t (home-grown)	75	110	65
Vet & medicines	29	29	29
Straw bedding @ £50/t (home-grown)	38	53	45
Commission, haulage & tags	44	49	53
	291	426	445
Gross Margin before forage	203	222	295
Forage variable costs:			
silage @ £152/ha	10	-	-
grazing @ £170/ha	58	65	68
	68	65	68
Total Variable Costs	359	491	513
GROSS MARGIN £/cow	135	157	227
GROSS MARGIN £/ha	333	413	567

Sensitivity-Change ±	Change in Gross Margin/head (£)		
10 p/kg in lwt sale price	26	32	36
Sale weight ± 10kg	21	20	21
Herd life ± 1 year	22	22	22

Replacement cost prices:

Cull cow	£918	In-calf heifer (purch.)	£1,700
Cull bull	£1,080	Replacement bull	£5,800

Spring Calving Cows Producing 18 - 20 Month Finished Cattle

PHYSICAL DATA

Breed: Commercial cows bred to a range of bulls, mostly continental

	Steers	Heifers
Calving period	Feb-Apr	Feb-Apr
Calves weaned (%)	92%	92%
Month of weaning	October	October
Calves sold finished (%)	91%	91%
Sale weight (kg lwt)	607	564
Dead weight (kg dwt)	340	310
Weaning weight (kg lwt)	280	240
Herd life of cows (years)	7	7
Herd life of bulls (years)	4	4
Cow:bull ratio (:1)	35	35
Feeding/cow and calf (winter days):		
silage (t)	5.0	5.0
straw bedding (t)	2.0	1.6
calf concentrates (kg) pre-weaning	100	100
cow concentrates (kg)	100	100
Forage area (ha):		
silage + aftermath	0.16	0.16
grazing	0.30	0.30
Overwintered calves:		
Feeding period 180 days, October-April		
Liveweight gain (kg)	110	110
Average daily liveweight gain (kg)	0.6	0.6
Feeding: barley/protein/minerals (t)	0.30	0.35
silage (t)	3.5	3.0
Silage area (ha)	0.11	0.10
Finishing cattle:		
Feeding period (days): at grass	180	180
housed	60	-
Liveweight gain	217	214
Daily liveweight gain: at grass	0.8	0.8
housed	1.1	-
Feeding: concentrates at grass (t)	0.20	0.25
barley/protein/minerals in house (t)	0.70	-
straw fed in house (t)	0.1	-
Grazing area (ha)	0.23	0.20

Housing system: Straw bedding assumed - home produced *

* Amend bedding costs for cows overwintered or on slurry systems.

Assumption: SSBSS value as per note on page 148.

Spring Calving Cows Producing 18 - 20 Month Finished Cattle

GROSS MARGIN DATA

OUTPUT	Spring born	
	Steer £/cow	Heifer £/cow
Calf sales (dwt - 91% crop)		
340 kg @ 370 p	1,145	-
310 kg @ 370 p	-	1,044
Scottish Suckler Beef Support Scheme	84	84
	<u>1,229</u>	<u>1,128</u>
Less: Replacement - cow	121	121
bull	33	33
	<u>1,075</u>	<u>974</u>
VARIABLE COSTS		
Cow concentrates @ £220/t	22	22
Calf concentrates @ £204/t	20	20
Barley, protein & minerals @ £165/t housed	165	58
Barley, protein & minerals @ £165/t at grass	33	41
Feeding straw @ £50/t	5	-
Bedding straw @ £50/t	100	80
Vet & medicines	58	58
Commission, levies & haulage	78	74
	<u>481</u>	<u>353</u>
Gross Margin before forage	<u>595</u>	<u>622</u>
Forage variable costs:		
silage @ £241/ha	65	63
grazing @ £133/ha	70	67
	<u>135</u>	<u>130</u>
Total Variable Costs	<u>616</u>	<u>483</u>
GROSS MARGIN £/cow	<u>460</u>	<u>492</u>
GROSS MARGIN £/ha (acre)	<u>575 (233)</u>	<u>647 (262)</u>

Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	31	28
Not bedded on straw	100	80
£10/t in straw price	21	16

Replacement cost prices:

Cull cow	£918	In-calf heifer (purch.)	£1,700
Cull bull	£1,080	Replacement bull	£5,750

Overwintering Spring-Born Suckled Calves

PHYSICAL DATA

	Spring-born		Spring-born		
	Steer		Heifer		
Purchase/transfer date	October		October		
Sale/transfer date	April		April		
Feeding period (days)	180		180		
Liveweight: at purchase/transfer (kg)	290		260		
at sale/transfer (kg)	390		350		
Average daily liveweight gain (kg/day)	0.6		0.5		
Mortality (%)	1%		1%		
Feeding:	diet basis	silage	straw	silage	straw
barley/protein/minerals (t)	0.30	0.66	0.35	0.66	
silage (t)	3.5	-	3.0	-	
straw (t) ME 6.5 MJ/kg DM	-	0.8	-	0.7	
Silage area (ha)	0.11	-	0.10	-	
Silage: yield (t/ha)	31	31	31	31	
DM quality (g/kg)	240	240	240	240	
ME quality (MJ/kg DM)	10.6	10.6	10.6	10.6	
N-fertiliser (kg/ha)	220	220	220	220	

Housing system: Straw bedding assumed*.

Straw bedding (t) 0.5 0.3 0.5 0.3

Cost @ £50/t based on home grown straw - adjust if bought in.

* Amend bedding costs if outwintered or on slurry systems.

Assumptions:

1. Silage diet concentrates phased out by 4 weeks to turnout.
2. Silage could be costed on a per tonne basis for clamp silage instead of a per hectare basis to reflect the true cost of growing, making, storing and handling silage.

Overwintering Spring-Born Suckled Calves

GROSS MARGIN DATA

OUTPUT	Spring-born			
	Steer £/head		Heifer £/head	
Sale value (lwt - 1% mortality):				
390 kg @ 225 p	869		-	
350 kg @ 220 p	-		762	
Less: Weaned calf (lwt):				
290 kg @ 225 p	653		-	
260 kg @ 220 p	-		572	
	<u>216</u>		<u>190</u>	
VARIABLE COSTS				
<i>Diet basis</i>	<i>silage</i>	<i>straw</i>	<i>silage</i>	<i>straw</i>
Barley, protein & minerals @ £165/t	50	-	58	-
Barley, protein & minerals @ £165/t	-	109	-	109
Feeding straw @ £50/t (home-grown)	-	40	-	35
Bedding straw @ £50/t (home-grown)	25	15	25	15
Vet & medicines	22	22	22	22
Commission, levies & haulage	44	44	40	40
	<u>141</u>	<u>230</u>	<u>145</u>	<u>221</u>
Gross Margin before forage	<u>75</u>	<u>- 14</u>	<u>45</u>	<u>- 31</u>
Forage variable costs:				
silage @ £241/ha	27	-	24	-
Total Variable Costs	<u>168</u>	<u>230</u>	<u>169</u>	<u>221</u>
GROSS MARGIN £/head	<u>48</u>	<u>- 14</u>	<u>21</u>	<u>- 31</u>
GROSS MARGIN £/ha (acre)	<u>441 (178)</u>	<u>-</u>	<u>209 (85)</u>	<u>-</u>
Sensitivity-Change ±				
10 p/kg in lwt sale price	38	38	35	35
10 p/kg in lwt purchase price	29	29	26	26
Not bedded on straw	25	15	25	15
£10/t in straw price	5	11	5	10

Finishing Spring-Born Suckled Calves Intensively at 12 Months

PHYSICAL DATA

	Spring-born	
	Steer	Bull
Purchase/transfer date	October	October
Sale date	April	April
Feeding period (days)	180	195
Liveweight: at purchase/transfer (kg lwt)	280	291
at sale (kg lwt)	541	603
Deadweight at sale (kg dwt)	298	338
Average daily liveweight gain (kg/day)	1.45	1.60
Mortality (%)	1.0	1.0
Feeding:		
barley/protein/minerals (t)	1.5	1.7
straw (t) ME 6.5 MJ/kg DM	0.3	0.3
Housing system: Straw bedding assumed*.		
Straw bedding (t)	0.5	0.5
Cost @ £50/t based on home grown straw - adjust if bought in.		
* Amend bedding costs if on slurry based systems.		

Finishing Spring-Born Suckled Calves Intensively at 12 Months

GROSS MARGIN DATA

OUTPUT	Steer £/head	Bull £/head
Sale value (dwt - 1% mortality):		
298 kg @ 370 p (541 kg lwt)	1,090	-
338 kg @ 363 p (603 kg lwt)	-	1,214
Less: Store purchase (lwt):		
280 kg @ 225 p	630	-
291 kg @ 205 p	-	597
	<hr/> 460	<hr/> 617
VARIABLE COSTS		
Barley, protein & minerals @ £172/t	258	292
Feeding straw @ £50/t (home grown)	15	15
Bedding straw @ £50/t (home grown)	25	25
Vet & medicines	22	22
Commission, levies & haulage	52	55
Total Variable Costs	<hr/> 372	<hr/> 409
GROSS MARGIN £/head	<hr/> 88	<hr/> 208

Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	29	33
10 p/kg in lwt purchase price	28	29
Not bedded on straw	25	25
£10/t in straw price	8	8

Finishing Year Old Autumn-Born Suckled Calves at 18 Months

PHYSICAL DATA

	Autumn-born	
	Steer	Heifer
Purchase/transfer date	October	October
Sale date	April	March
Feeding period (days)	180	165
Liveweight: at purchase/transfer (kg lwt)	420	380
Liveweight: at sale (kg lwt)	607	563
Deadweight at sale (kg dwt)	340	310
Average daily liveweight gain (kg/day)	1.0	1.1
Mortality (%)	1.0	1.0
Feeding:		
barley/protein/minerals (t)	0.70	0.61
kg/day	3.9	3.7
silage (t)	4.5	3.8
kg/day	25.1	23.1
Silage area (ha)	0.15	0.12
Silage: yield	31	31
DM quality (g/kg)	240	240
ME quality (MJ/kg DM)	10.6	10.6
Silage fertiliser (kg N/ha)	220	220
Housing system: Straw bedding assumed*.		
Straw bedding (t)	0.75	0.70
Cost @ £50/t based on home grown straw - adjust if bought in.		
* For slatted court omit bedding costs.		

Assumptions:

1. Calves from Upland/Lowground Suckler Cows – silage or straw diet.
2. Silage could be costed on a per tonne basis for clamp silage instead of a per hectare basis to reflect the true cost of growing, making, storing and handling silage.

Finishing Year Old Autumn-Born Suckled Calves at 18 Months

GROSS MARGIN DATA

OUTPUT	Steer £/head	Heifer £/head
Sale value (dwt - 1% mortality):		
340 kg @ 370 p (607 kg lwt)	1,245	-
310 kg @ 370 p (563 kg lwt)	-	1,136
Less: Weaned calf (lwt):		
420 kg @ 225 p	945	-
380 kg @ 220 p	-	836
	<u>300</u>	<u>300</u>
VARIABLE COSTS		
Barley, protein & minerals @ £172/t	120	105
Bedding straw @ £50/t (home grown)	38	35
Vet & medicines	17	17
Commission, levies & haulage	56	53
	<u>231</u>	<u>210</u>
Gross Margin before forage	69	90
Forage variable costs:		
silage @ £241/ha	36	29
Total Variable costs	<u>267</u>	<u>239</u>
GROSS MARGIN £/head	<u>33</u>	<u>61</u>
GROSS MARGIN £/ha (acre)	<u>220</u> (89)	<u>508</u> (206)
Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	34	30
10 p/kg in lwt purchase price	42	38
Not bedded on straw	38	35
£10/t in straw price	7	7

Finishing Year Old Spring-Born Suckled Calves at 18 - 20 Months

PHYSICAL DATA

	Spring-born	
	Yearling steer	Yearling heifer
Purchase/transfer date	April	April
Sale date	December	October
Feeding period (days): at grass	180	180
housed	60	-
Liveweight: at purchase/transfer (kg lwt)	390	350
at housing (kg lwt)	535	-
at sale (kg lwt)	607	564
Deadweight at sale (kg dwt)	340	310
Average daily lwt gain: at grass (kg/day)	0.8	0.8
housed (kg/day)	1.1	-
Mortality (%)	0.3	0.3
Feeding:		
concentrates at grass (t)	0.20	0.25
barley/protein/minerals in house (t)	0.7	-
straw fed in house (t) ME 6.5 MJ/kg DM	0.1	-
Housing system: Straw bedding assumed*		
Straw bedding (t)**	0.25	-
Grazing area (ha)	0.23	0.20
Grazing fertiliser (kg N/ha)	175	175
Stocking rate at grass (animals/ha)	4.2	5.0

* Amend bedding costs if on slurry based systems.

** Cost @ £50/t based on home grown straw - adjust if bought in.

Finishing Year Old Spring-Born Suckled Calves at 18 - 20 Months

GROSS MARGIN DATA

OUTPUT	Steer £/head	Heifer £/head
Sale value (dwt - 0.3% mortality):		
340 kg @ 370 p (607 kg lwt)	1,254	-
310 kg @ 370 p (564 kg lwt)	-	1,144
Less: Yearling calf (lwt):		
390 kg @ 225 p	878	-
350 kg @ 220 p	-	770
	<u>376</u>	<u>374</u>
VARIABLE COSTS		
Barley, protein & minerals @ £165/t (at grass)	33	41
Barley, protein & minerals @ £165/t (housed)	116	-
Feeding straw @ £50/t (home grown)	5	-
Bedding straw @ £50/t (home grown)	13	-
Vet & medicines	14	14
Commission, levies & haulage	56	53
	<u>237</u>	<u>108</u>
Gross Margin before forage	<u>139</u>	<u>266</u>
Forage variable costs:		
grazing @ £170/ha	39	34
Total Variable costs	<u>276</u>	<u>142</u>
GROSS MARGIN £/head	<u>100</u>	<u>232</u>
GROSS MARGIN £/ha (acre)	<u>435 (176)</u>	<u>1,160 (469)</u>

Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	34	30
10 p/kg in lwt purchase price	39	35
Not bedded on straw	13	-
£10/t in straw price	3	-

Beef Cattle Summer Finishing

PHYSICAL DATA

	Steer	Heifer
Liveweight at purchase (kg)	450	420
Liveweight at slaughter (kg lwt)	586	564
(kg dwt)	340	310
Cattle bought	mid-April	mid-April
Cattle sold	mid-September	mid-September
Finishing period (days)	150	150
Liveweight gain (kg)	136	144
Daily liveweight gain (kg)	0.9	1.0
Supplementary feed:		
barley, proteins & minerals (kg)	308	250
Grazing area (ha)	0.23	0.20
Grazing fertiliser N (kg/ha)	175	175
Feed levels per day:		
first 8 weeks (kg)	0	0
next 6 weeks (kg)	3	2
next 4 weeks (kg)	4	3
last 2 weeks* (kg)	5	4

* Feed at this level to finish by mid-September. Many will house by this time if finishing later.

Assumptions:

In practice, a proportion of the following cattle may be sold as forward stores or housed for autumn finishing at heavier weights. If so, additional concentrate feeding will be required.

Beef Cattle Summer Finishing

GROSS MARGIN DATA

	Steer £/head	Heifer £/head
OUTPUT		
Sale value (dwt):		
340 kg @ 370 p (586 kg lwt)	1,258	-
310 kg @ 370 p (564 kg lwt)	-	1,147
Less: Purchased store calf in April (lwt):		
450 kg @ 225 p	1,013	
420 kg @ 220 p	-	924
	<u>245</u>	<u>223</u>
VARIABLE COSTS		
Barley, protein & minerals @ £165/t	51	41
Vet & medicines	14	14
Commission, levies & haulage	<u>56</u>	<u>53</u>
	<u>121</u>	<u>108</u>
Gross Margin before forage	<u>124</u>	<u>115</u>
Forage variable costs:		
grazing @ £170/ha	<u>39</u>	<u>34</u>
Total Variable costs	<u>160</u>	<u>142</u>
GROSS MARGIN £/head	<u>85</u>	<u>81</u>
GROSS MARGIN £/ha (acre)	<u>370 (150)</u>	<u>405 (164)</u>
 Sensitivity-Change ±		
	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	34	31
10 p/kg in lwt purchase price	45	42

Calf Rearing Costs to 3 Months

PHYSICAL DATA

	Bucket fed	Ad-lib fed
Liveweight (kg): at birth	40	40
at sale, 3 months	110	115
Liveweight gain (kg/day)	0.78	0.83
Feeding period (days)	90	90
Mortality (%)	5	4
	kg	kg
Feeding*: Milk substitute	28	42
Calf concentrates	160	150
Hay	35	30
Bedding (straw)	0.2	0.2

* Home bred calves receive colostrum followed by whole milk up to 10 days of age.

Calf Rearing Costs to 3 Months

VARIABLE COST DATA

	Bucket fed	Ad-lib
VARIABLE COSTS		
Feed:		
milk substitute @ £1700/t	48	71
calf concentrate @ £302/t	48	45
hay (purchased) @ £120/t	4	4
	<hr/>	<hr/>
	100	120
Vet & medicines & tags	18	18
Bedding @ £50/t (home grown)	10	10
	<hr/>	<hr/>
	28	28
	<hr/>	<hr/>
Total Variable Costs	128	148

Sensitivity-Change ±	Change in costs/head (£)	
£100/t in milk substitute price	2.80	4.20
£10/t in calf concentrate price	1.60	1.50

Assumptions:

1. Dairy calves do not receive SSBSS payments – eligible calves have to be 75% beef genetics.
2. Adjust straw cost if bought in.

Intensive Finishing of Dairy Bred Bulls

PHYSICAL DATA

	Holstein	Continental Cross
Breed		
Liveweight at start (kg)	110	120
Feeding period (days)	290	300
Liveweight at slaughter (kg lwt)	500	545
Deadweight at slaughter (kg dwt)	265	300
Killing out percentage (%)	53	55
Overall daily liveweight gain (kg/day)	1.3	1.4
Mortality (%)	3	3
Feeding ¹ :		
110-120 kg liveweight/purchase to slaughter:		
concentrates (barley/protein/minerals) (t)	2.15	2.30
straw (t)	0.4	0.4
Housing system: Straw bedding assumed ² .		
Straw bedding ³ (t)	0.6	0.6

¹ For home bred calves see 'Calf rearing costs to 3 months' (pages 162-163) for cost of feeding to 12-14 weeks (or 110-115kg lwt).

² If housed on slurry based systems omit bedding costs.

³ Adjust straw cost if bought in.

Intensive Finishing of Dairy Bred Bulls

GROSS MARGIN DATA

	Holstein £/head	Continental Cross £/head
OUTPUT		
Sale value (dwt - adj 3% mortality):		
265 kg @ 295 p	758	-
300 kg @ 353 p	-	1,027
<i>Less: Calf purchase (3 months):</i>		
@ £220	220	-
@ £320	-	320
	<hr/> 538	<hr/> 707
VARIABLE COSTS		
Concentrates @ £172/t	370	396
Feeding straw @ £50/t (home grown)	20	20
Bedding straw @ £50/t (home grown)	30	30
Vet & medicines	14	14
Commission, haulage & levies, etc.	44	50
Total Variable costs	<hr/> 478	<hr/> 510
GROSS MARGIN £/head	<hr/> 60	<hr/> 197
Sensitivity-Change ±	Change in Gross Margin/head (£)	
£10/t in concentrate price	21	23
10 p/kg in dwt sale price	26	29

Forage Based Finishing Dairy Steers at 27 Months

PHYSICAL DATA

	Holstein	Continental
Breed		Cross
Liveweight at start (kg) ¹	110	125
Feeding period (days)	659	659
Liveweight at slaughter (kg lwt)	618	632
Deadweight at slaughter (kg dwt)	315	335
Killing out percentage (%)	51	53
Overall daily liveweight gain (kg/day)	0.8	0.8
Mortality (%)	3	3
Feeding:		
110-125 kg liveweight/purchase to slaughter:		
concentrates (2nd stage calf mix) (t)	0.15	0.15
concentrates (barley/protein/minerals) (t)	0.59	0.68
silage (t) - over two housing periods	6.0	6.4
Grazing area - over two summers (ha)	0.42	0.42
Silage area - for two housing periods (ha)	0.30	0.32
Silage:		
yield	20	20
DM quality (g/kg)	240	240
ME quality (MJ/kg DM)	10.6	10.6
Silage fertiliser (kg N/ha)	125	125

Housing system: Straw bedding assumed ².

Straw bedding ³ (t)	1.2	1.2
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¹ For home bred calves see 'Calf rearing costs to 3 months' (pages 162-163) for cost of feeding to 12-14 weeks (or 110-115kg lwt).

² If housed on slurry based systems omit bedding costs.

³ Adjust straw cost if bought in.

Forage Based Finishing Dairy Steers at 27 Months

GROSS MARGIN DATA

	Holstein	Continental Cross ³
OUTPUT	£/head	£/head
Sale value (dwt - adj 3% mortality):		
315 kg @ 353 p	1,079	-
335 kg @ 363 p	-	1,180
Less: Calf purchase:		
@ £220	220	-
@ £320	-	320
	<u>859</u>	<u>860</u>
VARIABLE COSTS		
Concentrate calf mix @ £256/t	26	26
Concentrate barley blend @ £172/t	101	117
Bedding straw @ £50/t (home grown)	60	60
Vet & medicines	28	28
Commission, haulage & levies, etc.	52	54
Total Variable costs	<u>267</u>	<u>285</u>
Gross Margin before forage	<u>592</u>	<u>575</u>
Forage variable costs:		
silage @ £152/ha	46	49
grazing @ £133/ha	56	56
	<u>102</u>	<u>105</u>
Total Variable costs	<u>369</u>	<u>390</u>
GROSS MARGIN £/head ¹	<u>490</u>	<u>470</u>
GROSS MARGIN £/ha (acre) ²	<u>340</u> (138)	<u>318</u> (129)

Sensitivity-Change ± Change in Gross Margin/head (£)

£10/t in concentrate price	6	7
10 p/kg in dwt sale price	30	32

¹ Unlike other beef finishing enterprises featured in the Farm Management Handbook, spanning over two years effectively incurs double the fixed cost share, which is not included above.

² Produces a strong gross margin per head but the extensive nature of this enterprise dilutes its return per hectare.

³ The higher sales value of a continental-cross steer is majorly offset by the higher calf purchase price.

Sheep

Introduction

Markets and price drivers

The UK is unique in the EU, being a significant sheep meat producer and exporter. It is one of the largest sheep meat producers in the world and both the third largest exporter and importer. The UK exported over 26% of sheep meat produced (2016), but imported 30% to complement seasonality of supply, price and carcass balance issues. The scale of exports particularly through peak season (Sep-Dec) makes trade links, export demand, and exchange rate competitiveness highly important.

Lamb can be a comparatively expensive protein on the retail shelf, therefore, the extent and duration of retail price promotions is a major driver of domestic consumption. The producer price is also significantly influenced by seasonality of supply as shown in the chart below.



Being predominantly finished off grass or forage crops means there is a strong relationship between the weather, grass growth and lamb supply. Producer price is also influenced by imports, principally from New Zealand. The NZ flock was in decline as greater land area had been committed to dairying, but it has since stabilised with smaller annual variation in lamb production now due to inclement weather. China is an increasingly significant market for NZ lamb. Historic trade links and being a high value market, however, mean GB remains a major customer. Recent years have shown that the timing of imported lamb onto GB retail shelves rather than the volume of imports having the biggest influence on the GB lamb and hogget trade.

Marketing

Prime lamb sales are almost entirely reliant on the spot market. Since it is a seasonal product, the timing of sales has a large influence on price. As highlighted in the above chart, the GB deadweight prime lamb price fluctuates greatly within a season. The festival of Ramadan is an increasingly important marketing date, although difficult to target as it

moves forward 10 days each year. Old season lamb tends to recover value heading towards the Easter market. The cost, however, associated with growing a lamb for the early market or delaying sale until the price rises again in early spring must also be taken into account.

The auction market accounted for 56% of sheep sales across the UK (2016). Similar to the cattle market, the live auction system provides an important service. It is a mechanism that brings together sheep and customers to establish a transparent price.

The most common method to spread risk, when selling at livestock auctions, is to target multiple sales per year. The future price may be influenced by gaining feedback from buyers and acting on that information. Similarly, when selling direct to processors, an improved price may be achieved if a large number of in-specification lambs can be delivered at pre-arranged times, known in advance.

Supermarket specification lamb accounts for the majority of domestic sales, however, a butcher's lamb is also a sizeable market (c. 10%). Exports include the heavy lamb trade to northern European countries, particularly France, which accounts for half of all exports. The Euro lamb market, predominantly to southern Mediterranean countries, is a small but key outlet for light hill lamb. While it remains important, this route has been curtailed by recession and availability of cheaper lamb imports.

Technical performance

Sheep enterprise margins are inevitably sensitive to the sales price. However, there is limited opportunity to influence the overall market and greater potential exists through improving output per hectare and cost control.

Top performing flocks consistently rear more lambs, sell more finished (if they are on the right land type) and use less purchased feed. Grassland management is also better. Whilst fixed costs on these top performing farms may be lower they are also spread over more kilos of lamb sold (higher output).

Budgeted margins for 2017/18 are expected to be similar on the year provided a similar exchange rate. Spring 2017 has been drier but not necessarily supporting better than average grass growth. Early finished lamb marketings are actually lower on the year to date. This may, again, result in a midseason surge of lambs.

Subsidies and support

The Scottish Upland Sheep Support Scheme (SUSSS) is a coupled support payment for sheep to provide additional support to producers on LFASS category A land. The payment rate is estimated at €100/ewe hogg annually but actual payment rates will be determined by the number of hogg applications each year. The full payment is made in the Summer following the year when the claim is made. This support has not been

included in the 2017/18 budget gross margins due to the specific nature of scheme eligibility. For more details, see Rural Aid Schemes, pages 433-434.

General Reference Data

Sheep feeding

Suggested daily rations (kg fresh matter) for Scottish Blackface ewes (60 kg lwt) during pregnancy using average quality baled silage (DM 300g/kg, ME 10.5MJ/kg DM) and hay (DM 830g/kg, ME 8.3MJ/kg DM).

Weeks before lambing	Single-bearing ewes		Twin-bearing ewes	
	<i>Silage</i>	<i>Concentrates</i>	<i>Silage</i>	<i>Concentrates</i>
8	2.8	0	2.8	0
6	2.8	0	2.7	0.15
4	2.7	0.25	2.5	0.35
2	2.6	0.35	2.3	0.45
	<i>Hay</i>	<i>Concentrates</i>	<i>Hay</i>	<i>Concentrates</i>
8	1.1	0	1.1	0.1
6	1	0.15	1	0.4
4	0.9	0.4	0.8	0.6
2	0.85	0.55	0.7	0.8

Suggested daily rations (kg fresh matter) for crossbred ewes (e.g. mule, 75 kg lwt) during pregnancy using average quality baled silage (DM 300 g/kg, ME 10.5 MJ/kg DM) and hay (DM 830 g/kg, ME 8.3 MJ/kg DM).

Weeks before lambing	Single-bearing ewes		Twin-bearing ewes	
	<i>Silage</i>	<i>Concentrates</i>	<i>Silage</i>	<i>Concentrates</i>
Mid-pregnancy	2.8 *	0	3 *	0
8	3.3	0	3.2	0.15
6	3.2	0.1	3	0.35
4	3.1	0.25	2.8	0.5
2	3	0.4	2.7	0.75
	<i>Hay</i>	<i>Concentrates</i>	<i>Hay</i>	<i>Concentrates</i>
Mid-pregnancy	1 *	0	1.1 *	0
8	1.3	0	1.4	0.15
6	1.3	0.15	1.2	0.35
4	1.2	0.35	1.1	0.65
2	1.1	0.6	0.8	1

* restricted amount fed.

Concentrates based on high quality compound, e.g. ME 12.5 MJ/kg DM and 18% CP (fresh basis). If the silage has an ME above 11.0MJ/kgDM

and CP above 11% then research has shown that supplementation with soya at 100g/hd/day per lamb carried for 3-4 weeks pre lambing can replace conventional compound feeds (mineral supplementation will also be required). Alternatives to hi-pro soya are treated soya products that can be fed at half the above rate, as they contain higher levels of Digestible Undegradable Protein.

Wool

The total payment made to producers on receipt of their 2017 clip includes the balancing payment due from 2016 plus the advance payment for 2017. The balancing payment made to producers for their 2016 clip is based on the final average price achieved at auction for the 2016 season less the advance payment already made, after deducting the handling costs for the 2016 clip.

The 2016 clip average values ranged from £0.14/kg (Mountain wool) up to £3.15/kg (Lustre wool).

Deductions for haulage and handling depend on the point of delivery. For wool picked up by a haulier, or delivered by the producer to a haulier's premises or authorised collection centre charges are as follows:

2,000 kg or over: A charge of £5.40 per approved container.

501 to 1,999 kg: A charge of £7.45 per approved container.

Under 500 kg: A charge of £10.80 per approved container.

A charge of £5.15 per approved container will apply when a producer delivers to a haulier's premises or authorised Collection Centre. There is no carriage recharge made to producers who deliver their wool direct to their authorised grading depot. The carriage charge (if applicable) is divided between the 'advance' and the 'balance' payments.

For more details of wool prices, charges, collection centres and grading depots, please contact the BWMB (www.britishwool.org.uk).

Development of wool shedding breeds

With the development of wool shedding breeds labour and shearing costs can be reduced. Wool shedding breeds can be looked at once per day and flystrike incidence is greatly reduced although normal protection against ectoparasites is still recommended. Dagging is eliminated and tailing is not required. Potential savings in protein and energy requirements may exist but are hard to quantify. Wool contamination of pastures is not an issue but fences do get covered in shed wool. Shearing costs are largely eliminated after 9 years of repeated crossing to wool shedding breeds. There is enough wool for insulation from upland and hill weather conditions but there is some evidence that they are less willing to lie down on wet ground and thus less suitable to finishing/wintering on stubble turnips.

Extensive Hill

PHYSICAL DATA

Breeds	Blackface, South Country & Lairg type Cheviot		
	Lambs reared (%)		
	80%	90%	100%
Ewe hoggs wintered	Away	Away	Away
Lamb crops per ewe (avg)	4	4	4
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	3	3	3
Lamb numbers:			
marked	80	90	100
sold/retained	77	87	97
sold: finished lambs	0	10	15
store lambs	51	51	56
flock replacement	26	26	26
Ewe numbers:			
draft/cast	14	15	16
mortalities	12	11	10
Wool sales (kg)	160	160	160
Concentrate feeding (kg)	1,800	1,900	2,000
Hay reserve (/annum) (kg)	3,000	3,000	3,000

Basis of data:

1. Lambs are assumed sold at or by the autumn sales 2017 (estimated price).
2. Lambing percentage reflects the range of performance found.
3. Finished lambs – assume 34 kg liveweight (15 kg carcass weight).
4. Mortality in ewe hoggs is assumed to be 3%.
5. Ewe concentrate feeding – 18% CP, ideally a balanced compound with feeding of ewes selected on the basis of scanning results. Assumes self-feed blocks are used on less accessible hills although expensive per unit of energy, ME range 8.5 to 12 MJ/kg DM, total block intake can range from 25-100 blocks/100 ewes.
6. Higher performance can result from better winter nutrition and provision of improved summer grazing for selected ewes, particularly those nursing twins.
7. Grazing is not charged. For improved grazings an annual maintenance charge of £50/ha covers a share of lime and fertiliser.
8. Hay from good in-bye land receiving 125kg/ha N, yielding 7t/ha.

Extensive Hill

GROSS MARGIN DATA

		Lambs reared (%)		
		80%	90%	100%
OUTPUT		£/100 ewes tupped		
Finished lambs:	10 @ £54	-	540	-
	15 @ £54	-	-	810
Store lambs:	51 @ £38	1,938	1,938	-
	56 @ £38	-	-	2,128
Draft/cast ewes:	14 @ £37	518	518	-
	16 @ £45	-	-	720
Wool sales 160kg @ £0.65/kg		104	104	104
		2,560	3,100	3,762
Less: ram replacement (net)		400	400	400
		<u>2,160</u>	<u>2,700</u>	<u>3,362</u>
VARIABLE COSTS				
Sheep feed @ £248/t		446	471	496
Away wintering ewe hoggs at £18.02/head (inc. haulage)		474	474	474
Vet, medicines & dips		364	366	368
Commission, levies, haulage, shearing, scanning & tags		519	580	646
		<u>1,803</u>	<u>1,891</u>	<u>1,984</u>
Gross margin before forage		<u>357</u>	<u>809</u>	<u>1,378</u>
Forage variable costs:				
0.4 ha hay @ £118/ha		47	47	47
Total Variable Costs		<u>1,850</u>	<u>1,938</u>	<u>2,031</u>
GROSS MARGIN		<u>310</u>	<u>762</u>	<u>1,331</u>
Sensitivity-Change ±		Change in Gross Margin/100 ewes (£)		
£5/hd in all lamb sales		255	305	355
£5/hd in draft ewe price		83	125	96
Hay charged at market value (£100/t)		-253	-253	-253

Improved Hill

PHYSICAL DATA

Breeds	Hill breeds inc Blackface hill type, NCC		
Breeds of rams	Bluefaced Leicester, NCC, Texel, Suffolk		
Lambing period	Assumed to commence 2nd week April		
	Lambs reared (%)		
	110%	120%	130%
	Home	Home	Home
Ewe hoggs wintered			
Lamb crops per ewe	4	4	4
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	3	3	3
Lamb numbers:			
marked	113	123	133
sold/retained	110	120	130
sold: ewe lambs	10	20	30
finished lambs	10	20	30
store lambs	62	52	42
flock replacement	28	28	28
Ewe numbers:			
draft/cast	14	15	16
mortalities	10	9	8
Ewe hoggs purchased	0	0	0
Wool sales (kg)	250	250	250
Concentrate feeding (kg)	2,500	3,000	3,500
Hay feeding	2,000	2,000	2,000
Hay reserve (/annum) (kg)	1,500	1,500	1,500
Bedding straw - 6wk period (kg/day)	80	80	80
Improved permanent pasture assumed (ha)	10.0	10.3	10.6

Basis of data:

1. Estimate of stock prices autumn/early winter 2017.
2. Finished lambs – assume 36 kg liveweight (16-17 kg carcass weight).
3. Ewes are first tupped as Gimmers.
4. Mortality in ewe is assumed to be 3%.
5. Ewe concentrate feeding – ideally a balanced compound 18% CP.
6. The level of concentrate feeding, the quality of hill land, the availability of improved or inbye grazing, the system of management and their combined effects on performance can vary greatly from farm to farm.

Improved Hill

GROSS MARGIN DATA

OUTPUT	Lambs reared (%)		
	110%	120%	130%
	£/100 ewes tupped		
Ewe lambs:			
10 @ £74	740	-	-
20 @ £74	-	1,480	-
30 @ £74	-	-	2,220
Finished lambs:			
10 @ £58 (36kg lwt)	580	-	-
20 @ £58	-	1,160	-
30 @ £58	-	-	1,740
Store lambs:			
62 @ £44	2,728	-	-
52 @ £44	-	2,288	-
42 @ £44	-	-	1,848
Draft/cast ewes:	14 @ £55	770	770
Wool sales 250kg @ £0.65/kg	163	163	163
	4,981	5,861	6,741
Less: ram replacement (net)	450	450	450
	4,531	5,411	6,291
VARIABLE COSTS			
Sheep feed @ £213/t	533	639	746
Vet, medicines & dips	495	502	508
Bedding straw @ £74/t	249	249	249
Commission, levies, haulage, shearing, scanning & tags	727	801	876
	2,004	2,191	2,379
Gross margin before forage	2,527	3,220	3,912
Forage variable costs:			
0.5 ha hay @ £118/ha	59	59	59
improved permanent pasture @ £133/ha	1,330	1,370	1,410
	1,389	1,429	1,469
Total Variable Costs	3,393	3,620	3,848
GROSS MARGIN	1,138	1,791	2,443
GROSS MARGIN per forage ha	114	174	230
Sensitivity-Change ± Change in Gross Margin/100 ewes (£)			
10 p/kg lwt in finished lamb price	35	69	104
£5/hd in all lamb sales	410	460	510
£5/hd in cast ewe price	70	70	70
30% in pasture utilisation	399	411	423

Draft Blackface Ewes

PHYSICAL DATA

Breeds	Draft Blackface to a terminal or crossing sire		
Lambing period	Commencing mid-March		
	Lambs reared (%)		
	130%	140%	150%
Ewe flock life (seasons)	1.5	1.5	1.5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.5	2.5	2.5
Lamb numbers:			
marked	133	143	153
sold/retained	130	140	150
sold:			
store	32	27	22
finished	65	70	75
breeding	33	43	53
Ewe numbers:			
sales	64	64	64
mortalities	3	3	3
purchased	67	67	67
Wool sales (kg)	250	250	250
Concentrate use:			
Ewe concentrate: ME 12.5 MJ/kg, 18% CP (kg)	3,500	4,000	4,500
Forage: hay - 12,600 kg and aftermath grazing (ha)	1.8	1.8	1.8
grazing (ha)	8.0	8.3	8.6
Total forage (ha)	<u>9.8</u>	<u>10.1</u>	<u>10.4</u>
Bedding straw (kg/day)	80	80	80

Basis of data:

1. Estimated breeding stock prices, autumn 2017.
2. Estimate of finished and store lamb prices, summer and autumn 2017.
3. Hay yield and quality 7 t/ha; ME 8.5 MJ/kg DM.
4. Hay and aftermath grazing fertiliser level 125 kg N/ha; grazing fertiliser level 125 kg N/ha.
5. Liveweight of lambs at sale: 36 kg, 32 kg store or sold as ewe lambs for breeding.
6. Straw bedding based on 80 kg/day for 100 ewes housed over a 6 week lambing period.

Draft Blackface Ewes

GROSS MARGIN DATA

OUTPUT	Lambs reared (%)		
	130%	140%	150%
	£/100 ewes tupped		
Ewe lambs: 33 @ £79	2,607	-	-
43 @ £79	-	3,397	-
53 @ £79	-	-	4,187
Finished lambs: 32 @ £58 (36 kg lwt)	1,856	-	-
27 @ £58 (36 kg lwt)	-	1,566	-
22 @ £58 (36 kg lwt)	-	-	1,276
Store lambs: 65 @ £44	2,860	-	-
70 @ £44	-	3,080	-
75 @ £44	-	-	3,300
Cast ewes: 64 @ £45	2,880	2,880	2,880
Wool sales 250kg @ £0.65/kg	163	163	163
	<u>10,366</u>	<u>11,086</u>	<u>11,806</u>
Less: ewes purchased - 67 @ £66	4,422	4,422	4,422
ram replacement (net)	375	583	583
	<u>5,569</u>	<u>6,081</u>	<u>6,801</u>
VARIABLE COSTS			
Ewe concentrate @ £213/t	746	852	959
Vet, medicines & dips	528	535	542
Bedding straw @ £74/t	249	249	249
Commission, levies, haulage, shearing, scanning & tags	1,243	1,303	1,364
	<u>2,766</u>	<u>2,939</u>	<u>3,114</u>
Gross margin before forage	<u>2,803</u>	<u>3,142</u>	<u>3,687</u>
Forage variable costs:			
hay @ £118/ha	212	212	212
grazing @ £133/ha	1,064	1,104	1,144
Total Variable Costs	<u>4,042</u>	<u>4,255</u>	<u>4,470</u>
GROSS MARGIN	<u>1,527</u>	<u>1,826</u>	<u>2,331</u>
GROSS MARGIN per forage ha	156	181	224

Sensitivity-Change ±	Change in Gross Margin/100 ewes (£)		
10 p/kg lwt in finished lamb price	111	93	76
£5/hd in store lamb price	325	350	375
£5/hd in breeding stock value	165	215	265
£5/hd in cast ewe price	320	320	320
£5/hd in ewe purchase price	335	335	335
30% in pasture utilisation	319	331	343

Crossbred Ewes

PHYSICAL DATA

Breeds	Large crossbred (75-85kg) e.g. Scotch Mule, Mule-cross		
Breed of ram	Terminal Sire		
Lambing period	Commencing early April		
	Lambs reared (%)		
Lambing period	150%	160%	170%
Lamb crops per ewe (avg)	4.5	4.5	4.5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.5	2.5	2.5
Lamb numbers:			
marked	152	162	172
sold/retained	150	160	170
sold: finished lambs	120	140	160
store lambs	30	20	10
Ewe numbers:			
culls	17	17	17
mortalities	5	5	5
gimmers purchased	22	22	22
Wool sales - ewes, rams & hogs (kg)	270	270	270
Ewe concentrate: ME 12.5 MJ/kg DM, 18% CP (kg)	4,500	5,000	5,500
Forage: improved grazing (ha)	10.0	10.3	10.6
silage (ha)	2	2	2
Total forage (ha)	12	12	13
Bedding straw (kg/day)	80	80	80

Basis of data:

1. Estimates of gimmer prices 2017, finished and store lamb and cast ewe prices 2015. Finished lambs at 42 kg, store 34 kg.
2. Silage once cut, 20 t/ha, 125 kg/ha N.
3. Concentrate use increases with increasing scanning percentage.
4. Bedding straw based on 80 kg/day for 100 ewes housed over a 6 week lambing period.
5. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.

Crossbred Ewes

GROSS MARGIN DATA

OUTPUT

	Lambs reared (%)		
	150%	160%	170%
	£/100 ewes tupped		
Finished lambs: 120 @ £72 (42kg lwt)	8,640	-	-
140 @ £72	-	10,080	-
160 @ £72	-	-	11,520
Store lambs: 30 @ £53	1,590	-	-
20 @ £53	-	1,060	-
10 @ £53	-	-	530
Cast ewes: 17 @ £72	1,224	1,224	1,224
Wool sales 270kg @ £0.85/kg	230	230	230
	<u>11,684</u>	<u>12,594</u>	<u>13,504</u>
Less: gimmers purchased - 22 @ £118	2,596	2,596	2,596
ram replacement (net)	542	542	542
	<u>8,546</u>	<u>9,456</u>	<u>10,366</u>
VARIABLE COSTS			
Ewe concentrate @ £213/t	959	1,065	1,172
Vet, medicines & dips	592	599	606
Bedding straw @ £74/t	249	249	249
Commission, levies, haulage, shearing, scanning & tags	1,197	1,266	1,333
	<u>2,997</u>	<u>3,179</u>	<u>3,360</u>
Gross margin before forage	<u>5,549</u>	<u>6,277</u>	<u>7,006</u>
Forage variable costs:			
silage @ £152/ha	304	304	304
grazing @ £133/ha	1,330	1,370	1,410
Total Variable Costs	<u>4,631</u>	<u>4,853</u>	<u>5,074</u>
GROSS MARGIN	<u>3,915</u>	<u>4,603</u>	<u>5,292</u>
GROSS MARGIN per forage ha	326	374	420

Sensitivity-Change ±

Change in Gross Margin/100 ewes (£)

10 p/kg lwt in finished lamb price	484	564	645
£5/hd in all lamb sales	750	800	850
£5/hd in cast ewe price	85	85	85
£5/hd in gimmer price	110	110	110
30% in pasture utilisation	399	411	423

Pure Bred Flock

PHYSICAL DATA

Breeds	Mid-sized (60-65kg) e.g. Lleyn, Romney		
Lambing period	March-April		
	Lambs reared (%)		
	150%	160%	170%
Lamb crops per ewe	4.5	4.5	4.5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.5	2.5	2.5
Lamb numbers:			
marked	152	162	172
sold/retained	150	160	170
sales:			
ewe lambs	25	35	45
finished lambs	75	85	95
store lambs	28	18	8
flock replacements	22	22	22
Ewe numbers:			
culls	18	18	18
mortalities	4	4	4
gimmers purchased	-	-	-
Wool sales (kg)	270	270	270
Ewe concentrate: ME 12.5 MJ/kg, 18%CP (kg)	4,500	5,000	5,500
Forage: grazing (ha)	8.5	8.8	9.1
silage (ha)	1.7	1.7	1.7
Total forage (ha)	<u>10</u>	<u>11</u>	<u>11</u>
Bedding straw (kg/day)	80	80	80

Basis of data:

1. Estimate of ewe lamb, finished and store lamb prices, cast ewe prices, summer and autumn 2017.
2. Silage at 0.4 t/ewe; silage once cut, 20 t/ha, 125 kg/ha N.
3. For wool sales, add 200kg for Romneys.
4. Finished lambs liveweight at sale, 38 kg, store lambs 32 kg.
5. Bedding straw based on 80 kg/day for 100 ewes housed over a 6 week period. This can be deducted if no housing required.
6. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.

Pure Bred Flock

GROSS MARGIN DATA

OUTPUT	Lambs reared (%)		
	150%	160%	170%
	£/100 ewes tupped		
Ewe lambs: 25 @ £79	1,975	-	-
35 @ £79	-	2,765	-
45 @ £4	-	-	180
Finished lambs: 75 @ £63 (38kg lwt)	4,725	-	-
85 @ £63	-	5,355	-
95 @ £63	-	-	5,985
Store lambs: 28 @ £47	1,316	-	-
18 @ £47	-	846	-
8 @ £47	-	-	376
Draft/cast ewes: 18 @ £68	1,224	1,224	1,224
Wool sales 270kg @ £0.85/kg	230	230	230
(add £290/100 ewes for Romney wool)	9,470	10,420	7,995
Less: ram replacement (net)	583	583	583
	<u>8,887</u>	<u>9,837</u>	<u>7,412</u>
VARIABLE COSTS			
Barley, protein & minerals @ £213/t	959	1,065	1,172
Vet, medicines & dips	676	683	691
Bedding straw @ £74/t	249	249	249
Commission, levies, haulage, shearing, scanning & tags	1,025	1,095	1,029
	<u>2,909</u>	<u>3,092</u>	<u>3,141</u>
Gross margin before forage	<u>5,978</u>	<u>6,745</u>	<u>4,271</u>
Forage variable costs:			
silage @ £152/ha	258	258	258
grazing @ £133/ha	1,131	1,170	1,210
	<u>1,389</u>	<u>1,428</u>	<u>1,468</u>
Total Variable Costs	<u>4,298</u>	<u>4,520</u>	<u>4,609</u>
GROSS MARGIN	<u>4,589</u>	<u>5,317</u>	<u>2,803</u>
GROSS MARGIN per forage ha	450	506	260
Sensitivity-Change ±			
10 p/kg lwt in finished lamb price	274	310	347
£5/hd in all lamb sales	640	690	740
£5/hd in cast ewe price	90	90	90
30% in pasture utilisation	339	351	363

Early Finished Lamb Production

PHYSICAL DATA

Breeds	Suffolk/Continental cross ewe to terminal sire		
Lambing period	Mid-December to end January		
	Lambs reared (%)		
	140%	150%	160%
Lamb crops per ewe (avg)	5	5	5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.5	2.5	2.5
Lamb numbers:			
marked	143	153	163
sold finished	140	150	160
Lamb liveweight at slaughter (kg)	40	40	40
Lamb deadweight at slaughter (kg)	19	19	19
Ewe numbers:			
culls	18	18	18
mortalities	4	4	4
gimmers purchased	26	26	26
Wool sales - ewes, rams & hogs (kg)	270	270	270
Concentrate use:			
ewe concentrate: ME 12.5 MJ/kg, 18% CP (kg)	6,000	6,500	7,000
lamb concentrate (kg)	3,000	3,750	4,000
Total concentrate (kg)	<u>9,000</u>	<u>10,250</u>	<u>11,000</u>
Forage: hay and aftermath grazing (ha)	1.8	1.8	1.8
grazing (ha)	5.6	5.6	5.6
Total forage (ha)	<u>7.4</u>	<u>7.4</u>	<u>7.4</u>
Bedding straw (kg/day)	80	80	80

Basis of data:

1. Breeding stock prices, autumn 2017.
2. Finished lamb prices, summer 2018.
3. Hay yield and quality 7 t/ha; ME 8.5 MJ/kg DM.
4. Hay and aftermath grazing fertiliser level 125 kg N/ha grazing fertiliser level 125 kg N/ha.
5. Bedding straw based on 80 kg/day for 100 ewes housed over a 12 week housing period.
6. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.

Special features: Ewes housed at lambing and often up to weaning. Lambs creep fed at grass or weaned at 6 weeks and finished on concentrates. Ewes grazed tightly during summer. Often a part flock system. Small flocks, high labour input.

Early Finished Lamb Production

GROSS MARGIN DATA

OUTPUT	Lambs reared (%)		
	140%	150%	160%
	£/100 ewes tupped		
Finished lambs 140 @ £78 (40 kg lwt)	10,920	-	-
150 @ £78	-	11,700	-
160 @ £78	-	-	12,480
Cast ewes: 18 @ £80	1,440	1,440	1,440
Wool sales 270kg @ £0.85/kg	230	230	230
	<u>12,590</u>	<u>13,370</u>	<u>14,150</u>
Less: gimmers purchased - 26 @ £118	3,068	3,068	3,068
ram replacement (net)	542	542	542
	<u>8,980</u>	<u>9,760</u>	<u>10,540</u>
VARIABLE COSTS			
Barley, protein & minerals @ £213/t	1,278	1,385	1,491
Lamb concentrate @ £203/t	609	761	812
Vet, medicines & dips	513	514	514
Bedding straw @ £50/t	336	336	336
Commission, levies, haulage, shearing, scanning & tags	1,209	1,273	1,335
	<u>3,945</u>	<u>4,269</u>	<u>4,488</u>
Gross margin before forage	<u>5,035</u>	<u>5,491</u>	<u>6,052</u>
Forage variable costs:			
hay @ £118/ha	212	212	212
grazing @ £133/ha	745	745	745
Total Variable Costs	<u>4,902</u>	<u>5,226</u>	<u>5,445</u>
GROSS MARGIN	<u>4,078</u>	<u>4,534</u>	<u>5,095</u>
GROSS MARGIN per forage ha	551	613	689

Sensitivity-Change ±	Change in Gross Margin/100 ewes (£)		
10 p/kg lwt in finished lamb price	538	576	614
£5/hd in cast ewe price	90	90	90
£5/hd in gimmer price	130	130	130
£10/tonne concentrate price	90	103	110

Easy Care (Wool Shedding)

PHYSICAL DATA

Breeds	Typically Easycare		
	late April/May		
Lambing period	Lambs reared (%)		
	140%	150%	160%
Lamb crops per ewe	4.5	4.5	4.5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.0	2.0	2.0
Lamb numbers:			
marked	144	154	164
sold/retained	140	150	160
sales:			
ewe lambs	10	20	30
finished lambs	40	40	40
store lambs	68	68	68
Ewe numbers:			
culls	18	18	18
mortalities	4	4	4
Wool sales (kg)	0	0	0
Concentrate use:			
barley/SBP to ewes at tupping (kg)	1,000	1,100	1,200
lamb finishing supplement (kg)	750	750	750
Total barley and concentrate (kg)	<u>1,750</u>	<u>1,850</u>	<u>1,950</u>
Forage: grazing (ha)	8.5	8.8	9.1
silage aftermath (ha)	1.7	1.7	1.7
Total forage (ha)	<u>10.2</u>	<u>10.5</u>	<u>10.8</u>

Basis of data:

1. Breeding stock prices, autumn 2017.
2. Estimate of finished and store lamb prices, autumn 2017.
3. Silage yield and quality 20 t DM/ha; ME 10.5 MJ/kg DM (DM 220 g/kg).
4. Silage and aftermath grazing fertiliser level 125 kg N/ha, grazing fertiliser level 125 kg N/ha.
5. Access to 10 ha of non-rotational grazed set-aside or 20 ha cattle pasture/100 ewes from 1 September - 14 January assumed. Lambs sold finished October/November, store November/December.
6. Significant savings in labour at lambing on this system. Hill genotype, or Lleyen used as ram on ewe lambs lambing outside.
7. Liveweight of lambs at sale: 38 kg.
8. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.

Easy Care (Wool Shedding)

GROSS MARGIN DATA

		Lambs reared (%)		
		140%	150%	160%
OUTPUT		£/100 ewes tupped		
Ewe lambs	10 @ £79	790	-	-
	20 @ £79	-	1,580	-
	30 @ £79	-	-	2,370
Finished lambs:	40 @ £63 (38kg lwt)	2,520	-	-
	40 @ £63	-	2,520	-
	40 @ £63	-	-	2,520
Store lambs:	68 @ £41	2,788	-	-
	68 @ £41	-	2,788	-
	68 @ £41	-	-	2,788
Draft/cast ewes:	18 @ £62	1,116	1,116	1,116
Wool sales 0kg @ £0/kg		-	-	-
		<u>7,214</u>	<u>8,004</u>	<u>8,794</u>
Less: ram replacement (net)		<u>467</u>	<u>467</u>	<u>467</u>
		<u>6,747</u>	<u>7,537</u>	<u>8,327</u>
VARIABLE COSTS				
Barley & mineralised SBP @ £213/t		213	234	256
Lamb finishing pellets @ £203/t		152	152	152
Vet, medicines & dips		415	422	429
Commission, levies, haulage, scanning & tags		843	906	969
		<u>1,623</u>	<u>1,714</u>	<u>1,806</u>
Gross margin before forage		<u>5,124</u>	<u>5,823</u>	<u>6,521</u>
Forage variable costs:				
silage @ £152/ha		258	258	258
grazing @ £133/ha		1,131	1,170	1,210
		<u>1,389</u>	<u>1,428</u>	<u>1,468</u>
Total Variable Costs		<u>3,012</u>	<u>3,142</u>	<u>3,274</u>
GROSS MARGIN		<u>3,735</u>	<u>4,395</u>	<u>5,053</u>
GROSS MARGIN per forage ha		366	419	468
Sensitivity-Change ±		Change in Gross Margin/100 ewes (£)		
10 p/kg lwt in finished lamb price		146	146	146
£5/hd in all lamb sales		590	640	690
£5/hd in cast ewe price		90	90	90
30% in pasture utilisation		339	351	363

Gimmering

PHYSICAL DATA

Breeds	Crossbred, Cheviot, Lley
System	Ewe lambs purchased in autumn, wintered on swedes and hay, grazed tightly in summer and sold as gimmers in autumn
	/100 sheep
Mortalities (no.)	2
Wool sales (kg)	270
Concentrate use:	
Barley (kg)	1,500
Forage: hay-5,000 kg (ha)	0.7
swedes (ha)	1.5
grazing (ha)	3.0
Total forage (ha)	<u>5.2</u>

Basis of data:

1. Ewe lamb price, autumn 2017.
2. Estimate of gimmer price, autumn 2018.
3. Hay yield and quality 7 t/ha; ME 8.5 MJ/kg DM.
4. Hay fertiliser level 125 kg N/ha; grazing fertiliser level 125 kg N/ha.
5. Yield of swedes 75 t/ha. See page 100-101 for swede production costs.
6. Where an all-hay diet is envisaged, approximately 22 t or 3.1 ha extra hay with aftermath grazing would be required to replace 2 ha of swedes.

Gimmering

GROSS MARGIN DATA

OUTPUT

	£/100 sheep
Crossbred gimmers: 98 @ £120	11,760
Wool sales 270kg @ £0.85/kg	230
	<hr/>
	11,990
<i>Less:</i> Crossbred ewe lambs purchased - 100 @ £79	7,900
	<hr/>
	4,090

VARIABLE COSTS

Concentrates - barley & minerals @ £203/t	305
Vet, medicines & dips	290
Commission, levies, haulage, shearing, scanning & tags	1,074
	<hr/>
	1,669
	<hr/>
Gross margin before forage	2,421

Forage variable costs:

hay @ £118/ha	83
swedes @ £310/ha	465
grazing @ £133/ha	399
	<hr/>
Total Variable Costs	2,616
	<hr/>
GROSS MARGIN	1,474
	<hr/>
GROSS MARGIN per forage ha	283

Sensitivity-Change ±

£5/hd in sale price

Change in Gross Margin/100 sheep (£)

490

Short Keep Lambs - Winter Finishing on Rape

PHYSICAL DATA

System	Store lambs purchased in September/October, sold finished November/December	
Grazing period: range, low to high		
stocking period (days)		45-75
average (days)		55
Stocking rate: range (no./ha)		40-60
average (no./ha)		50
Liveweight at start (kg)		27
Liveweight at slaughter (kg)		42
Deadweight at slaughter (kg)		19
		/100 lambs
Mortalities (no.)		2
Area of rape (ha)		2
Area of grass 'run-back' (ha)		1
Concentrates (cereal) fed (kg)		500

Basis of data:

1. Estimate of store lamb price, autumn 2017.
2. Estimate of finished lamb/hogg price, November/December 2017.
3. Performance from lambs grazing rape can vary greatly between years. The requirement for supplementary concentrates is also very variable from year to year, and area to area. Cereal supplementation will be more necessary in higher rainfall areas, and it may be difficult to finish lambs in very high rainfall areas. Small lambs under 25 kg liveweight fail to perform well on rape and should be finished inside. A dry run back area with suitable forage and water should be provided. See page 96-97 for forage rape production costs.

Short Keep Lambs - Winter Finishing on Rape

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 98 @ £71 (42 kg lwt)	6,958
Less: Store lambs purchased - 100 @ £41	4,100
	<hr/>
	2,858
VARIABLE COSTS	
Concentrates - barley & minerals @ £203/t	102
Vet & medicines	150
Commission, levies, haulage, shearing, scanning & tags	762
	<hr/>
	1,014
Gross margin before forage	<hr/>
	1,844
Forage variable costs:	
forage rape @ £113/ha	226
Total Variable Costs	<hr/>
	1,240
GROSS MARGIN	<hr/>
	1,618
GROSS MARGIN per forage ha	<hr/>
	539

Sensitivity-Change ±	Change in Gross Margin/100 lambs (£)
£5/hd in lamb sale price	490
30% in pasture utilisation	68

Short Keep Lambs - Indoor Finishing on Concentrates

PHYSICAL DATA

System	Store lambs housed in December, sold finished February
Liveweight at housing (kg)	28
Liveweight at slaughter (kg)	36
Deadweight at slaughter (kg)	16.5
Food conversion efficiency (kg feed/kg lwt gain)	range 7 - 10
Finishing period (days)	60
Daily liveweight gain (g)	100 - 150
	/100 lambs
Mortalities (no.)	2
Concentrates: whole barley (kg)	4,020
sugar beet pulp (kg)	1,610
protein supplement (46% CP) (kg)	805
salt/minerals/vitamins (kg)	165
Total mix (kg)	<u>6,600</u>
Hay feeding (kg)	300
Bedding straw (housed period) (kg/day)	80

Basis of data:

1. Estimate of store lamb price, autumn 2017.
2. Estimate of finished lamb price, March 2018.
3. Suitable for lambs that are difficult to finish outside: ram lambs, riggs, anything under 25 kg in the autumn and thin lambs.
4. Profitability depends on rising lamb prices rather than food conversion efficiency. Late-born smaller lambs, non-standard types, any lambs under 25 kg liveweight and lambs that have failed to finish outside are all suitable for this system.
5. Care should be taken when introducing housed lambs to concentrate feeding where starchy cereals e.g. barley are used. Acidosis can often result, causing digestive upsets and in some cases, mortality. Typical feed conversion rate is 8.25 kg concentrate to produce 1 kg lwt (including concentrate fed during introductory period), for Blackface and other hill breeds. Crossbred lambs convert at 7-7.5 kg when gaining from 30-35 kg to 40-45 kg. Minerals will contain no Mg and low P.

Short Keep Lambs - Indoor Finishing on Concentrates

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 98 @ £58 (36 kg lwt)	5,684
Less: Store lambs purchased - 100 @ £41	4,100
	<hr/> 1,584
VARIABLE COSTS	
Concentrates homemix @ £203/t	1,340
Vet & medicines	150
Bedding straw @ £74/t	249
Commission, levies, haulage, shearing, scanning & tags	711
	<hr/> 2,450
Gross margin before forage	- 866
Forage variable costs:	
hay @ £118/ha	5
Total Variable Costs	<hr/> 2,455
GROSS MARGIN	<hr/> - 871

Sensitivity-Change ±	Change in Gross Margin/100 lambs (£)
10 p/kg lwt in finished lamb price	367
£5/hd in store lamb purchase price	500
£10/t in concentrate price	66
10 days in finishing period - straw, feed and hay	284

Long Keep Lambs - Finishing on Swedes

PHYSICAL DATA

Breeds	Blackface, Cheviot, Texel, Crossbred wethers
System	Store lambs purchased in September/October, run over stubbles and grassland to mid- December, folded on swedes to end March/ mid-April
Liveweight at start (kg)	27
Liveweight at slaughter (kg)	44
Deadweight at slaughter (kg)	21
Finishing period (days)	70
	/100 lambs
Mortalities (no.)	4
Concentrates: barley and minerals (kg)	1,500
Forage: hay (ha)	0.33
swedes (ha)	1.33
grazing (ha)	1.00
Total forage area (ha)	<u>2.66</u>

Basis of data:

1. Estimate of store lamb price, autumn 2017.
2. Estimate of finished hogg price, spring 2018.
3. Hay yield and quality 7 t/ha; ME 8.5 MJ/kg DM.
4. Hay fertiliser level 125 kg N/ha.
5. Yield of Swedes - 80 t/ha. See pages 96-97 for swede production costs. Use winter hardy varieties of swedes after December. A dry run back area with suitable forage and water should be provided. Supplement with an extra 100 g/head/day of soya if swede tops lost by frost and no grassy runback available. Provide access to dry lying area.
6. Grazing requirement approximately 8 ha for 2 months after purchase; equivalent to 1 ha on annual basis.

Long Keep Lambs - Finishing on Swedes

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 96 @ £79 (44 kg lwt)	7,584
Less: Store lambs purchased - 100 @ £41	4,100
	<hr/>
	3,484
VARIABLE COSTS	
Concentrates homemix @ £203/t	305
Vet & medicines	310
Commission, levies, haulage, shearing, scanning & tags	781
	<hr/>
	1,396
	<hr/>
Gross margin before forage	2,088
Forage variable costs:	
hay @ £118/ha	39
swedes @ £310/ha	412
grazing @ £133/ha	133
	<hr/>
Total Variable Costs	1,980
	<hr/>
GROSS MARGIN	1,504
	<hr/>

Sensitivity-Change ±	Change in Gross Margin/100 lambs (£)
£5/hd in lamb sale price	480
£5/hd in store purchase price	500
30% in pasture utilisation	175

Red Deer

Introduction

The June 2016 agricultural census recorded 7,005 farmed deer in Scotland (versus ~900,000 wild deer), down 231 head (3%) from the previous year. In the UK as a whole deer numbers fell 1% in 2016 to 31,000. UK deer numbers remain well below historic levels. As recently as the early 1990s there were over 50,000 farmed deer in the UK as a whole and over 16,000 in Scotland.

Currently, Scotland produces around 3,000 to 3,500 tonnes of venison per year from wild deer, with farmed production only around 50 tonnes.

The Scottish Venison Strategy Group wants to encourage increased production of Scottish farmed venison and reduce the UK's reliance on imports. They anticipate that an additional 1,200 tonnes of venison per annum will be required to keep up with ongoing UK demand requiring an additional 300 to 400 more deer farms. Achieving such a 24 fold increase in Scottish farmed venison production by 2020 is highly challenging. In the longer-term, such an increase could be achievable if the relative profitability of farmed deer were to improve compared to beef and sheep. Much will depend on what changes to agricultural support and trade access are made following Brexit and whether these create opportunities for new enterprises such as deer farming. Interestingly non-EU venison enjoys tariff free access to the EU compared to tariffs of ~50% for beef and sheep-meat.

Support and subsidies

Historically deer farming did not attract support payments and subsidies putting it at a disadvantage to cattle and sheep farming. However, the reformed CAP regime now enables deer farmers to claim support payments under the Basic Payment Scheme.

Starting deer farming

The main barriers to people entering deer farming are the start-up costs which are estimated at upwards of £50,000 for a 100 hind breeding herd. Red deer breeding hinds will generally cost from £300-£1,000 for pedigree stock with breeding stags costing from £500-£2,000. Other significant costs include specialist and handling facilities.

Other barriers identified include access to an abattoir, knowledge of where to obtain breeding stock and specialist knowledge relating to the industry. Some of these barriers are being addressed with a dedicated deer abattoir opened in Fife. Also funding of projects such as the Deer Farm and Park Demonstration Project are helping spread knowledge about the sector.

Once set up, there is a relatively low labour demand for deer farming meaning that it may fit well with existing livestock or arable enterprises. In general, deer are relatively healthy and free from disease. The main

health issues are: TB, Johne's disease, copper deficiency and lungworm, all of which are manageable with good practice.

Farmed venison processing and markets

Deer farmers are unique in the livestock sector in being able to kill their deer either on the farm or in an abattoir. No matter how the animals are processed, the deer must be examined ante-mortem by a vet within 72 hours of death. The meat must be processed through facilities that have been licensed and regularly inspected by the Food Standards Agency or Food Standards Scotland. Only two supermarkets in the UK purchase farmed venison generally from abattoir killed carcasses.

At the moment there are two dedicated abattoirs in the UK killing farmed deer, one in Scotland and one in Yorkshire.

Stagison is the only deer abattoir and processing plant in Scotland. Stagison accept deer from farms and estates all over Scotland. They take calves from 6 months old that they finish on the farm, to yearlings that are finished ready to process. They currently supply venison to chefs and suppliers in the Scottish food industry and offer fresh and frozen venison products.

Dovecote Park in Yorkshire supply Waitrose with British farmed venison which they source from the First Venison Group. This is a co-operative of 33 UK farmed venison producers with seven in Scotland that supply over 2,500 carcasses (approx. 30% from Scotland) which are slaughtered at Round Green Farm, a purpose built abattoir in South Yorkshire before the product is moved to Dovecote Park for retail packaging.

A third option is for farmers to sell their deer to finishers. There are a number of producers in England that will accept deer from 6 months old and finish them on their own farm before processing.

References

A range of information relating to deer farming is available from the organisations below:

- The Venison Advisory Service: www.venisonadvisory.co.uk/
- The Deer Farm & Park Demonstration Project: <http://deerfarmdemoproject.scottish-venison.info/>
- The Scottish Venison Partnership: www.scottish-venison.info/
- The British Deer Farms and Parks Association: <http://bdfpa.org/Quality Assured Farm Venison Scheme: https://www.saiglobal.com/assurance/farm-assurance/quality-assured-farm-venison.htm>

Red Deer - Lowground Breeding and Feeding

PHYSICAL DATA

Calving period		May-Jun
Sale period		Aug-Nov
Herd life:	hinds (years)	12
	stags (years)	6
Calves born		92%
Calves reared		85%
Hind deaths (no.)		1
Liveweight at sale:	15-18 month stags (kg)	110
	15-18 month hinds (kg)	90
	cull hinds (kg)	90
Killing out percentage		56%
		/100 hinds
Stags (no.)		3
Sales:		
	15-18 month stags (no.)	43
	15-18 month hinds (no.)	35
	cull hinds (no.)	7
Winter feeding period (days):		
	hinds and stags	150
	calves	180
Feeding:	concentrates (t)	15.5
	silage (t)	161.2
Silage:	yield (t/ha from 2 cuts)	31
	ME quality (MJ/kg DM)	10
	fertiliser (kg N/ha)	220
Grazing	fertiliser (kg N/ha)	175
Total forage area required (ha)		
Silage and aftermath grazing		5.2
Grazing		13.0
		<hr/>
		18.2

Hay (3.8 ha at 7 t/ha) and swedes (1.7 ha at 75 t/ha) can be fed as an alternative to silage.

Housing system (straw bedding assumed):

Hinds housed January to April, calves housed November to April.

Straw bedding (t/hd)	- hinds and stags	0.10
	- calves	0.10

Red Deer - Upland Breeding Selling Calves

PHYSICAL DATA

Calving period		May-Jun
Sale period		Nov-Dec
Herd life:	hinds (years)	12
	stags (years)	6
Calves born		92%
Calves reared		85%
Hind deaths (no.)		1
Liveweight at sale:	stag calves (kg)	50
	hind calves (kg)	40
	cull hinds (kg)	90
Killing out percentage		56%
		/100 hinds
Stags (no.)		3
Sales:		
	stag calves (no.)	43
	hind calves (no.)	35
	cull hinds (no.)	7
Winter feeding period (days):		
	stags	150
	calves	30
Feeding:	concentrates (t)	3.8
	hay (t)	4.2
Hay:	yield (t/ha)	7
	ME quality (MJ/kg DM)	8.5
	fertiliser (kg N/ha)	125
Grazing	fertiliser (kg N/ha)	125
Total forage area required (ha)		
Hay and aftermath grazing		0.6
Grazing		10.0
		<hr/>
		10.6
Hill outrun		70.0
Housing system (straw bedding assumed):		
Hinds outwintered on hill, replacement calves housed November to April.		
Straw bedding (t/hd)	- hinds and stags	0.00
	- calves	0.10

Red Deer - Finishing Stag Calves

PHYSICAL DATA

Time of purchase		October
Sale period		Aug-Nov
Stags reared		97
Liveweight:	at purchase (kg)	50
	at sale (kg)	110
Killing out percentage		56%
Deadweight at sale (kg)		62
Mortality		3%
Liveweight gain (kg/day)		0.15
		/100 stags
Feeding:	concentrates (t)	10.9
	silage (t)	80.6
Silage:	yield (t/ha)	31
	ME quality (MJ/kg DM)	10
	fertiliser (kg N/ha)	220
Grazing	fertiliser (kg N/ha)	175
Total forage area required (ha)		
Silage and aftermath grazing		2.6
Grazing		5.5
		<hr/> 8.1

Hay (2.0 ha at 7 t/ha) and swedes (0.8 ha at 75 t/ha) can be fed as an alternative to silage.

Housing system (straw bedding assumed):

Calves housed November to April.

Straw bedding (t/hd)	- calves	0.10
----------------------	----------	------

Red Deer - Finishing Stag Calves

GROSS MARGIN DATA

OUTPUT			£/100 stags
Sale value:			
finished stags	62 kg @	540 p/kg dwt	32,476
Less:			
calves purchased	50 kg @	285 p/kg lwt	14,250
			<u>18,226</u>
VARIABLE COSTS			
Concentrates @ £220/t			2,401
Vet & medicines			243
Bedding @ £74/t			718
Other livestock expenses			1,655
			<u>5,017</u>
Gross Margin before forage			<u>13,209</u>
Forage variable costs:			
silage @ £241/ha			424
grazing @ £170/ha			732
			<u>1,156</u>
Total Variable Costs			<u>6,173</u>
GROSS MARGIN £/100 stags			<u>12,053</u>
GROSS MARGIN £/ha			<u>1,488</u>

Sensitivity - Change ±	Change in Gross Margin/100 stags (£)
£5/hd in stag sales	485

Basis of data:

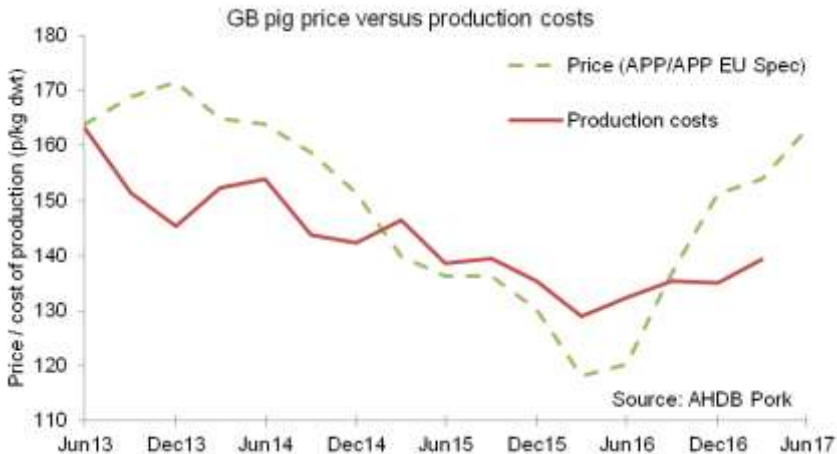
Sale price - slaughter price based on expected prices for sales to the abattoir. In practice many deer farms sell part of their production direct to retailers, caterers and consumers at deadweight prices over £5.50/kg but with additional processing and marketing costs.

Pigs

Introduction

Markets and prices

Finished pig prices have rebounded strongly in the last year from a low of 113p/kg dwt in spring 2016 rising 37% to 155p/kg dwt by June 2017. EU and global market factors have been the main drivers of higher pig-meat prices. Falling EU sow numbers and a sharp rise in exports to China have finally helped plug the surplus left by Russia's export ban on EU pork. On top of this the weakness of sterling has further boosted UK values. Feed and other costs have tended to increase but not nearly as much as pig-meat prices leading to a sharp recovery in pig production margins. According to AHDB in early 2016 the average UK pig finisher was losing -£10 per head before most producers moved into profit in late 2016. In the first quarter of 2017 finished producer margins were estimated at around +£12 per head. The chart below illustrates these movements.



For the second year in a row, the June 2016 census figures show that the UK female breeding herd increased (1.7%) on the year to 415,000 head. This remains well down on historic levels with UK sow numbers at 800,000 head in 1997. The Scottish breeding sow population also increased with total sow numbers up 1% at 37,798 head in 2016.

Sow productivity continues to improve with AHDB Pork reporting that the average number of pigs weaned per sow in the UK in 2016 was 26.2, compared with 25.8 in the preceding 12 months, an increase of 0.4 piglets per sow. While remaining above the EU average (22.9), piglets per sow in the UK remains behind top producers; Denmark, Ireland and Belgium.

The UK is far from self sufficient in pig meat with domestic production standing at approximately 55% of total UK consumption. Currently the UK imports a significant volume of product from a range of countries in order to fulfil the shortfall in domestic production. Most of these suppliers

are from within the European Union with the biggest suppliers being Denmark, Germany and the Netherlands.

With UK product being seen by some markets as a premium product and the need to ensure maximum value from the carcass the UK also exports a relatively large volume of lower value product.

Marketing and processing

The UK pig industry is much more rationalised than other livestock sectors, such as beef and sheep, with the bulk of output coming from 1,600 large producers according to AHDB. More than 80% of these breeding sows are in England with only 7% situated in Scotland. The supply for pigs is also more vertically integrated than the beef and sheep sectors with contracts much more common.

In Scotland, expansion of capacity at the remaining slaughterhouses, notably Brechin, has not so far led to any recovery in local fattening and slaughtering. In 2016 the Scottish clean pig kill in Scotland was down marginally (1,000 head) at 300,000 head, the fourth year of almost static output. Given the rise in the Scottish sow herd and higher numbers of pigs weaned per sow this means that large numbers of weaners are still heading to England for finishing and slaughter.

In order to grow demand for Scottish grown pork, in 2016 QMS launched the Selected Pork Marketing Strategy Group and ran a campaign to promote the benefits of assured pork from selected farms in Scotland. Specially selected pork is approved by the Scottish SPCA who independently inspect farms and processors.

In the UK the Co-op has announced they will only source 100% British meat including pork, bacon and ham. While welcomed by British farmers, the Co-op is a relatively small retailer and with the UK only around 55% self sufficient in pig meat at present there is not the scope to meet this demand. If this trend continues however, it may encourage a gradual rise in domestic production.

Margins

The biggest cost in pig production is feed which accounts for approximately 50-60% of costs. As such the profitability of pig production generally hinges on three factors; the price received for pigs, the feed price and the efficiency of feed conversion. With pig prices currently rising faster than feed prices, pig margins are currently positive. Part of this is due to the fall out from Brexit and the weaker pound. The more enduring route to profitability for pig producers is to raise the number of pigs reared per sow. This requires continued investment in genetics, staff training, technology and housing for improved performance to be sustained.

Breeding Pigs - Indoor Units

PHYSICAL DATA*

	4 week weaning	
	Average	Premium
Litters/sow/year (no)	2.30	2.36
Live pigs born/litter (no)	12.98	13.50
Piglet mortality (%)	11.75	10.10
Weaners/litter (no)	11.45	12.14
Pigs weaned/sow/annum**	26.35	28.64
Pigs sold/sow/annum	25.56	27.78
Age at weaning (days)		26.7
Age at sale/transfer (days)		91
Liveweight at weaning (kg)		7.30
Liveweight at sale (kg)		37.0
Sow:boar ratio		19
No. sows replaced annually (%)		53.6
No. boars replaced annually (%)		40
Sow mortality (%)		5.99
Feed use (conventional diets):		
sow meal (sow, boar, gilt) (kg)		1,265
Daily liveweight gain (g/day)		0.407
Feed conversion ratio (:1)		1.70
<i>Feed (kg of feed/sow/annum):</i>		
Creep feed (14 days of age to 9 kg lwt)	76	86
Weaner diet (9 to 15 kg lwt)	305	344
Rearing diet (15 to 34 kg lwt)	891	1,003
Total feed/sow/annum	2,537	2,697

* Based on data derived from AHDB Pork.

** Per sow and gilt in the herd, rounded and with an allowance for barreners.

Breeding Pigs - Indoor Units

GROSS MARGIN DATA

	£/sow/annum 4 week weaning	
	Average	Premium
OUTPUT		
Weaners sold @ £38*	971	1,056
Less:		
sow and boar replacement (net)	48	48
	<u>923</u>	<u>1,008</u>
VARIABLE COSTS		
Feed:		
sow meal @ £230/t	291	291
creep feed @ £675/t	52	58
weaner diet @ £270/t	82	93
rearing diet @ £255/t	227	256
Vet & medicines	28	29
Other livestock expenses	53	60
Total Variable Costs	<u>733</u>	<u>787</u>
GROSS MARGIN	<u>190</u>	<u>221</u>
Gross Margin/weaner sold	<u>7.43</u>	<u>7.95</u>

Sensitivity-Change ±	Change in Gross Margin/sow/annum (£)	
£1/weaner sold	26	28
1 weaner pig for sale	38	38
£5/t in feed prices	13	13

Replacement cost prices:

Cull sow (160 kg @ 90 p/kg dwt)	£144	Replacement gilt	£200
Cull boar (180 kg @ 80 p/kg dwt)	£144	Replacement boar	£800

* Weaners sold includes a 3% post weaning mortality.

Basis of data:

1. Feed cost is purchased feed, an estimate derived from quoted list prices.
2. Vet and medicine costs and other livestock expenses are SAC Consulting estimates.

Breeding Pigs - Outdoor Units

PHYSICAL DATA

	Average	Premium*
Breeding herd		
Stocking rate (sows/ha)	14	14
Litters/sow/year (no.)	2.26	2.32
Live pigs born/litter (no.)	11.7	12.2
Piglet mortality (%)	13.8	13.0
Weaners/litter (no.)	10.1	10.6
Pigs weaned/sow/annum	22.8	24.6
Weight at weaning (kg)	7.3	7.3
Age at weaning (days)	26.5	25.8
Proportion sows replaced annually (%)	50.0	53.2
Proportion boars replaced annually (%)	40	40
Sow mortality (%)	3.8	4.0
Sow:boar ratio (:1)	16	16
Sow feed used (kg/annum)	1,575	1,620
Weaners		
Post weaning mortality (%)	3.2	3.5
Weaners sold/sow	22.08	23.77
Age at sale/transfer (days)	86	77
Weight at sale (kg)	36.80	31.60
Weight gain (kg)	29.54	24.26
Daily liveweight gain (g/day)	484	577
Feed conversion ratio (:1)	1.70	1.49
Weaner feed (kg/weaner)	50.22	36.15

* Selected on pigs reared/sow/year.

Breeding Pigs - Outdoor Units

GROSS MARGIN DATA

	£/sow/annum	
	Average	Premium
OUTPUT		
Weaned pigs @ £38	839	903
Less: sow and boar replacement (net)	47	49
	<u>792</u>	<u>854</u>
VARIABLE COSTS		
Feed: sow cobs @ £235/t	370	381
weaner feed @ £270/t	309	240
Vet & medicines	37	37
Transport	26	26
Other livestock expenses	25	25
Total Variable Costs	<u>768</u>	<u>709</u>
GROSS MARGIN	<u>24</u>	<u>145</u>
GROSS MARGIN/weaner sold	<u>1.11</u>	<u>6.09</u>
GROSS MARGIN £/ha (acre)	<u>342</u> (138)	<u>2,028</u> (821)

Sensitivity-Change ±	Change in Gross Margin/sow/annum (£)	
£1/weaner sold	22	24
1 weaner pig for sale	38	38
£5/t in feed prices	3	4

Replacement cost prices:

Cull sow (160 kg @ 90 p/kg dwt)	£144	Replacement gilt	£200
Cull boar (180 kg @ 80 p/kg dwt)	£144	Replacement boar	£800

Note:

Sow costs are higher than indoor units due to the requirement for cobs for management purposes.

Finishing Pigs

PHYSICAL DATA

Type of finisher	All Average	Finishers Premium
Liveweight: at purchase/transfer (kg)	37.6	35.0
at slaughter (kg)	108.6	109.9
Deadweight: at slaughter (kg)	81.5	82.4
Killing out (%)	75	75
Mortality (%)	2.9	2.4
Liveweight gain (g/day)	835	861
Feed conversion ratio (:1)	2.47	1.97
Feed use (kg)	175	148
Days in herd	85	87
Sale price (p/kg dwt)	148	148
Feed price (£/t)	225	225

Finishing Pigs

GROSS MARGIN DATA

	£/hd	
	All Average	Finishers Premium
OUTPUT		
Sales	120.55	121.99
Less: weaner cost @ £38 (plus allowance for mortality)	39.08	38.93
	<hr/> 81.46	<hr/> 83.06
VARIABLE COSTS		
Feed	39.38	33.30
Vet & medicines	1.75	1.75
Other livestock expenses	4.00	4.00
Total Variable Costs	<hr/> 45.13	<hr/> 39.05
GROSS MARGIN	<hr/> 36.34	<hr/> 44.01
Sensitivity-Change ±		
1 p/kg dwt in sale price	0.81	0.82
£10/t in feed prices	1.75	1.48

Basis of data:

Other livestock expenses include deductions for power, water, bedding, haulage, commission and levies.

Poultry

Introduction

UK egg producers have experienced weaker prices and falling margins in 2016 and early 2017 largely as a result of a strong increase in domestic production, outpacing demand. Investment in large scale free-range houses (30,000 birds) has contributed to this production increase and new entrants need to be careful before entering. The free-range industry has also faced restrictions due to Avian Influenza requiring birds to be kept indoors. In the winter of 2016/17 flocks were kept under restrictions for more than 12 weeks resulting in the loss of their free-range designation under EU regulation leading to much lower market prices. The industry is currently in discussion with the EU to help mitigate against future restrictions by permitting an extension of the housed period and also allowing birds access to enclosed winter outdoor cages during AI restriction periods while maintaining their free-range status.

UK chicken meat production has enjoyed a more favourable market environment in the last year with strong growth in global and UK poultry-meat demand and generally better prices offset by some increases in feed costs. Brexit poses a number of threats to both egg and poultry-meat production but the heavy reliance on EU labour is one of the most urgent issues needing addressed during negotiations.

Chicken Egg Production

In 2016 the UK produced a record 28.8 million cases of eggs (360 eggs to a case). Of these, 73% of eggs were produced in England and Wales, 13% in Scotland and 14% in Northern Ireland (source - Defra 2017a). Eggs are classed by production method and in the UK this is currently dominated by eggs produced in enriched cages and free range systems. The table below shows egg production by system as a % of total egg production by year.

	1965	1980	2010	2016
Cage*	53%	95%	50%	50%
Barn	37%	4%	5%	2%
Free range	10%	1%	42%	46%
Organic	-	-	3%	2%

* enriched cages became a legal requirement for cage systems for laying hens in 2012.

Trends for eggs by production type have varied widely over the past 50 years, and anyone considering investing in an egg production business should be sure of the market for their egg type. However, in recent years, the market share of egg production types has generally remained steady, in part because of recent EU regulations (Council Directive 1999/74/EC) that banned conventional cages in 2012 on welfare grounds.

Independent egg producers can sell their eggs via the large egg producers/packers, or through local businesses (e.g. hotels, farmer's markets). Flock size and thus eggs per annum will probably govern which route an egg producer favours. See page 111 for information on poultry keeping regulations.

About 90% of eggs in the UK are produced using the British Lion Quality Code of Practice, which ensures that the eggs sold are indeed British and adhere to various UK and EU legislation governing the food safety of eggs, in particular that laying hen flocks are vaccinated against Salmonella and that all eggs are traceable. For more information, see <http://www.egginfo.co.uk/>.

Egg grading

Egg grading percentages are dependent on a large number of variables, e.g. lighting programmes and feed specifications, and can be altered by changing the feeding and lighting during rearing and the feed specifications during lay. Most major breed management manuals provide suitable information. The following table shows the egg grading ratios as a percentage with weight for each grade.

	Ratio	Grade A weight
Very large	6.0%	>73g
Large	49.0%	63-72.99g
Medium	35.0%	53-62.99g
Small	3.9%	<53g
Seconds	6.3%	-

Egg price indicators

	Pence per 6 pack			
	<i>Very large</i>	<i>Large</i>	<i>Medium</i>	<i>Mixed weight</i>
Cage	-	-	-	-
Barn	-	65	-	-
Free range	145	131	106	85
Organic	320	216	212	168

Source: Leading supermarkets average price for standard 6 packs (June 2017)

Quality assurance

The predominant and most recognised hen egg assurance scheme is the British Lion Quality Code of Practice.

For updates on changes to the Code of Practice for Lion Quality eggs visit the British Egg Industry Council website at:

www.britisheggindustrycouncil.com

Other assurance schemes, such as Freedom Foods free range egg production, or Soil Association organic egg production, can be found at:

- www.freedomfood.co.uk/industry/rspca-welfare-standards
- www.soilassociation.org/farmersgrowers/technicalinformation/poultrylaying

Broiler Meat Production

In 2017, the world is expected to produce 89.5 million tonnes of broiler chicken meat (USDA), representing a 1% increase on 2016. Avian Influenza has severely affected production in China and other parts of Asia, restricting supply, boosting world prices and encouraging higher output in Brazil in particular. Within the UK, half (50%) of all meat eaten comes from poultry (and most of that - 85% - is made up of broiler chicken) (DEFRA 2017). About 20 million broiler chicks are placed in rearing farms per week in the UK. UK chicken meat production has risen strongly in recent years, up 17% to 1.515mt in the 5 years to 2016. In contrast in Scotland broiler meat output fell 35% to 81kt by 2015 due to rationalisation of processing and production to central Scotland. As a result broiler units in the north and south closed. Meanwhile rapid expansion has been seen in Northern Ireland. UK output has grown strongly up 10% in the first five months of 2017 compared to a year earlier. The number of broiler chicks placed in the UK in January to May 2017 was up 6.3% on 2016 placements (Defra 2017b).

The majority of broiler chickens are reared conventionally, with free range and organic production accounting for about 5% of the market. Conventional rearing typically means in light-controlled houses, but providing natural daylight through windows (along with other types of environmental enrichment, such as perches and bales of wood shavings/straw) is becoming increasingly popular. Both male and female broiler chicks grow rapidly, so either or both sexes can be reared, depending on what target slaughter weight is desirable. With conventional rearing, the average liveweight at the point of slaughter (at around 36-40 days of age) is 2.2 kg (Defra 2017b).

Legislation governing the keeping of conventionally-reared broiler chickens (Council Directive 2007/43/EC) stipulates the maximum stocking densities allowed, but note that the UK does not permit the highest stocking density of >39-42 kg/m² (Defra 2011). For more information on housing space requirements see page 372.

Many broiler producers sell their produce under the Assured Chicken Production scheme, which is part of the Red Tractor farm assurance scheme, to ensure food safety and traceability. For more information, see <http://assurance.redtractor.org.uk/rtassurance/home.eb>.

Useful Poultry References

- BPC 2017: www.britishpoultry.org.uk/
- USDA 2017 Livestock and Poultry: World Markets and Trade
- Council Directive 1999/74/EC Laying down minimum standards for the protection of laying hens, pp1-5.
- Council Directive 2007/43/EC Laying down minimum rules for the protection of chickens kept for meat production, pp1-10.
- Defra 2011 Interim guidance for keepers of conventionally reared meat chickens: www.gov.uk/government/publications/meat-chicken-keeper-guidance
- Defra 2017a. United Kingdom Egg Statistics (data to March 2017): www.gov.uk/government/statistics/egg-statistics.
- Defra 2017b. United Kingdom Poultry and Poultry Meat Statistics (data to May 2017): www.gov.uk/government/statistics/poultry-and-poultry-meat-statistics
- <http://www.gov.scot/Topics/farmingrural/Agriculture/Livestock/eggs/eggs>

Laying Hens - Free Range

PHYSICAL DATA

Source: Hyline Brown Management Guide 2014
Egg stock Brown

Body weight at 17 weeks (kg)	1.40-1.48
Body weight at 70 weeks (kg)	1.91-2.03
Age at 50% production (age, weeks)	20
Peak production (%)	95-96

Laying period:

Pullets housed (weeks)	16
Pullets point of lay (weeks)	18
Weeks in lay per annum adjusted for downtime	48.5
Bird laying cycle (week 18 to 72) (eggs)	295-305
Adjusted egg production (bird/annum) *	246

Mortality:

Livability during lay (%) - refer to breed management guides	0.95
Stocking density (birds/ha)	2,500

Feed:

Feed use (16 to 18 weeks) (kg/hd)	1.23
Feed use (19 to 72 weeks) (kg/hd)	49.14

* Adjusted for 365d, mortality, downtime (pullet to lay, washing)

Note:

Other bird expenses includes veterinary treatments, disinfectants, litter, dead bird disposal and range maintenance.

Laying Hens - Free Range

GROSS MARGIN DATA

	£/1000 bird/annum Wholesale	£/doz Wholesale
OUTPUT	£	£
Eggs sales @ £0.902/doz	18,483	0.90
Old hen value less catching cost	0	0.00
Less:		
Pullet purchase @ £4 per bird	4,000	0.20
	<u>14,483</u>	<u>0.71</u>
VARIABLE COSTS		
Feed:		
Ave compound feed purchased @ £240/t	10,655	0.52
Other bird expenses	750	0.04
Total Variable Costs	<u>11,405</u>	<u>0.56</u>
GROSS MARGIN	<u>3,078</u>	<u>0.15</u>

Sensitivity ±	Change in Gross Margin/1000 birds/annum (£)
£0.10/doz eggs sold	2,049
£10/t feed	444
1% increase in mortality at point of lay (£/1000 birds)	31

Basis of data:

1. Egg price based on BFREPA UK average packer to producer free range price, as at summer, 2017.
2. High numbers of second grade eggs may be penalised and devalue the average price received.
3. Pullet price based on estimated BFREPA price (16 week fully vaccinated 3,000 bird order), June 2017.
4. Producers selling direct to market will incur additional packaging, grading and marketing costs as well as increased transport, labour and administration costs.

Grading, packaging and marketing costs vary significantly from business to business depending on the degree of automation, the size of the packing operation and the requirements of the customer being supplied.

Broilers

PHYSICAL DATA

Average finished bird weight (kg)	2.2
Killing out %	74%
Average wholesale price (p/kg - lwt)	119
Average age at finishing (days)	38

Age ranges between 39-44 days depending on breed and final weight

Chick costs (p/bird)	36
Chick mortality (%)	4

Price of chicks dependent on size of order and should presume to be fully vaccinated

Feed use (kg/bird)	3.7
Feed conversion ratio	1.7

Stocking density (birds/m ²)	18
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Broiler stocking density limited to 33 kg/m², for more details see the broiler meat production introduction.

System turn around time 50-55 days, 6 or 7 crops per year.

Note:

Other bird expenses include veterinary treatments, bedding and power.

Broilers

GROSS MARGIN DATA

OUTPUT	p/bird
Bird sales 2.2 kg @ 88.06 p/kg lwt	193.73
Less:	
Replacement - chicks incl. mortality	<u>37.44</u>
	<u>156.29</u>
VARIABLE COSTS	
Feed:	
Concentrate feed purchased @ £280/t	103.60
Other bird expenses	<u>24.50</u>
Total Variable Costs	<u>128.10</u>
GROSS MARGIN	<u>28.19</u>

Sensitivity ±	Change in Gross Margin/bird (p)
10 p/kg	22.00
£10/t feed	3.70

Organic Farming

Introduction

Total organic food sales in the UK increased in 2016 by 7.1% to £2.09 billion. The catering sector has seen the biggest growth in sales at 19.1% followed by home delivery up 10.5% and independent retailers up 6.3%. Supermarkets increased organic sales by 6.1% and remain the largest sector with 69% of total sales.

The area of land farmed organically in the UK continues to decline, however there has been an increase in the area of land in conversion.

At farm level, prices for the main Scottish organic outputs are improving. The organic milk price premium is generally 10ppl premium on conventional milk. The finished beef price trend has generally followed the conventional price, but the organic premium has improved at around 60-100p/kg and prices have been ahead of the previous year. The premium for organic lamb remains small at around 10-20p/kg and prices have not fluctuated as much as previous years.

The premium for organic cereals remains around £100/t over conventional grain but prices have improved in line with conventional grain price rises.

Scottish Government support for the organic sector remains strong through the Scottish Organic Action Plan, and through funding for organic farming in the 2014-2020 SRDP.

Why farm organically?

Organic produce attracts a price premium. This premium can be volatile, depending on supply and demand. Organic farming systems also have lower variable costs than conventional systems, as many inputs are prohibited. When enterprise output can be maintained, organic farming enterprises have the potential to leave a good gross margin.

Organic farming is also supported under the Agri-environment Climate Scheme (AECS) of the Rural Development Programme. Attractive rates are available for both organic conversion and maintenance funding as shown in the following table.

£/ha	Year 1	Year 2	Year 3	Year 4	Year 5
	Conversion		Maintenance		
Arable	280	280	65	65	65
Fruit/veg	400	400	200	200	200
Improved grass	140	140	55	55	55
Rough grazing	12.50	12.50	8.50	8.50	8.50

The first two years of organic conversion payments are higher than the latter three years where maintenance rates apply. This is to compensate for lower output during the conversion period before organic premiums can be attained.

Land that is managed organically is exempt from all Greening requirements of the Basic Payment Scheme (BPS) (see the Rural Aid Schemes section on pages 426-454 for more detail).

The principles of organic farming also accord with the ethos of many land managers. Using clover and livestock manures to provide fertility, the promotion of health rather than treatment of disease, and an 'acceptable' weed burden that provides food for birds and pollinating species are the aims of some land managers. Going through the formal process of certification allows produce to be sold as organic, and so receive a price premium.

How to get into organic farming

Some farm businesses require big changes to their systems in order to convert, while others will require little change. It is worth talking through the implications of converting with an adviser. Many organisations run organic farm walks throughout the year, giving farmers the chance to visit an organic farm which will demonstrate the link between organic farming and good environmental management.

There are several different organic bodies that provide certification (details on page 231). The choice of certification body can depend on several factors, including cost and the enterprises operated on the farm. Grant funding is available for farmers, and it is advisable that this is secured before conversion.

Organic conversion

In many cases converting to organic farming will require a change in farm management. There is more emphasis on increasing a farm's self-reliance: growing most of its own livestock feed; recycling nutrients through manure management; and using ley phases with a lot of clover to fix nitrogen, and which helps to provide fertility for arable crops later in the rotation. As well as building fertility, crop rotations also provide clean grazing and help manage the weed burden. The requirement for more 'natural' production restricts the amount of concentrates that can be fed to cattle and sheep, emphasising a forage-based system. Housed livestock have minimum stocking densities, and must also have a dedicated lying area, possibly necessitating changes to housing with existing slatted floors.

Technical information

The data used in the preparation of the gross margins overleaf has been a necessary compromise of organic production figures from across Scotland. This should be borne in mind when using the margins, for example, in areas where straw is difficult to source a much higher price should be allocated to bedding.

Silage yield is based on a lower yielding, two cut system. Where yields are high due to a large clover yield in a year with an early spring, this should be increased. If only one cut is taken and yields are lower then

the forage area will have to be adjusted accordingly. Silage costs are based on baling and wrapping a third of the silage produced. This cost will increase or decrease depending on the proportion of pit or baled silage.

Organic certification

Any farmer wishing to produce food for sale as organic must comply with regulations setting out the minimum standards of production. Certification bodies have their own standards which are generally more specific, and in some respects stricter than the basic EU standards. All farmers in the UK are certified to this higher level.

Organic Farming Contacts

Certification bodies

Scottish Organic Producers Association (SOPA)	0131 335 6606 info@sopa.org.uk
The Biodynamic Association (BDA)	01453 759 501 office@biodynamic.org.uk
Organic Farmers and Growers (OF&G)	01939 291 800 info@ofgorganic.org
Irish Organic Farmers and Growers Association Ltd. (IOFGA)	+353 090 643 3680 info@iofga.org
The Organic Food Federation	01760 720 444 info@orgfoodfed.com
Organic Trust Ltd.	+ 353 (0) 185 30271 organic@iol.ie
Quality Welsh Food Certification Ltd. (QWFC)	01970 636 688 enquiries@qwfc.co.uk
Soil Association Certification Ltd.	England: 0117 314 5000 Scotland: 0131 666 2474

Information and advice

The Organic Research Centre	01488 658 298 elmfarm@organicresearchcentre.com
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Organic Wheat - Winter

PHYSICAL DATA

(a) Seed

Organic seed sown at 200 kg/ha (1.60 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

(d) Other crop expenses

Net wrap at 50-77p/bale for round straw bales.

Organic Wheat - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	1.8	(0.7)	2.4	(1.0)	3.0	(1.2)
OUTPUT			£/ha (acre)			
Grain @ £250/t*	750		1,000		1,250	
Straw @ £40/t	72		96		120	
	<u>822</u>	(333)	<u>1,096</u>	(444)	<u>1,370</u>	(554)
VARIABLE COSTS						
Seed @ £420/t	84		84		84	
Fertiliser	24		24		24	
Trace elements	10		10		10	
Other crop expenses	7		10		12	
	<u>125</u>	(51)	<u>128</u>	(52)	<u>130</u>	(53)
GROSS MARGIN	<u>697</u>	(282)	<u>968</u>	(392)	<u>1,240</u>	(502)

GRAIN PRICE SENSITIVITY

£200 /t	547	(221)	768	(311)	990	(401)
£240 /t	667	(270)	928	(376)	1,190	(482)
£280 /t	787	(318)	1,088	(440)	1,390	(563)

* Milling price (feed price £30/t lower)

Basis of data:

Sale price estimate for 2018 crop, September/October ex-farm spot price at 15% moisture content and average quality.

Organic Oats - Spring

PHYSICAL DATA

(a) Seed

Organic seed sown at 200 kg/ha (1.60 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

(d) Other crop expenses

Net wrap at 50-77p/bale for round straw bales.

Organic Oats - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	1.8	(0.7)	2.4	(1.0)	3.0	(1.2)
OUTPUT			£/ha (acre)			
Grain @ £250/t*	750		1,000		1,250	
Straw @ £40/t	72		96		120	
	<u>822</u>	(333)	<u>1,096</u>	(444)	<u>1,370</u>	(554)
VARIABLE COSTS						
Seed @ £420/t	84		84		84	
Fertiliser	24		24		24	
Trace elements	10		10		10	
Other crop expenses	7		10		12	
	<u>125</u>	(51)	<u>128</u>	(52)	<u>130</u>	(53)
GROSS MARGIN	<u>697</u>	(282)	<u>968</u>	(392)	<u>1,240</u>	(502)

GRAIN PRICE SENSITIVITY

£200 /t	547	(221)	768	(311)	990	(401)
£240 /t	667	(270)	928	(376)	1,190	(482)
£280 /t	787	(318)	1,088	(440)	1,390	(563)

* Milling price (feed price £30/t lower)

Basis of data:

Sale price - estimate for 2018 crop, September/October ex-farm spot price at 15% moisture content and average quality.

Organic Barley - Spring

PHYSICAL DATA

(a) Seed

Seed sown at 200 kg/ha (1.6 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

Organic Barley - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	1.6	(0.6)	2.1	(0.9)	2.7	(1.1)
OUTPUT			£/ha (acre)			
Grain @ £225/t*	675		900		1,125	
Straw @ £40/t	64		85		106	
	<u>739</u>	(299)	<u>985</u>	(399)	<u>1,231</u>	(498)
VARIABLE COSTS						
Seed @ £350/t	70		70		70	
Fertiliser	24		24		24	
Trace elements	10		10		10	
Other crop expenses	6		8		11	
	<u>111</u>	(45)	<u>113</u>	(46)	<u>115</u>	(46)
GROSS MARGIN	<u>628</u>	(254)	<u>872</u>	(353)	<u>1,116</u>	(452)

GRAIN PRICE SENSITIVITY

£195 /t	538	(218)	752	(304)	966	(391)
£240 /t	673	(272)	932	(377)	1,191	(482)
£270 /t	763	(309)	1,052	(426)	1,341	(543)

* Feed price (malting premium £30/t)

Basis of data:

Sale price estimate for 2018 crop.

Organic Beans - Spring

PHYSICAL DATA

(a) Seed

Seed sown at 225 kg/ha (1.8 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

Organic Beans - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	5.0	(2.0)
OUTPUT			£/ha (acre)	
Grain @ £280/t*	840		1,400	
	<u>840</u>	(340)	<u>1,400</u>	(567)
VARIABLE COSTS				
Seed @ £525/t	131		131	
Fertiliser	24		24	
Trace elements	10		10	
Other crop expenses	-		-	
	<u>165</u>	(67)	<u>165</u>	(67)
GROSS MARGIN	<u>675</u>	(273)	<u>1,235</u>	(500)

GRAIN PRICE SENSITIVITY

£220 /t	495	(200)	935	(378)
£270 /t	645	(261)	1,185	(480)
£310 /t	765	(310)	1,385	(561)

* Feed price

Basis of data:

Sale price estimate for 2018 crop. Deductions for high levels of field beans which do not meet minimum quality standards can reduce the price considerably.

Organic Potatoes - Maincrop

PHYSICAL DATA

Machine harvested

(a) Seed

Planted at 2.5 t/ha. This figure can rise to 4 t/ha depending on seed size. Organic seed must be used unless a derogation is obtained for specialist varieties.

(b) Fertiliser

Farm yard manure used, no artificial fertiliser.

(c) Sprays

Seed treatment None.

Nematicide Assumption of no treatment applied.

Herbicides None used.

Blight control Copper oxychloride (derogation obtainable).

Aphid control None used.

Slug control 2 applications of ferric phosphate (derogation obtainable) for high risk situations. If low risk situation (i.e. sandy soils), reduce spray cost by £43/ha.

Desiccation Pulverising and/or gas burning. See page 349 for costs.

(d) Other crop expenses

Levy costs, SGRPID field inspection fees; roguing and labels and positive ventilation and cold storage are included. Other costs may include bags (£7.50-£11.20/t of crop) and royalties (which will depend on variety).

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £12/hr as per labour rates on page 62 for low yielding potato crops.

Organic Potatoes - Maincrop

GROSS MARGIN DATA

Yield: t/ha (t/acre): seed	-	(0.0)	-	(0.0)
Yield: t/ha (t/acre): ware	25	(10.1)	49	(19.8)
Yield: t/ha (t/acre): s/feed	1	(0.4)	2	(0.8)
	<u>26</u>	(10.5)	<u>51</u>	(20.6)
OUTPUT			£/ha (acre)	
Seed @ £0/t	-		-	
Ware @ £280/t	7,000		13,720	
Stockfeed @ £10/t	10		20	
	<u>7,010</u>	(2,837)	<u>13,740</u>	(5,561)
VARIABLE COSTS				
Seed @ £300/t	750		750	
Fertiliser	-		-	
Sprays	116		116	
Other expenses	2,059		3,884	
	<u>2,925</u>	(1,184)	<u>4,750</u>	(1,922)
GROSS MARGIN	<u>4,085</u>	(1,653)	<u>8,990</u>	(3,639)
WARE PRICE SENSITIVITY				
£150 /t	835	(338)	2,620	(1,060)
£250 /t	3,335	(1,350)	7,520	(3,043)
£310 /t	4,835	(1,957)	10,460	(4,233)
£360 /t	6,085	(2,463)	12,910	(5,225)

Organic Dairying

Introduction

Organic dairy farming aims for self-sufficiency within a unit. An effective way of doing this is by utilising high quality grass silage as the main source of both protein and energy. This achieves economies in concentrate feeding. Further economies are made by replacing dairy cake with home mixes.

Gross margins

The enterprise performance levels are specific to the individual cow per annum based on the whole herd performance divided by the average number of cows in the herd. They allow for a number of variables, but also contain a number of constant assumptions.

Variables

Traditionally dairy herds could either be classed as spring or autumn calving. A more level production of milk is now being encouraged by co-operatives. This has resulted in adjustments in calving patterns, with more herds now achieving all-year round calving.

Feeding systems vary ranging from a simple system of silage or grass ad-lib with parlour cake fed to yield. Higher input systems may make use of a partial mixed ration with a low level of concentrate fed along with silage, again topped up with parlour feeding. Total mixed rations may also be fed without additional parlour feed. Whatever the system, forage inclusion must be a minimum 60% of the total ration on a dry matter basis.

Constant assumptions

Herd life	3 to 5 years
Calving interval	390 days
Cow mortality	1-2%
Calf mortality (up to 7 days)	8%
Size of cow	650 kg
Winter feeding period	200 days

Rations

For simplicity the feeds included have been restricted to ad-lib silage and grass plus 18% crude protein, 13.5 ME compound cake.

Organic Dairying - Summary of Assumptions

(a) Average price assumed (ppl)

An average price of 39ppl is assumed. This will fluctuate seasonally and may be partly dependent on quality characteristics.

(b) Calf value

A sale/transfer price of £151/hd has been adjusted for calving interval and mortality. The calf value can be altered by £8.61 for each £10 difference in the sale/transfer price.

(c) Cull cow (annual share)

A sale price of £499.50/hd has been adjusted for herd life and mortality, and assumes no variation between high and low yielding cows. The annual share can be altered by £2.34 for each £10 difference in cull cow price. Assumed herd life of 4.17 years.

(d) Heifer replacement (annual share)

Heifer purchase/transfer price varies according to yield. A purchase price equating 15ppl has been used, here, and this has been adjusted for herd life and mortality. The annual share can be altered by £2.45 for each £10 difference in purchase/transfer price.

(e) Other livestock expenses

These are taken from commercial dairy herds and include milk recording, bedding sawdust and dairy detergents.

Organic Dairy Cow - 7,000 Litres

PHYSICAL DATA

Calving period	All year
	/cow
Average annual yield (litres)	7,000
Feed requirements (kg)	
Silage (kg)	8,500
Concentrates (kg)	1,800
Concentrates fed per litre (kg)	0.26
Overall forage area (ha)	
Silage and aftermath grazing	0.32
Grazing	0.35
Total	<u>0.67</u>

Basis of data:

See *Summary of assumptions-physical data*, page 242-243.

Organic Dairy Cow - 7,000 Litres

GROSS MARGIN DATA

Calving period	All year
	/cow
Average annual yield (litres)	7,000
OUTPUT	£
All year milk @ 39 p/litre	2,730
Calf value	130
Cull cow (annual share)	120
	<hr/>
	2,980
Less: Heifer replacement (annual share)	257
	<hr/>
	2,723
VARIABLE COSTS	
Concentrates @ £395/t	711
AI	46
Vet & medicines	74
Other livestock expenses	91
	<hr/>
	921
Gross margin before forage	<hr/>
	1,802
Forage variable costs:	
Silage @ £49/ha	16
Grazing @ £49/ha	17
	<hr/>
Total Variable costs	954
GROSS MARGIN £/cow	<hr/>
	1,769
GROSS MARGIN £/ha	<hr/>
	2,641

Sensitivity-Change ±

1 p/litre in milk price	70
£10/t in concentrate price	18

Organic Suckler Cows - Mainly Silage Diets

PHYSICAL DATA

Breed:	Commercial type cows bred to a range of bulls, mostly continental
Calving period	Feb-Apr
Calves weaned (%)	92
Month of weaning	October
Days to weaning	220
Month of sale	October
Liveweight of calves at sale	
Steers (kg)	260
Heifers (kg)	240
Herd life of cows (years)	7
Herd life of bulls (years)	4
Cow mortality (%)	2
Calf mortality (%)	3
Cow:bull ratio (:1)	35
Feeding/cow and calf (winter days):	180
silage (t)	6
calf concentrates (kg)	180
cow concentrates (kg)	-
Straw (t)	0.9
Silage:	
yield	30 t/ha from 2 cuts;
quality	DM 220 g/kg; ME 10.5 MJ/kg DM
Overall forage area (ha)	
silage and aftermath grazing	0.20
grazing	0.45
	<hr/>
	0.65

Assumptions:

Mainly grass farm either buying in all straw and concentrates or growing small amount of cereals.

Note:

1. Cull cow value based on 100% of cull cows into the food chain.
2. SSBSS based on 94% calves claimed. See pages 141-142 for more details.

Organic Suckler Cows - Mainly Silage Diets

GROSS MARGIN DATA

Calving period	Feb-Apr	
OUTPUT	£/cow	
Calf sales (lwt - 92% crop)		
Steers		
Heifers		
260 kg @ 225p		512
240 kg @ 220p		
Scottish Suckler Beef Support Scheme		85
		<u>597</u>
Less: Replacement - cow		88
bull		26
		<u>483</u>
VARIABLE COSTS		
Barley @ £200/t		36
Minerals		12
Vet & medicines		20
Straw - Feeding & Bedding @ £74/t (bought-in)		67
Commission, tags & levies		25
		<u>160</u>
Gross Margin before forage		<u>323</u>
Forage variable costs:		
silage @ £49/ha		10
grazing @ £49/ha		22
		<u>32</u>
Total Variable Costs		<u>192</u>
GROSS MARGIN £/cow		<u>291</u>
GROSS MARGIN £/ forage ha (acre)		<u>448</u> (181)

Sensitivity-Change ±

10 p/kg in lwt sale price	23
Sale weight ± 10kg	20
Herd life ± 1 year	18

Replacement cost prices:

Cull cow	£900	In-calf heifer (purch.)	£1,450
Cull bull	£1,150	Replacement bull	£4,750

Organic Finishing Cattle

PHYSICAL DATA

Liveweight at purchase (kg)	250
Liveweight at slaughter:	
kg lwt	580
kg dwt	320
Cattle bought	October
Cattle sold	January
Finishing period (days)	440
Liveweight gain (kg)	330
Daily liveweight gain (kg)	0.75
Supplementary feed-barley, protein & minerals (kg)	700
Straw (t)	0.8
Overall forage area (ha)	
silage and aftermath grazing	0.22
grazing	0.25
	<hr/>
	0.47
	<hr/>

Organic Finishing Cattle

GROSS MARGIN DATA

OUTPUT	£/head	
Sale value (dwt):		
320 kg @ 430p	1,376	
Less: Purchased store calf in October (lwt)		
250 kg @ 223p	<u>558</u>	
	<u>818</u>	
VARIABLE COSTS		
Barley, protein & minerals @ £200/t	140	
Vet & medicines	18	
Straw - feeding & bedding @ £74/t (bought-in)	59	
Commission, tags & levies	<u>47</u>	
	<u>264</u>	
Gross Margin before forage	<u>554</u>	
Forage variable costs:		
silage @ £49/ha	11	
grazing @ £49/ha	<u>12</u>	
	<u>23</u>	
Total Variable Costs	<u>287</u>	
GROSS MARGIN £/head	<u>531</u>	
GROSS MARGIN £/ha (acre)	<u>1,129</u>	(457)
Sensitivity-Change ±		
10 p/kg in dwt sale price	32	
Dwt sale weight ± 10kg	43	

Organic Breeding Ewes - Finished Lamb Production

PHYSICAL DATA

Breeds	Crossbred ewe to terminal sire
Lambing period	April/May
Lamb crops per ewe (avg)	4
Ram flock life (seasons)	3
	/100 ewes tupped
Rams (no.)	2.5
Lamb numbers: marked	150
mortalities	5
sold finished	145
Lamb lwt at slaughter (kg)	42
Lamb dwt at slaughter (kg)	20
Ewes: culls	20
mortalities	5
gimmers purchased	25
Wool sales (kg)	272
Concentrate use: barley/mineral (kg)	2,000
Total concentrate (kg)	2,000
Forage (ha): silage	1
grazing	12
Total forage (ha)	13

Basis of data:

1. Silage yield and quality 30 t/ha from 2 cuts; ME 10.5 MJ/kg DM.
2. Breeding stock and finished lamb prices 2017/18 season.

Organic Breeding Ewes - Finished Lamb Production

GROSS MARGIN DATA

OUTPUT	£/100 ewes tugged	
Finished lambs: 145 @ £76/hd	11,020	
Cast ewes: 20 @ £72/hd	1,440	
Wool sales: 272kg @ £0.85/kg	231	
	<u>12,691</u>	
Less: 25 gimmers purchased @ £150/hd	3,750	
ram replacement (net)	292	
	<u>8,649</u>	
VARIABLE COSTS		
Cereals & minerals @ £313/t	626	
Vet, medicines & dips	400	
Commission, levies, shearing, scanning & tags	931	
Gross margin before forage	<u>6,692</u>	
Forage variable costs:		
1 ha silage @ £49/ha	49	
12 ha grazing @ £49/ha	588	
Total Variable Costs	<u>2,594</u>	
GROSS MARGIN	<u>6,055</u>	
GROSS MARGIN £/ forage ha (acre)	<u>466</u>	(188)
Sensitivity-Change ± Change in Gross Margin/100 ewes (£)		
£1/hd in finished lamb price	145	
£1/hd in draft ewe price	20	
30% grazing utilisation	176	

Crofts and Small Farms

Introduction

This section gives an overview of crofting and small farms.

Information on land tenure and legislation is included as well as information on support schemes specifically directed to crofts and small farms.

Gross margins have been designed with a smaller scale in mind. These focus on beef cattle, sheep and poultry.

For new entrants to farming, this section should be read in conjunction with the New Entrant section on pages 392-402.

Crofting

Crofting is a form of land tenure which is unique to Scotland. Generally, a croft is a relatively small agricultural land holding which is normally held in tenancy and which may or may not have buildings or a house associated with it.

Crofts range in size from less than 0.5 ha to more than 100 ha. An average croft is nearer 5 ha.

A crofter is the tenant or owner-occupier of a croft. Usually, the crofter holds the croft on the "statutory conditions", which apply to every croft tenancy, and will not have a written lease.

There are 20,570 crofts in Scotland with 15,388 individual crofters making up crofting households with a total population of around 33,000.

There are legislative duties which must be adhered to when taking over a croft. Residence on the croft is required or the crofter must reside within 32km. There is a duty not to neglect the croft, to cultivate and maintain the croft for agriculture or to put it to another purposeful use (e.g. any use which does not have an adverse effect on the croft, the public interest, the interests of the landlord or the use of adjacent land).

Common grazings

There are over 1,000 common grazings in the crofting counties. A common grazing is an area of land shared by a number of crofter shareholders. The use of a common grazing is governed by a grazing committee, elected by the shareholders in the common. Individual shareholders have a 'souming' which governs the amount of stock they are allowed to graze. Details of shares and 'soumings' are contained in the common grazings regulations.

The Crofting Commission

The Crofting Commission is a Non-Departmental Public Body (NDPB) responsible for regulating crofting. The Commission comprises of five

Crofting Commissioners elected from geographic areas in the crofting counties, and two Commissioners appointed by the Scottish Government.

Obtaining a croft

There are a number of ways to obtain a croft. The following table gives detail of these and the requirements involved.

Type of change	Description	Notification to Crofting Commission	Register Croft for first time
Assignment	Transfer of a croft tenancy from tenant crofter to proposed new tenant	Assignment Application Croft Tenancy form	Yes
Sub - Let	Transfer of a croft tenancy from tenant crofter to proposed new tenant for a fixed period of time	Subletting Application Croft Tenancy form	No
Change of ownership – tenant purchasing croft	Purchase of Croft	Notification of change of ownership form	No
Change of ownership – change of owner-occupier	Purchase of Croft	Notification of change of ownership form	Yes
Letting	Croft is let by landlord or owner-occupier to a tenant	Application to Let Croft (Whole or Part)	Yes
Short Term Letting	Owner Occupier letting a croft to a tenant for less than 10 years	Short Term Let Application Owner-Occupier Crofter	No

Crofting terms

Decrofting is the term used for the process of removing land from crofting tenure. This is typically used to secure a house site suitable for commercial lending.

Resumption, similarly to decrofting, is the removal of land from croft tenure; in this case it is carried out by the landlord, following permission from the Scottish Land Court.

Apportionment is the term used when someone who shares in a common grazing wants to take part of the common grazing for their own exclusive use.

Crofting register

The crofting register is map based and provides a definitive record of the extent of, and interest in, land within crofting tenure in Scotland. The register shows the boundaries of land and also name and address of the crofter. The register is maintained by the Keeper of the Registers of Scotland.

Applications to register a croft should be submitted to the Crofting Commission. As well as completing Form A which can be found at <https://www.ros.gov.uk/services/forms/guidance-and-forms> you must also supply a clear and legible map showing the boundaries of the croft. Maps that meet the desired standard can be acquired from local authorities, architects and surveyors and distributors of Ordnance Survey maps.

Small Farms

In contrast to crofts, small farms are not specifically mentioned in legislation; instead they are governed under the same agricultural tenancy legislation as detailed in pages 364-369. In order to be eligible for small farm specific grants and services, the Scottish Government deems a small farm to be a holding between 3ha and 30ha in size.

Rural Aid Schemes for Crofts and Small Farms

Agriculturally active crofts and small farms are entitled to the same direct subsidies that are available to the rest of the farming industry, as detailed on pages 426-454. There are also grant schemes specifically designed to benefit crofters and small farmers.

Crofting Agricultural Grant Scheme (CAGS)

This scheme provides grants for crofters to make improvements to their crofts and help to sustain their businesses. Funds of up to £25,000 for individual crofters and £125,000 for groups of crofters can be used for capital projects, such as the construction or improvement of agricultural buildings and for the establishment of Common Grazings Committees.

CAGS grant rates are shown in the following table:

	young crofters ²	Individuals other crofters	young crofters ²	Groups ¹ other crofters
LFA	80%	60%	90%	80%
NLFA	60%	40%	80%	60%

¹ e.g. Grazing committees.

² under 41 years old, with adequate occupational skills and competence, and in business for less than 5 years.

Funding for eligible capital projects can cover all aspects of the project, including the cost of materials, transportation of materials, costs of contractors and own labour. Items eligible for grant aid include:

1. Erection or improvement of agricultural buildings, and shelters for the temporary housing and sheltering of out-wintered livestock.
2. Works associated with agricultural building, including yards, hard-standings, dungsteads, and silos (excluding grain silos).
3. Investment in land management, including the initial grassland improvement works for the restoration of degraded land and the control of bracken.
4. Slurry stores.
5. Arterial drainage and field drainage.
6. All other forms of general drainage including under drainage, hill drainage and ditching.
7. Provision or improvement of facilities for the organised feeding of out-wintered livestock, including permanently fixed troughs and feed barriers, and associated concrete bases.
8. Provision or improvement of equipment for the handling and treatment of livestock.
9. Planting of shelter belts and the provision of fences, hedges, walls, gates or stock grids.
10. Provision or improvement of amenities, including water supplies, mains electricity connections, electricity generators or gas supplies.
11. Provision of electrical equipment.
12. Provision or improvement of access tracks to land improvement areas, roads, bridges, culverts or boat slips.
13. Assistance of up to £500 towards the establishment of a properly constituted Common Grazings Committee.

Small Farms Grant Scheme

This scheme provides support to eligible farmers or crofters for investments related to development, modernisation or adaptation of small farms, i.e. holdings that have between 3ha and 30ha of eligible agricultural area. To be eligible, total gross income for sole traders should be no more than £30,700 and £41,000 for partnerships or groups. Funds of up to £25,000 for individuals and £125,000 for groups can be used to erect or improve agricultural buildings, provision of slurry stores, field drainage, handling facilities, shelter belts, electrical equipment and for access.

Croft House Grant (CHG)

This scheme provides grants for crofters to improve and maintain the standards of crofter housing, with the aim of attracting and retaining people within the crofting areas of Scotland. Funding of 40% of the costs up to a maximum of £38,000 in high priority areas and up to £28,000 in standard priority areas can be used for new builds, major repairs, internal improvements and rebuilding work. Projects below £8,000 in value are ineligible for grant aid under CHG.

Eligibility is partly based on the production of a 5 year business plan for the croft. There are limits applied to the size of a new build house which relate to the number of bedrooms. Applications are accepted all year round, but decisions are typically made four times a year. Applications are scored based on a number of factors including those mentioned above.

Agri-Environment Climate Scheme (AECS)

Full details of AECS can be found on page 436-437. There are a number of options which are particularly relevant for crofters and small farms. These include:

Management Option	Payment Rate
Conservation Management of Small Units (up to 30ha)	£77.78/ha
Cattle Management on Small Units (up to a max of 20ha @ 2 ha/cow)	Retention - £107.38/ha Introduction - £162.63/ha
Cropped machair	£239.76/ha

Croft and Small Farm Gross Margins

The gross margins on the following pages give an insight into livestock enterprises on a smaller scale. The gross margins are an illustration and must be adjusted for specific circumstances.

Beef

The suckler cow margins are based on crofts and small farms with a mixture of inbye ground and rough grazing/common grazing. The margins provide an illustration of a herd with 10 native type suckler cows on in-wintered and out-wintered systems calving mainly in February - April.

Output is based on a calving percentage of 90% and selling weaned calves in October. Income from the SSBSS (see page 433 for more detail) is based on the Island rate. This should be adjusted for £43/cow (90% calving percentage) if budgeting for a mainland system. Adding value to output would come from direct marketing beef.

Replacement costs are based on purchasing all breeding stock. If hiring a bull, this cost should be adapted.

The variable costs take account of added costs to feed, straw and livestock haulage for being smaller in size or being based in remote areas.

For more information on keeping cows see pages 109, 111-116, 140-143, 371 and 374.

Sheep

For crofts and small farms, sheep provide a basis in getting started in commercial livestock farming. Compared to cattle, sheep require a lower

capital investment to establish a flock and income can be generated within a 12 month period due to their short gestation period.

The sheep gross margins illustrate technical and financial performance for a range of croft and small farm situations. The margins are based on Blackface and Cheviot hill breeds and Mule and Texel type lowland breeds. Where other breeds are used, prices should be adjusted accordingly. Income comes from selling lambs and cast sheep at the auction market either as store or finished animals. Adding value to output would come from direct marketing lamb or fleece.

Replacement costs are based on retaining homebred ewe lambs or buying in gimmers for lowland situations. Rams are assumed to be hired. Where buying rams, costs should be adjusted. The margins do not account for keeping flock replacements.

The variable costs take account of added costs to feed, straw and livestock haulage for being smaller in size or being based in remote areas.

For more information on keeping sheep see pages 109-110, 111-116, 371 and 374.

Free range chicken egg production

Free range egg production is an ideal enterprise for a croft or small farm business. There is a smaller land requirement compared to other livestock, low flock set-up costs and quick and regular cashflow. Any significant capital expense will be mainly dictated by requirement for bird housing.

When keeping more than 50 birds the keeper must be registered (see page 111 for more detail). If the intention is to sell eggs beyond the farm gate, e.g. to farm shops or local shops, then the business should be registered with the Scottish Government Eggs and Poultry Unit. For details and guidance see:

<https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/egg-and-poultry-inspections/>

The enterprise illustrated assumes chicken egg production using hybrid birds. Egg production using native chicken breeds or other species, such as ducks or geese could also be considered. The gross margin assumes buying point of lay pullets, purchase of feeding in 25kg bags and marketing eggs at the farm gate using labelled (with laying date and best before) half dozen boxes. When selling the eggs at the farm gate, a premium price is available as customers appreciate the eggs freshness, provenance and taste.

Other croft and small farm enterprise options

See pages 268-285 for more information on other livestock and farm diversification ideas.

Suckler Herd - Croft and Small Farm

PHYSICAL DATA

Breed: Cross bred native cows bred to native bull.

	Upland suckler in- wintered	Hill suckler out- wintered
Calving period	Feb-Apr	
Calves weaned	90%	90%
Month of weaning	October	October
Days to weaning	220	220
Month of sale	October	October
Lwt of calves: at weaning (kg)	253	235
Lwt of calves: at sale/transfer (kg)	253	235
Herd life of cows (years)	10	10
Herd life of bulls (years)	4	4
Cow mortality (%)	1	1
Calf mortality (%)	4	4
Cow:bull ratio (:1)	10	10
Feeding/cow and calf (winter days):	180	180
silage (t)	5.4	6
straw (t)	0.6	0
calf concentrates (kg)	100	100
cow concentrates (kg)	180	225
Grazing fertiliser (kg N/ha)	75	75
Silage & aftermath fertiliser (kgN/ha)	125	125
Silage:		
yield (t/ha from 1-cut)	20	20
DM quality (g/kg)	220	220
ME quality (MJ/kg DM)	10.5	10.5
Overall forage area (ha):		
silage and aftermath grazing	0.27	0.30
grazing	0.40	0.40
	<hr style="width: 50%; margin: 0 auto;"/> 0.67	<hr style="width: 50%; margin: 0 auto;"/> 0.70
Housing system: In cubicles (if straw bedding used, adjust straw costs)		
Straw for general use incl. calving pens	0.33	0.00
Straw bedding (t)	1.25	0.00

Suckler Herd - Croft and Small Farm

GROSS MARGIN DATA

OUTPUT	Upland suckler in- wintered £/cow	Hill suckler out- wintered £/cow
Calf sales (lwt)	90%	90%
Steers		
270 kg @ 225 p	506	-
Heifers		
235 kg @ 220 p	-	471
250 kg @ 225 p		
220 kg @ 220 p		
Scottish Suckler Beef Support Scheme	125	125
	<hr/>	<hr/>
	631	596
Less: Replacement - cow	75	75
bull	30	30
	<hr/>	<hr/>
	526	491
VARIABLE COSTS		
Cow concentrates @ £245/t	44	55
Calve concentrates @ £245/t	25	25
Vet & medicines	27	27
Straw feeding and bedding @ £100/t	93	0
Commission, haulage, tags & levies	55	54
	<hr/>	<hr/>
	243	160
Gross Margin before forage	<hr/>	<hr/>
	283	331
Forage variable costs:		
silage @ £152/ha	41	46
grazing @ £106/ha	42	42
	<hr/>	<hr/>
	83	88
Total Variable Costs	<hr/>	<hr/>
	326	248
GROSS MARGIN £/cow	<hr/>	<hr/>
	200	243
GROSS MARGIN £/ha	<hr/>	<hr/>
	298	347

Sensitivity-Change ±

Change in Gross Margin/head (£)

10 p/kg in lwt sale price	23	21
Sale weight ± 10kg	20	20
Herd life ± 1 year	13	13

Replacement cost prices:

Native type cull cow	£725	Native type In calf heifer (purch	£1,400
Cull bull	£800	Replacement bull (purch.)	£2,000

Sheep Flock - Croft and Small Farm

PHYSICAL DATA

Breeds:

	Hill - Lowland		
Breed of Sire	Hill	Low	Low
Breed of Dam	Hill	Hill/Low	Low
Lambing period	Early April		

Lambs reared (%)

80%	120%	160%
4.5	4.5	4.5

/10 ewes tupped

Rams Hired	1	1	1
Lamb numbers:			
marked	8	12	16
sold/retained	8	12	16
sold: finished lambs	0	1	13
store lambs	5	8	3
retained for breeding	3	3	0
Ewe numbers:			
culls	2	2	2
mortalities	1	1	1
gimmers purchased	0	0	3
Wool sales - ewes, rams & hogs (kg)	16	25	27
Ewe concentrate (kg)	180	300	500
Forage: improved grazing (ha)	0	1	1
silage/hay (ha)	0	0.2	0.2
Total forage (ha)	0	1.2	1.2
Bedding straw (kg/day/hd)	0	0.8	0.8

Sheep Flock - Croft and Small Farm

GROSS MARGIN DATA

OUTPUT

			Lambs reared (%)		
			80%	120%	160%
			/10 ewes tupped		
Finished lambs:	0 @	£0	-	-	-
	1 @	£58	-	58	-
	13 @	£72	-	-	936
Store lambs:	5 @	£38	190	-	-
	8 @	£44	-	352	-
	3 @	£53	-	-	159
Cast ewes:	2 @	£37	74	-	-
	2 @	£55	-	110	-
	2 @	£72	-	-	144
Wool sales:	16 @	£0.65	10	-	-
	25 @	£0.65	-	16	-
	27 @	£0.85	-	-	23
			<hr/>	<hr/>	<hr/>
			274	536	1,262
Less: gimmers purchased @ £120/hd			-	-	360
ram hire @ £5/ewe			50	-	-
ram hire @ £6/ewe			-	60	60
			<hr/>	<hr/>	<hr/>
			224	476	842
VARIABLE COSTS					
Ewe concentrates @ £248/t			45	74	124
Vet, medicines & dips			36	50	60
Bedding straw @ £100/t			-	34	34
Commission, levies, haulage, shearing, scanning & tags			56	83	141
			<hr/>	<hr/>	<hr/>
			137	241	359
Gross margin before forage			<hr/>	<hr/>	<hr/>
			88	236	484
Forage variable costs:					
silage @ £152/ha			-	30	30
grazing @ £106/ha			-	106	106
Total Variable Costs			<hr/>	<hr/>	<hr/>
			137	377	495
GROSS MARGIN			<hr/>	<hr/>	<hr/>
			88	99	347

Sensitivity-Change ±

Change in Gross Margin/100 ewes (£)

10 p/kg lwt in finished lamb price	-	3	52
£5/hd in all lamb sales	25	45	80
£5/hd in cast ewe price	10	10	10
£5/hd in gimmer price	-	-	15

Free Range Laying Hens - Croft and Small Farm

PHYSICAL DATA

System:	Hybrid
Body weight at 17 weeks (kg)	1.44
Body weight at 70 weeks (kg)	1.97
Age at 50% production (age, weeks)	20
Peak production (%)	80
Pullets housed (weeks)	16
Pullets point of lay (weeks)	18
Weeks in lay per annum adjusted for downtime	49.1
Bird laying cycle (week 18 to 85)	270
Adjusted egg production (eggs/bird/annum) *	184
Livability during lay (%) - refer to breed management guides	92%
Feed use (16 to 18 weeks) (kg/hd)	1.23
Feed use (19 to 72 weeks) (kg/hd)	49.14

* Adjusted for 365d, mortality, downtime (pullet to lay, washing)

Free Range Laying Hens - Croft and Small Farm

GROSS MARGIN DATA

OUTPUT	£/100 bird/annum	£/doz
Eggs sales @ £3/doz	4,598	3.00
Old hen value less catching cost	0	0.00
Less:		
Pullet purchase @ £6 per bird	600	0.39
	<u>3,998</u>	<u>2.61</u>
VARIABLE COSTS		
Feed @ £383/t	1,413	0.92
Other bird expenses	400	0.08
Packaging - trays & cases	192	0.13
Total Variable Costs	<u>2,005</u>	<u>1.13</u>
GROSS MARGIN	<u>1,993</u>	<u>1.48</u>

Sensitivity ±	Change in Gross Margin/100 birds/annum (£)
£0.10/doz eggs sold	153
£10/t feed	37
1% increase in mortality at point of lay (£/100 birds)	-2

Note: Costs are typically much higher in a smaller flock, however, this can be mitigated through higher value egg sales direct to customers.

Diversification

Introduction

It is estimated that around 65% of farms in the UK supplement traditional incomes through farm diversification (Source: Economic Report on Scottish Agriculture 2016). Income streams from such enterprises should help strengthen both these businesses and the wider rural economy. Government agricultural strategies recognise the need for farm businesses, where appropriate, to seek opportunities for sustainable diversification. In Scotland, public support for on-farm diversification via Rural Development funding (e.g. SRDP) may be available through the LEADER programme (2014-2020), see page 440 for more details.

While diversification seems to make good sense for many farmers, making diversification projects work can be challenging. It is important that farmers do not diversify out of desperation, as the underlying financial strength of the farm business clearly affects the resources which can be devoted to any new enterprise and it also affects the potential to borrow capital, or access any grant aid. At the very least a new enterprise will require a considerable commitment of time and energy which is bound to have a knock-on effect on the core farm business. Depending on the type of diversified enterprise chosen, it may also place pressures and demands on other resources such as capital, buildings, land and machinery. Ultimately, any serious underlying financial problems in the core farm business may prevent what is otherwise a first-rate diversification development getting off the ground. The business case for diversification projects needs to be inherently strong, therefore the diversification enterprise must either complement the existing farm facilities and activities and/or be able to operate as a stand alone business.

Part-Time Off-Farm Work

Off-farm employment can provide an additional income stream to the farm business. When assessing opportunities for such work consideration should be given to factors such as the time and cost of travelling and the possible need to change the way the farm is operated to fit in with work patterns. Agricultural contracting continues to be a major off-farm activity, using either surplus machinery or labour capacity, or machinery purchased specifically for this work. Contracting charges for a range of agricultural activities are shown on pages 347-350.

On Farm Diversification

As with all types of diversification, thorough business planning is essential to assess the level of expected return from a new enterprise. As well as financial planning, legal and other issues may also need to be addressed. Aspects to consider in relation to on-farm diversification enterprises are detailed as follows:

Planning permission – Many opportunities for supplementary income will involve non-agricultural uses (change of use) of land and buildings, for which planning permission will be required. See pages 375-379 for further details.

Insurance – Likewise, many diversified enterprises will significantly alter the risks envisaged in standard insurance contracts, particularly for third party cover. Whilst some ventures may be able to be covered from the existing farm policy, it may be necessary to take out a new specific policy relating to the diversification business. It is essential that insurers are kept fully informed of these activities.

Value added tax (VAT) – If the business is VAT registered then VAT should normally be charged on business activities supplementary to an existing registered business. It may be possible by negotiation to establish that the new business is essentially separate from the existing one and need not be registered or charged VAT. In this latter case, VAT paid on inputs will not be recoverable. HMRC should be consulted regarding VAT issues. See page 476-482 for details on VAT.

Hygiene – Since 1 January 2006, EU food hygiene legislation has applied throughout the UK and this sets wide ranging standards for food preparation, handling and transport, and the premises and vehicles to be used. Penalties for failing to comply include substantial fines and imprisonment. Early consultation with the local authority is strongly recommended for any diversification activity involving food for human consumption. Useful information can also be found on the Food Standards Agency website (<http://www.foodstandards.gov.scot>).

Skills – A number of diversification businesses will require a range of skills beyond those normally used in many farming businesses. For example food production or retailing businesses are likely to require such skills as customer service, sales, marketing, stock control, demand forecasting and pricing in order to be successful and these will either need to be acquired through training or by employing people with these talents.

Sources of information for on-farm diversification

Defra has published an online guide to farm diversification covering issues such as deciding if diversification is right for you, alternative agricultural enterprises, planning and preparing for diversification, diversification out of agriculture, and funding. This guide can be accessed at:

<https://www.gov.uk/guidance/diversifying-farming-businesses>.

A useful guide to the process of diversification has been published by Kent Downs Rural Advice Service and can be found at:

<http://www.kentdowns.org.uk/publications/farm-diversification-toolkit>.

In Wales, Farming Connect may also provide one-to-one subsidised support to registered farmers to help them think about and plan suitable diversification projects. For more information, contact your local Farming Connect Office or view details on-line at:
<https://businesswales.gov.wales/farmingconnect/>.

A number of alternative enterprise information sheets are provided by the Centre for Alternative Land Use in Wales at:
<http://www.calu.bangor.ac.uk/technotes.php.en>.

Speciality Crops

Speciality oil crops

Several speciality oil crops have been grown in the UK for a wide range of uses. Some oilseed crops perform particularly well in Scotland yielding higher oil levels while others are not suited to Scotland due to agronomic constraints, particularly the higher risk of a late and wet harvest. Production of several crops has been concentrated in the south of England or overseas to ensure more reliable harvest conditions. Crops with greater potential for cultivation in Scotland are outlined below.

Oilseed rape – Developing specialist markets for conventional oilseed rape (*Brassica napus*) and also cultivation of oilseed rape varieties with specialist oil profiles allows diversification whilst having the benefit of a crop which is familiar to growers. Several growers throughout Scotland have set up specialist brands of cold pressed rapeseed oil for culinary use in recent years. These include Mackintosh of Glendaveny, Ola, Summer Harvest, Borderfields and Black and Gold. Markets have been developed which recognise the excellent nutritional characteristics of rapeseed oil (it has the lowest levels of saturated fatty acids of all commonly used fats and oils) in combination with the benefits of cold pressing to maintain natural vitamin content.

High Erucic Acid Rapeseed (HEAR) is grown to produce erucic acid, used as a specialist lubricant particularly for plastics for which it has clearance for food contact. Seed from HEAR varieties is not suitable for human consumption and HEAR varieties can not be grown in the same rotation as conventional varieties. Yields are typically below the best conventional varieties but similar to average yielding conventional varieties. Contracts for production are available from a number of merchants with current premiums around £25-30/t over conventional rapeseed.

Another oilseed rape type, with high oleic, low linolenic levels in its oil (HOLL), is used as a specialist healthy frying oil. The oil profile of this type means that it is very stable, resisting oxidation and retaining its taste in a catering environment. Details of varieties can be found on the North UK Oilseed Rape Varieties List (AHDB).

Linseed – Linseed oil is high in α -linolenic acid, and used for the manufacture of coatings, drying agents and putty. Although this fatty acid would be desirable for nutrition, its presence leads to rapid oxidation of the oil, reducing shelf life. The area of linseed has recently increased in the south of England as an alternative to oilseed rape which has become more difficult to establish since the neonicotinoid insecticide ban. In Scotland the area of linseed grown is currently low. Spring sown varieties tend to be rather late maturing for Scottish conditions. The introduction of autumn sown varieties provides an earlier harvest and these have potential for Scotland if winter hardiness can be confirmed with trials currently in progress.

Minor oilseed crops – A range of more novel oilseed crops can be grown in the UK and Scotland though few are presently being widely grown due to limited contracts and agronomic limitations though this may change.

Crambe: Like HEAR, *Crambe* (*C abyssinica*) is grown for the erucic acid contained in its seeds. It has been grown extensively in the UK and it grows well in Scotland. *Crambe* contains higher levels of erucic acid than HEAR, but its yields are slightly lower.

Echium: *Echium* (*Echium plantagineum*) also known as Viper's bugloss, produces high levels of stearidonic acid (14% of oil). The oil has valuable application in cosmetics and in skin care for the treatment of eczema and sunburn and as an anti-wrinkle preparation. *Echium* has been successfully grown in trials in Scotland. It is spring sown, the crop flowers for an extended period and time of swathing has to be carefully selected to maximise seed setting.

Specialist oilseed crops seed suppliers and contract buyers include; Premium Crops (www.premiumcrops.com), and Nature's Crops (www.naturescrops.com).

Essential oil crops

Essential oil crops are generally grown on a smaller-scale than the specialist oil crops mentioned above and include high value opportunities. Several are being grown throughout the UK, including lavender, peppermint, rose and rosemary, although the less favourable conditions at harvest in Scotland limit production potential.

Fibre crops

Flax and hemp for fibre can both be cultivated successfully in Scotland and more widely in the UK. There is interest in increasing the use of natural fibres, however, commercial scale processing of these fibres is currently absent or limited in Scotland and the UK at present.

The use of natural fibre products and the particular attributes of products derived from these fibres, is generating global interest in these crops for a wider range of fibre qualities. End uses include biocomposites for car

components in the automotive industry, lightweight glass replacement in the aviation industry and insulation materials in the construction industry. A further use for hemp in construction is as hemcrete, where the inner core of the stem is blended with a lime based binder and cast around a timber frame. Hemcrete's qualities of high levels of thermal insulation and excellent strength characters are of note and it meets building regulations, counting towards the code for sustainable homes (CSH).

Flax is traditionally used for high quality linen production requiring exacting production conditions, however, there is no longer a viable commercial market for it in the UK. There are no longer any large-scale buyers of hemp in the UK since Hemcore of Essex went into administration in 2013. A family run business remains processing its own hemp for horse bedding and construction in Yorkshire www.eastyorkshirehemp.co.uk/. There is also a nascent hemp producers association; www.ukhemp.co.uk/ .

Dual purpose hemp varieties are also available. In addition to using their stems for fibre, the oil from their seeds has an application in the specialist food market.

The lack of processing facilities in Scotland and the UK limits greater cultivation of these crops as they are bulky and expensive to transport in their raw state, hence it is necessary to have processing facilities close to the site of production for economic viability. A home office licence is required for the cultivation of hemp; this would normally be obtained by the processor of the hemp fibre.

Alternative Livestock

There are a wide range of alternative livestock enterprises that farmers can diversify into, many of which can use existing husbandry skills, and complement existing livestock systems on the farm. These alternative livestock are kept for fibre (e.g. cashmere goats, alpacas, angora goats, etc), meat (e.g. wild-boar, buffalo, ostrich, venison, ducks, geese, rabbits, etc), milk and dairy products (e.g. dairy-goats, dairy-sheep, water buffalo, etc) or as in the case of worms for a variety of reasons such as composting of green waste, fishing bait, sale of composting and earth worms to households, etc.

A common theme that runs through most types of alternative livestock is that there are considerable capital costs to endure at start-up, essentially through the requirement to purchase livestock and equipment. Often the early adopters of alternative livestock species control the breeding stock and command premium prices for their stock so some industries in infancy can be expensive to enter. Examples of stock prices include:

- Breeding female alpacas cost about £3,000 on average but can cost up to £20,000 depending on age and pedigree. Stud males can fetch over £30,000.
- Breeding wild boar sows cost from £300 - £600.
- Dairy goat does generally cost about £175 - £250.
- Boer meat goats generally cost around £200 - £400.
- Cashmere goat does generally cost about £100 with bucks costing between £150 - 250.
- Dairy ewes generally cost from £150 - £300.
- Day old ducklings cost about £1.70 per chick whilst day old goslings are about £6 per chick.

In addition to the actual cost of livestock, there are sometimes high capital costs associated with stock control, such as housing, fencing and specialist handling facilities (e.g. wild boar have specialised fencing requirements because they are classified as a dangerous wild animal and deer need deer fencing). If the alternative livestock is being farmed for meat then it is also worthwhile checking that local abattoirs are licensed to slaughter that specific type of animal, and if not what alternatives (such as field slaughter) exist.

In recent times there has been considerable press interest in bees and the role they play in pollination of food crops which has led to increased interest in honey production on a small-scale. More information can be obtained from the Scottish Beekeepers' Association (www.scottishbeekeepers.org.uk) and the British Beekeepers' Association (www.bbka.org.uk).

Farmers considering diversifying into alternative livestock must seriously assess the market potential for their product and ensure that an adequate return can be generated to meet the start-up costs. Some novel livestock industries have a limited infrastructure in place (to buy specialised feed, sale of breeding stock, or marketing of finished produce) meaning it is more difficult to negotiate on price or find alternative suppliers. There is a tendency in some forms of alternative livestock to rely on selling breeding stock as a means of recovering the capital investment, but market outlets for meat, fibre, and other products must be closely examined (perhaps through farmers' markets and farm shops, or finding specialist high value niche markets for products). As such, it is advised that any farmer considering diversifying into alternative livestock should contact the appropriate producer association for advice and support at an early stage of the diversification process.

Information on deer farming can be found on pages 198-205.

Retailing

Those involved in direct marketing should take into consideration the production costs of any venture, but also the time, commitment, travel

and support required to sell directly to the consumer. These factors are not always reflected in pricing models, particularly time spent by producers and their families. In consideration of promotion, enthusiasm and knowledge of the production system including animal welfare, breeds and varieties can be key elements when communicating with the end user, who may not have a strong knowledge of the product or its potential uses.

The opportunity to develop direct retailing can be determined by factors such as capital availability and location (especially if a farm shop is proposed). Above all, a market demand and opportunity must have been established. As with any new venture, a business plan incorporating a marketing plan should be prepared and this should include information and research into all the relevant aspects of the proposal, such as:

- The size of the local population within a 30-60 minute drive of the proposed retail outlet(s).
- Capital costs: car parking and access, construction, storage facilities, purchase of a website domain name, purchase of delivery van, etc.
- Running costs: including business rates, staff costs (bearing in mind that the shop may need to open evenings and weekends to maximise sales) and advertising.
- Consideration of range, variety and pricing (this should reflect the quality of produce offered including the freshness, environmental impact and provenance of the produce on offer).
- Planning permission requirements.
- Legislative requirements (e.g. environmental health, food hygiene, labelling, health and safety, trading standards, access from the local Highways Authority).

Further advice is available from a number of sources including:

- Connect Local: <http://connectlocal.scot/>
- SAC Consulting Food and Drink: www.sruc.ac.uk/foodanddrink; 01224 711 250
- Taste of Scotland: <http://taste-of-scotland.com/farmers-markets-in-scotland/>
- National Farmers' Retail and Markets Association: www.farma.org.uk; 0345 319 6740
- The Larder - A Guide to Scotland's Food & Drink: <https://food.list.co.uk/guides/the-larder/>
- Scottish Government food and drink policy: <https://beta.gov.scot/policies/food-and-drink/>
- Scotland Food and Drink: <http://www.foodanddrink.scot/>

Farmers' markets

There are currently over 50 regular farmers' markets in Scotland, and 500 certified markets throughout the UK. Most farmers' markets are held monthly, with some held more frequently, particularly in areas with larger populations. Most farmers' markets will have an ethos of providing the

consumer with high quality food and drink grown or produced locally and some markets (often called community markets) will consider other products produced in the local area such as crafts or other artisan products. There is usually an expectation by both organisers of the markets and consumers that the market will offer the opportunity to buy directly from the producer.

Markets are often run by the farmers and producers themselves, or by town centre management companies, local councils or by companies appointed by councils to run markets. All farmers' markets and individual stallholders are expected to meet the same standards of health, safety and labelling as any other retail outlet. Farmers' markets can provide the opportunity to communicate the benefits of the product and gather feedback directly from the end user. Farmers' markets are often considered more expensive by consumers, although research has indicated that product pricing is comparable with other retailers where similar high quality is available. In recent years a number of farmers markets have noticed a decline in interest as both consumers and farmers concentrate on farm shops and direct online sales.

Producers considering selling produce through a farmers' market should:

- Assess what is already being sold at the market? Will there be a demand for the produce? Is there enhancement of the product range?
- Contact the market organiser for more information on the operation of the local market.
- Visit a local market and obtain information on competitors' products and prices.
- Consult other sources of advice, e.g. the National Farmers' Retail and Markets Association (www.farma.org.uk).
- Ask whether the business can commit the time, money and other resources to preparing and selling produce at farmers' markets?
- Think about how the customer will be attracted to the product? Consider the product itself, packaging, information about the product, layout of the stall and price.
- Consider how the product can be stored and displayed, ensuring compliance with all legislation and other regulations. The Food Standards Agency Scotland (www.foodstandards.gov.scot) produces a useful publication: *Food Safety and Labelling for Farmers Markets*, which covers food safety and labelling requirements (www.food.gov.uk/multimedia/pdfs/farmermarketscot.pdf).

Farm shops

Farm shops range in size and format, from a temporary kiosk (see pages 276-277) by the road selling seasonal produce such as fruit, to large scale complexes with a substantial floor area, incorporating a café or restaurant and a children's play area. The format depends upon the objectives and requirements of the business but the popularity of farm shops has increased considerably over the last decade and some of the

biggest generate turnovers larger than the farms from which they originated.

Points to consider when planning a farm shop:

- The increase in popularity of farm shops is linked to the growing trend amongst consumers to buy local food with provenance and traceability. Most farm shop businesses are based around products that are produced or made on the farm, in the shop, or where possible, within the local area.
- A good access road, drive and car parking areas are vital as customers are reluctant to drive and walk through mud and pot holes to get to the shop or café.
- A storage area similar to that of the shop, with good vehicle access will be required. Some of this will need to be chilled or refrigerated, depending upon what is being sold.
- Building costs vary considerably depending upon size, type and extent of the development. Refurbishing redundant buildings can be more expensive than building new but may produce a more 'authentic' farm shop feel than a new build. If starting small, plan in room for expansion as the business grows, including the car parking area.
- Linking the farm shop to produce grown or made on the farm and telling the history or provenance of the farm is a key marketing tool.
- Encouraging customers to stay longer (dwell time) will generally increase the spend per customer. A café and or other activities such as play area, walking paths etc. will all help to increase dwell time.
- This is a customer service business, so recruiting and retaining good staff is essential. If the shop is having a butchery and/or café selling good quality meals then a master butcher and chef may well be necessary.
- Franchising areas (e.g. butchery or café) out to existing local businesses is worth considering as they bring the necessary skills and will help to reduce running costs.

Depending upon size, a well presented farm shop and café can produce an annual turnover of between £500,000 and over £1,000,000 with some larger farm shops taking in over £3million per annum. Staff costs generally range between 20%-40% of total business turnover depending upon the type of business, with the percentage usually higher in the café (30%-50%) than the shop (12%-20%).

Footfall and spend per customer (average £11-16 per customer) are key elements in creating a successful business so keeping the offering interesting and good promotion are vital for continual growth.

Vending machines

With the increased requirement for traceability for consumers the vegetable, fruit and/or dairy vending machine is a novel low cost method of diversification. Vending machines allow consumers to purchase fresh produce direct from the farm without the overheads involved with a farm

shop. An 18 compartment vending machine can cost from £7,000 for an ambient system to £15,000 for a refrigerated model. In the correct location with the correct produce the machines can draw in around £1,000 per week. Vending machines are good for attracting customers by offering fresh seasonal fruit and vegetables. Keeping vending machines stocked with fresh produce is important to ensure repeat customers. This may require a significant amount of labour dependent on the proximity of the machine from the farm. Typical produce includes 3-5kg potato bags, mixed vegetable boxes, fresh punnets of fruit, as well as milk and eggs.

Tourism

Ecotourism and nature-based tourism

An increasing number of tourists and visitors are looking for “greener” holidays or activities. This can range from looking for a true ecotourism experience to staying in “eco-friendly” accommodation to simply enjoying the natural landscape of an area. Ecotourism, which tends to be connected to educational aspects such as the promotion of sustainability, is different from nature-based tourism which can be viewed as tourism to places of natural significance or beauty, although there is some overlap between the two concepts.

Individual businesses could consider their own green credentials and how they could, if necessary, adjust their marketing to attract the maximum number of potential customers. Many businesses are members of initiatives such as the Green Business Tourism Scheme (www.green-tourism.com) and membership of such schemes can be used in marketing information and advertising material. A range of tourism businesses could incorporate nature-based activities such as wildlife-watching and adventure activities into what they offer their customers and how they market their business to take advantage of this interest. Information on the local environment, scenery and nature-based activities in the area could also be provided to potential customers. This also presents the opportunity for businesses to collaborate in the production of marketing information.

Self-catering

Planning permission and building regulations (see pages 375-379) are the essential first steps when considering offering self-catering accommodation. If starting a new business or converting or extending your premises, you should contact your local authority planning department for their advice on planning permission at a very early stage. Even if you wish only to equip an existing building as a holiday cottage, you may need ‘change of use’ planning permission to do so. Any structural alterations to a property, or the construction of a new building, will be subject to building regulations, so again contact your local authority. Compliance with other regulations, particularly fire will also be

required. Self-catering accommodation will be more successful when located along popular tourist routes and in areas with good tourist facilities/activities. As there may be strong competition for business in some areas, it is important to offer a high standard of accommodation and possibly other facilities, which will increase capital costs. Suitable parking and good vehicle accessibility are important. Good marketing is required to maximise occupancy rates and participation in quality assurance schemes will also be beneficial, e.g. VisitScotland Quality Assurance Schemes (www.visitscotland.org). Membership of associations can also be beneficial, such as the Association of Scotland's Self-Caterers (<http://www.assc.co.uk/>).

Returns will depend on size, location, quality and season. There is a great deal of seasonality and regional variation but keeping properties well maintained and well presented is essential for repeat custom and to enhance occupancy rates. Where hired help is required the turn over and laundry cost can be £50 to £70 per stay per unit.

Bed and breakfast

In common with self-catering units, the quality of bed and breakfast (B&B) accommodation must be of a high standard in order to attract customers in what is a very competitive market. Location and proximity to tourist attractions and facilities are also important selling points. There is a great deal of seasonality and regional variations in occupancy. Membership of quality assurance schemes can be beneficial in attracting customers; in 2016, graded accommodation occupancy rates were recorded at 50% while not graded accommodation had 44% occupancy. Compliance with all appropriate regulations, particularly fire regulations and relevant food hygiene regulations will also be required. If the establishment offers dinner, business rates may apply.

Facts and figures

	Farmhouse B&B	Self-catering
Accommodation tariffs ¹	£25-£50/bed/night	£230-£1,000+/week
Length of season ²	38wk	30-34wk
Occupancy rate ³	36-42%	48%
Operating costs ⁴	25-30% of output	50-60% of output

- ¹ Charges vary depending on the location, low/high season, quality of the accommodation and the facilities available.
- ² The holiday season generally runs from April to October and highest occupancy can be expected from May to September.
- ³ 2016 average occupancy (VisitScotland).
- ⁴ Costs include food (for B&Bs), hired/casual labour, repairs, renewals and maintenance, fuel, electricity, advertising, insurance and sundries. Unpaid family labour is not included.

Sources of information

Sources of further information for tourist accommodation include:

- Criteria/guidance for Small Serviced Classification (http://www.visitscotland.org/business_support/quality_assurance/accommodation/self_catering_accommodation.aspx)
- Farm Stay (www.farmstay.co.uk)
- Accommodation in Scotland (<http://www.explorescotland.net/holiday-in-scotland/accommodation/>)

Equestrian Enterprises

Equestrian related enterprises are often ideal diversification options for farms or rural occupiers due to the existing infrastructure and land. Enterprises that are commonly considered are:

- Horse Livery
- Cross Country Schooling Course
- Riding School
- Horse Bed and Breakfast
- Horse Riding Holidays

It must be decided from the outset on the service that is to be provided and thus the level of input that is required. Factors to be considered include:

Demand – In many areas there is an oversupply of equestrian facilities and it is strongly recommended that a feasibility study should be carried out before embarking on any new venture.

Location – Good riding country, with access for safe, off-road riding and within easy reach of at least one centre of population is the ideal situation. Enterprises with unique offerings, specialist services/facilities or located on the outskirts of major towns/cities may be able to command a higher rate.

Land – On free draining ground, horses and ponies will require around 0.50-0.75 hectares (1-2 acres) of well established, moderate quality grazing per head (equine grass mixtures are available). A larger area will be required where land is poorer or where year round turnout is required. If not enough land is available or where the diversified business is to be kept separate from the main farm business, rent will need to be considered. Grassland management costs will vary according to land available but may include a reseeding policy, with annual fertiliser applications and weed control, and seasonal field operations such as harrowing, rolling and topping.

Fencing – Well maintained fencing which is suitable for horses (electric fencing is often preferred), with good gates and an adequate water supply. In some cases smaller paddocks or all weather turnout areas may be required. See pages 353-354 for fencing costs.

Shelter – This will include field shelters and/or well ventilated permanent stables. Wooden field shelters or loose boxes may cost around £2,000 upwards each. Conversion of an existing agricultural building may be less expensive. Construction of a 12 box yard, including tack and feed rooms could cost around £25,000 upwards (excluding groundworks and services). Rubber matting in stables is desirable.

General facilities – Lorry and car hard standing parking areas, secure tack and feed stores, a muck disposal area, covered hard standing area with water supply and good drainage for grooming and washing down and toilet facilities are basic requirements.

Riding facilities – An all-weather outdoor schooling area is almost essential in order to attract customers for some enterprises (e.g. livery yards) and an indoor arena may also be desirable (e.g. for riding schools). A 40m x 20m outdoor schooling area could cost between £10,000-40,000. A similar size indoor arena could cost between £75,000-150,000. Both outdoor and indoor costs are determined by the level of ground works required, the size of the arena, the surface chosen and provision of lighting and mirrors.

Labour – Personnel with customer care and people skills are essential for equestrian enterprises and often a yard/facility manager with experience/qualifications in horse care and events is an important asset. Businesses employing labour will have costs such as wages, employers liability insurance and the cost of personal protective clothing.

Operating costs – These are highly dependent on service provision and can include feed (concentrates and forage), bedding (straw or shavings), electricity and water, machinery repairs, fuel, property repairs, insurance, advertising/website/social media management and business rates.

Horse health and welfare – Information on the minimum requirement for keeping horses can be found in the Code of Practice for the Welfare of Equidae <http://www.scotland.gov.uk/Resource/Doc/271583/0080953.pdf>. Many yards will operate a worming programme on site but the cost of wormer would generally be an additional charge. It may be appropriate to consider a health scheme for the horses in the yard, e.g. the Premium Assured Strangles Scheme (PASS) (see page 113 for more detail).

Health and safety – All businesses should be aware of health and safety implications, see pages 361-362 for more details or the publication at: http://adlib.eversite.co.uk/resources/000/264/078/Livery_Yards_Guidance_2006.pdf.

Fire safety - Businesses should also be aware of their responsibilities with regards to fire safety. More details can be found at: <https://www.gov.uk/government/collections/fire-safety-law-and-guidance-documents-for-business>

Value added tax (VAT) – Advice from an accountant or tax advisor should be sought to make a judgement on whether the services and products provided should be taxable, e.g. depending on the business's VAT status the provision of DIY livery may not attract VAT, however the additional services provided through full livery are likely to attract VAT.

Rates – Buildings used for agriculture are normally exempt from rates however horses are not considered as agricultural “livestock”. Where a business is providing buildings for use by horses, these buildings are potentially rateable. Advice should be taken from local Council representatives for specific circumstances. The Small Business Bonus Scheme may apply depending on the size of the enterprise and the area occupied for commercial purposes.

Planning – For any new buildings or change of use of agricultural buildings/land, planning permission will be required. Advice should be taken from a local planning consultant or the local Council planning department. For more information on planning regulations see pages 375-379.

Approved centres – This would show clients that the business has been assessed against detailed criteria and recognised as being well managed, offering first rate customer care, high levels of horse husbandry and general good practice throughout. See www.bhs.org.uk and www.abrs-info.org for more information.

Living accommodation – Facilities may need to be provided for staff (if required) and for guests where a lodging service is on offer, e.g. bed and breakfast, dormitories/bunkhouses or self catering in a farm cottage/static caravan/log cabin. When providing accommodation and meals, investigation into local authority regulations, e.g. fire and food hygiene, should be carried out. Membership of quality assurance schemes may also be considered.

Horse livery

On-farm horse and pony livery can range from providing grazing only, to full livery (including labour, grazing, stabling, grooming, feeding and possibly exercise).

Returns will vary depending on the level of service (which is dependent on the knowledge of the person/s running the yard) and facilities being provided (e.g. a basic farm diversification or a specialist professional yard).

Livery services are likely to range from 70-100% occupancy. Grass and DIY livery are realistically the base market for farm diversification projects while part and full livery services will be more suited to yards with available skilled personnel.

Examples of livery services and approximate returns are shown in the following table:

Livery Service	Returns (£/horse/wk)
Grass	Grass keep only, no stable £15-30
DIY	Stable and grazing only, all horse care carried out by horse owner (hay and bedding can be included as extra) £20-45
Part	Full care* for part of the week (e.g. weekdays with DIY at weekend) £60-90
Full	Full care* including or excluding exercise £75-150

* full care includes stable, grazing, labour, feeding, bedding but excludes wormer, vet costs and farrier.

Example gross margins (**not** including site specific fixed costs such as labour, rent, rates, maintenance, PPE, insurance, professional and subscription/licence fees, etc) for livery services are shown in the following table:

	Grass	DIY	Part	Full
Occupancy (wks)	44	44	44	44
Price (£/wk)	25	40	80	110
	£/horse/year			
OUTPUT				
Livery	1,105	1,768	3,536	4,862
Other Income	-	-	-	-
	1,105	1,768	3,536	4,862
VARIABLE COSTS				
Concentrates 0.6t @ £350/t	-	-	217	217
Hay 2.5t @ £160/t	-	-	396	396
Bedding - shavings 1.2t @ £280/t	-	-	329	329
Misc	-	-	-	-
	-	-	942	942
Forage variable costs:				
grazing 0.6ha @ £106/ha	64	64	64	64
Total Variable Costs	64	64	1,005	1,005
GROSS MARGIN	1,105	1,768	2,594	3,920

Adding value to a livery enterprise is increasingly common through offering other services. These services can include the provision of horse care assistance to DIY livery horse owners, clipping (if skilled personnel are available), products (such as straw and hay/haylage) or such as those in the enterprises described in the following sections.

Cross country schooling course

The availability of a fairly extensive area of well drained ground in an accessible location is essential for this enterprise. Varied terrain with access to a river/stream provides options for different jump constructions including a water jump. Initial investment will be substantial and in

addition to many of the equestrian enterprise factors previously mentioned, can include:

- General groundworks
- Field access (for official and emergency service vehicles)
- Jump purchase
- Jump construction
- Communications

It is estimated that jumps will cost in the range of £250 to £1,000 per jump. It is highly recommended that the course and all jumps are approved by an experienced and approved course designer in terms of siting, fence design, construction, materials and safety. A consultation fee for this would be expected.

Income will be seasonal depending on factors such as geographical location, weather and availability of land (out with normal farm management practices). The season would commonly run from the end February/start March through to October. Hire costs per horse range from £20 - £35 per hour depending on the number/height/range of jumps available. Sensible planning of the siting of fences may facilitate the generation of additional revenue from holding Hunter Trials, One Day Events or similar events.

Maintenance of ground and jumps will be cost specific to this enterprise. Casual labour (with the provision of a tractor) on the days when events are running would also be required. Management time in terms of labour will be minimal.

Riding school

A riding school is a specialised facility which requires experienced management and operation.

Basic requirements include the availability of land (for grazing and riding), stabling, ancillary areas and riding facilities. An indoor schooling area is almost essential in Scotland to ensure an income all year round.

The level of investment will be heavily influenced by the existing availability of buildings for conversion. Horses and ponies will also need to be purchased and costs can range from £750 - £4000 depending on size and suitability.

Income should be budgeted on year round accessibility with evenings and weekends being busy periods out-with school holidays. Lesson charges range from £10 - £50 per rider depending on the number of horses in the ride, the quality of the horse/pony being hired and level of instruction being given. Up to 8 riders may safely join a low level, slow paced beginner type lesson.

Labour and operating costs (as described previously) should be budgeted. Teaching staff will cost upwards of £15 per hour in addition to

basic wage rates for yard staff. Management time and costs in terms of staffing will be significant. Local authority licensing under the Riding Establishments Act 1964 and 1970 will be essential when offering horses for lessons (riding lessons offered to someone on their own horse would not require this licence).

Horse bed and breakfast

This enterprise is focussed on providing a bed and breakfast service for horses (and humans) who require respite while on long journeys or as an overnight stay prior to or during an event. The proximity of the facility to major arterial routes or areas of particular interest for off-road riding or equestrian events will be an important factor to gaining trade.

This enterprise is best suited where facilities are already in place and limited investment is required. Requirements include the availability of one or more stables and an area of turnout for horses. Accommodation for people (i.e. bed and breakfast in a house or self catering in a static caravan or cottage) can be optional and add value to the service.

Income may be irregular depending on location and on the time of year where there are local scenic riding routes/events available. Charges will start at £20 per person per night and £10 per night per horse depending on the quality and service offered.

Running costs and management requirements will vary but are likely to be fairly minimal.

Horse riding holidays

Location is fundamental to the success of horse riding holidays. A riding holiday centre is most suited to premises in scenic and remote rural areas. Good access to off-road riding over a variety of terrain is essential.

The service can include the provision of horses to hire or there can be the option for guests to bring their own horses.

Basic facilities could include:

- a covered area for tacking up.
- stables (for hire horses and/or guests horses).
- grazing (for hire horses and/or guests horses).
- a tack room.
- toilet facilities.
- living accommodation for guests.

The service can be enhanced by providing other riding facilities, i.e. all weather or indoor arenas, show jumping and cross country facilities and tuition and all inclusive luxury accommodation. With the above in mind, investment could be great if starting with a blank canvas. This enterprise will work best when there are already horses and facilities in place. Local authority licensing will apply where horses are provided.

Income is likely to be based on short stays (e.g. weekend) or on weekly terms and will be seasonal (end March to end September). Prices will range with a high dependence on the service and facilities provided. These can start at £250 for shorter stays to £1,300 for longer and more intensive/themed stays.

Operating costs will be highly influenced by the service being provided. Basic, smaller scale enterprises will have costs for facilities/infrastructure maintenance and the keep of horses/ponies. Premium enterprises will have a much greater expense for labour and catering

Forestry and Farm Woodlands

Introduction

Increasing the area of woodland in Scotland is a key Scottish Government objective to help meet national carbon emission reduction targets and support economic growth. Farmers are being encouraged to manage and increase the area of woodlands on farm and to maximise the benefits this can bring to the farm business.

This section provides guidance on; trees and the law, woodlands and shelter, timber prices, Christmas trees, financial assistance for farm woodlands and taxation.

Trees and the Law

Felling licences

The felling of trees is controlled by the Forestry Commission in exercise of its powers under the Forestry Act 1967. A licence from the Forestry Commission is normally required (though not for topping or lopping), but in any calendar quarter up to 5m³ may be felled by an occupier without a licence provided not more than 2m³ are sold.

Certain types of felling are exempt. Full details are available from the Forestry Commission (<http://scotland.forestry.gov.uk/supporting/grants-and-regulations/felling-licences>). A felling licence must be obtained before the felling can commence. Unless exempt, felling without a licence is illegal and carries, on conviction, a fine of £2,500 or twice the value of the trees, whichever is higher.

It is usually a condition of any felling licence that the site is replanted, or an equivalent sized area elsewhere on the property. This obligation runs with the land. Assistance to restructure woodland is obtainable through Pillar II Scottish Rural Development Programme (SRDP) funding under the Forestry Grant Scheme (FGS).

If trees are covered by a Tree Preservation Order, in a Conservation Area, or in a Site of Special Scientific Interest (SSSI) then an application to fell must also be made to the Local Authority or Scottish Natural Heritage for the latter.

Dutch elm disease

Under the Dutch elm disease (Local Authorities) (Amendment) Order 1988, local authorities may require owners to fell elms infected by Dutch elm disease. To prevent the spread of the disease, regulations also control the movement of elm logs within the terms of a licence issued by the Forestry Commission in certain areas.

Ash dieback

Legislation passed on the 29th October 2012, restricts the importation and movement of ash trees for planting, because these carry a high risk

of spreading the *Chalara fraxinea* fungus, which causes Chalara (Ash) dieback.

Plant Health Order prohibits movement of ash seeds, plants and trees within the country. However, ash firewood and timber can continue to be moved around the country, but it is recommended that any leaf material is removed before movement.

Phytophthora ramorum

Since its discovery in south-west England in 2010, *P. ramorum* has spread considerably. Its high incidence in the south-west of Scotland has led to a large area being designated an 'infection management zone', while new cases are being found predominantly along the west coast of Scotland, with more appearing south of the Cairngorms. The infection spread map can be viewed at:

<https://www.forestry.gov.uk/pramorom#images>

Susceptible trees include larch (*Larix*) species and *Quercus rubra* (northern red oak); *Q. cerris* (Turkey oak), *Q. ilex* (holm oak); *Fagus sylvatica* (beech), *Castanea sativa* (sweet chestnut), and *Aesculus hippocastanum* (horse chestnut).

P. ramorum is a notifiable disease. Do check the symptoms before alerting the Forestry Commission. Further information can be found at:

<https://www.forestry.gov.uk/pramorom>

Currently, no cure has been found and there are no effective chemical treatments available. If *P. ramorum* is confirmed in woodland, Forestry Commission Scotland will issue a Statutory Plant Health Notice, placing a legal requirement on the owner to fell the trees within a set period of time. Grant aid is available to assist with agents' fees and restocking, further information can be found on page 294-303, and at:

<https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/forestry-grant-scheme/tree-health/>

Any movement of Phytophthora-affected wood from a forest site (or subsequent move of affected material from a mill or processing site) requires a movement licence. Phytophthora-affected wood may only be moved to a facility that holds a valid processing licence.

Information on risk zones can be found at:

<http://scotland.forestry.gov.uk/supporting/forest-industries/tree-health/phytophthora-ramorum>

Phytophthora alni

All alder species in Britain are threatened by a lethal disease of which the causal agent is *Phytophthora alni*. No restrictions apply.

Phytophthora austrocedri

Phytophthora austrocedri is a fungus-like pathogen which poses a threat to juniper trees in Britain. Juniper (*Juniperus communis*) is an important native species, thus a significant proportion of the small area of juniper woodland in Britain is protected. Infected trees have been found at sites across Scotland and the north of England. The pathogen primarily attacks juniper roots and extends up into the lower stem. Eventually the tree will be killed by girdling of the main stem. The pathogen is notifiable and all suspected cases should be reported to the Forestry Commission.

Dothistroma needle blight

Dothistroma Needle Blight (Red Band Needle Blight) is caused by the fungus *Dothistroma septosporum*. It has been found on a range of conifer species, but pine are the most common hosts, with Corsican pine, Lodgepole pine and Scots pine all now affected. Defoliation can continue year on year gradually weakening the tree, significantly reducing timber yields and eventually leading to mortality. Restrictions only apply to forest plant nurseries.

Woodland and Shelter

Trees and woodland can provide valuable protection from wind and driving rain which can:

- Reduce lamb and ewe mortality which results from evaporative chilling
- Increase weight gain in livestock
- Increase milk yields in cows
- Improve livestock health and condition
- Reduce feed costs
- Reduce evapotranspiration of pasture and crops
- Protect light soils
- Increase soil organic matter content

Woods can act as a wind shield or a wind break, depending on the porosity of the wood. These principles are set out below:

Wind Shield

- Virtually impermeable woodland (<40% porosity)
- Reduces wind speed by up to 90%
- Wind speed reduction over distance of up to 10 times tree height from lee side of forest
- Greatest shelter within distance of 3 to 5 times of tree height
- Completely stops wind within small area; high turbulence in field
- Best for livestock protection

Wind Break

- Permeable woodland (40-60% porosity)
- Reduces wind speed by up to 70%
- Wind speed reduction over distance of 20-30 times tree height from lee side of forest

- Achieves reduced wind speeds across large area
- Little turbulence well above ground
- Best for crops and silage

Scottish Timber Log Prices

The table below provides a comparison of Scottish timber prices. The values are for clear fells only. Prices vary according to market conditions, quality of timber, total volume harvested, ease of access and transport cost. Values are given in £/t, sold on an out turn tonnage basis. Roadside sales are net of harvesting costs, while standing sales are net of harvesting and haulage costs and represent the gross margin of that crop.

Typical broadleaf and conifer log prices for the year pre-April 2017 are as follows:

Species	Log Type	Price (£/t)	
		Roadside	Standing
Ash or beech	Various	27 - 50	7 - 30
Oak	Beam	87 - 125	67 - 105
Oak	Planking	150 - 200	130 - 180
Burr Elm	Individual tree	275 - 600	-
Larch*	Random length	30 - 35	10 - 15
Scots pine	Logs	30 - 35	10 - 15
Sitka spruce	Green logs	37 - 42	17 - 22
Sitka spruce	Red logs	30 - 35	10 - 15
Sitka spruce	Pallet wood	23 - 28	3 - 8
Mixed conifers	Chipwood or pulp	16 - 22	1.50 - 13

* This is specific to large trees.

Timber crop values, at clear fell, range considerably with quality crops usually selling well. Estimated standing sale timber values for Sitka spruce (YC 16) can be £3,000 to £7,500/ha.

Woodland owners increasingly keep part of the timber harvested for their own use for woodfuel. The cost to harvest and extract small round-wood to roadside is typically in the range £13-18 per tonne.

Christmas Trees

Christmas trees can provide a profitable cash crop for either a small acreage as a diversification on farm or on a larger commercial scale. By planting a new area annually, a steady income can be realised as the trees mature in an average of eight to ten years and are harvested and re-planted.

Site Choice

Soils should have a good structure, lighter soils with no plough pan are preferred. Drainage should be good, with no wet areas. Nutrient status should be adequate, or capable of being rectified. The site should not be in a frost pocket and should be free from perennial weeds.

Christmas tree species

Common Name	Botanical Name	Length of production and Soils
Noble fir	<i>Abies procera</i>	Soft needles. Approximately 10-12 years to reach 2m height. Susceptible to late frosts. Soil pH approx. 5.0.
Scots pine	<i>Pinus Sylvestris</i>	Naturally grown on poor sites, pH slightly alkaline and acidic 5.0-7.5. ready for market in 5-7 years depending on size required. Deep rooted.
Norway spruce	<i>Picea abies</i>	Traditional Christmas tree. Soil pH 5.5-6.5. Approximately 8-12 years to reach marketable size.
Nordman fir	<i>Abies nordmanniana</i>	Susceptible to late frosts. Soil 5.0. Approximately 10-12 years to reach 2 m in height.
Frasier fir	<i>Abies fraseri</i>	Soil pH 5.0-5.8. Approximately 8-12 years to reach marketable size.

Planting and spacing

Typical plant spacings and the number of trees per hectare are set out in the table below. Loading areas should be allowed for and access tracks/paths every 12-15 rows would be desirable, and this is reflected in the plant spacing in the right column.

Spacing	Trees/ha, planted areas	Trees/ha, inc. paths etc.
1m x 1m	10,000	8,700
1m x 1.2m	8,300	7,220
1.2m x 1.2m	6,900	6,000

Fencing for rabbits and deer will likely be required and would be site specific. Drainage may also be required.

Pruning and shearing

To improve the quality of the trees from year 1, pruning and shearing will be required. This increases the density of the foliage and the tree shape.

Weeding and fertilising

Regular weeding is required to prevent competition for nutrients and water, but also to maintain the form of the Christmas trees. Heavy weed growth can cause shading and/or restrict growth of the lower branches, thereby reducing the quality of the tree.

Soil fertility should be assessed and remediated ahead of planting. This then requires only nitrogen to be applied annually from year three, and top-ups of phosphorus and potassium.

Pests and diseases

Common pests and diseases are listed below.

Phytophthora root rot - This is a fungal disease present in the soil, affecting a broad range of tree species. It causes yellowing of the needles, wilting and death of branches.

Red band needle blight - This is caused by the fungus *Dothistroma septosporum* which can occur in all conifers but it mainly affects pines. This affects all ages of needle growth and leads to heavy defoliation.

Aphids and adelgids - These both suck the host plants sap and inject substances which affect both reproduction and plant growth. These can both be treated with broad spectrum insecticides.

Needle cast disease - This is caused by fungi and affects the previous growing season's needles. This causes brown and or yellow spots on the needles and can cause needle loss. The advice is to apply a fungicide treatment and the removal of heavily infected trees.

Planting and felling legislation

Where the planting area exceeds 5ha, or 2ha in a sensitive area such as a National Park or National Scenic Area, an Environmental Impact Assessment (EIA) determination is required from the Forestry Commission. The determination would stipulate whether an EIA is required or not, or if more information is required to inform the determination.

Whilst felling regulations apply to all woodland, the cutting of Christmas trees will fall under the following exemptions:

- Felling of trees of 8cm diameter or less, measured at 1.3m above ground level;
- Thinning of trees of 10cm diameter or less, measured at 1.3m above ground level.

If there is any doubt as to whether the exemptions apply or not, seek advice from Forestry Commission Scotland.

Costs

Production costs over the whole production cycle, over a seven year period are in the order of £24,500/ha. This comprises the following elements, based on 7,220 trees/ha:

	£
Purchase of transplants	3,250
Planting	1,080
Fertiliser	700
Herbicides	1,350
Pruning/shearing	7,200
Harvesting and marketing	10,850
	24,430

Fixed costs tend to be associated with planning and set-up and comprise the following:

- Land rental or land purchase
- Deer and rabbit fencing
- Hard standings (large area required if retailing from site)
- Drainage

Prices

Wholesale prices at the present time are £1.80 to 2.20/ft for Spruce and Pine, and £2.30 to 4.90/ft for Fir species. Based on an effective planting density (including paths, etc) of 7,220 trees/ha and adjusting by 10% for losses/unmarketable trees, the income of marketed 6ft (average height) trees would be approximately £78,000/ha for Norway Spruce and Scots Pine and £160,000/ha for lower needle drop species such as Nordmann Fir. The latter is equivalent to £20,000/ha/year. If retailing on site the prices may be slightly higher.

More information on growing Christmas trees can be obtained from the British Christmas Tree Growers Association (BCTGA) at www.bctga.co.uk or Centre for Alternative Land Use at <http://www.calu.bangor.ac.uk/Technical%20leaflets/050403%20CALU%20Christmas%20trees.pdf>

Financial Assistance for Farm Woodlands

Financial assistance for the creation and maintenance of forestry and farm woodlands is supported through the Forestry Grant Scheme (FGS) under the 2014-20 Scotland Rural Development Programme (SRDP).

The FGS is entirely administered, except for payments, by the Forestry Commission. Full details of the new FGS can be found at: <https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/forestry-grant-scheme/>.

The following information has been adapted from the above website to give an overview of the scheme options. Applicants should refer to the full scheme guidance as revisions are likely and applicants should always check if there have been any updates.

Forestry activity is supported under eight categories and these are:

1. Woodland creation
2. Woodland improvement grant
3. Sustainable management of forests
4. Agro-forestry
5. Forest infrastructure
6. Tree health
7. Harvesting and processing
8. Co-operation

Woodland creation

Grants for woodland creation have increased substantially, especially for productive woodlands. The Forestry Commission hopes that about 60-70% of new planting will be of productive woodlands. The structure involves capital payments for planting and fencing, with payments for tree shelters, and bracken control if needed, together with an annual maintenance payment claimed on the Single Application Form. Of particular note is that you can continue to claim Basic Payment on land planted under the scheme.

There are nine options for woodland creation, each with specific requirements for composition and stocking densities. These are:

1. Conifer, predominantly Sitka spruce.
2. Diverse conifer, species other than Sitka.
3. Broadleaves, productive species at high stocking.
4. Native Scots pine.
5. Native upland birch.
6. Native broadleaves, other native woodlands, mainly lower ground NVC types.
7. Native low density.
8. Small or Farm woodland, mixed woodlands less than 10ha, no individual block to be more than 5ha in size.
9. Northern & Western Isles.

A higher rate of grant is payable in four target areas and these are:

1. Conifer, Diverse Conifer or Broadleaves in areas defined as being preferred or potential in the relevant local authority woodland strategy or equivalent.
2. Areas identified by the Cairngorms National Park Authority as a priority for woodland expansion, for predominately Scot's Pine or native broadleaved options.
3. Woodlands for Water, in priority areas identified by SEPA, for all options other than the Conifer option.
4. Native woodland options within the area identified as the "Highland Native Woodland Target area".

In addition a capital grant is payable for the use of vegetatively propagated Sitka Spruce.

The planting grants and capital grants applicable to the woodland creation scheme are as follows:

Planting Grant	Payment rate (£/ha)		
	<i>Initial Planting</i>	<i>Annual Maintenance</i>	<i>Total for 5 years</i>
Standard Areas			
Conifer	1,920	208	2,960
Diverse conifer	2,160	336	3,840
Broadleaves	2,880	528	5,520
Native Scots Pine	1,840	272	3,200
Native upland birch	1,840	128	2,480
Native broadleaves	1,840	272	3,200
Native low density broadleaves	560	96	1,040
Small or farm woodland	2,400	400	4,400
Northern and Western Isles	3,600	624	6,720
Target Areas			
Conifer	2,160	234	3,330
Diverse conifer	2,430	378	4,320
Broadleaves	3,240	594	6,210
Native Scots Pine	2,070	306	3,600
Native upland birch	2,070	144	2,790
Native broadleaves	2,070	306	3,600
Native low density broadleaves	630	108	1,170
Small or farm woodland	2,700	450	4,950
Northern and Western Isles	n/a	n/a	n/a

Capital Item Grant	Payment rate
Genetically-improved Sitka Spruce	£150/ha
Stock fence	£4.40/m
Deer fence	£6.80/m
Deer fence - high cost	£9.90/m
Upgrading stock fence to deer fence	£3.28/m
Rabbit-proofing stock or deer fence	£1.60/m
Tree shelter: above 1.2 metres	£2.00 each
Tree shelter: 0.6 to 1.1 metres	£1.16 each
Vole guard	£0.20 each
Enhancing or modifying a stock fence - Black Grouse and Capercaillie core areas	£2.00/m
Enhancing or modifying a deer fence	
- Low cost Black Grouse/Capercaillie core areas	£2.00/m
- High cost Black Grouse/Capercaillie core areas	£4.48/m
Conversion of deer fence to stock fence Black Grouse and Capercaillie core areas	£1.60/m
Gate for stock fence	£136 each
Gate for deer fence	£172 each
Badger gate	£64 each
Self-closing gate for non-vehicular access	£280 each

Capital Item Grant	Payment rate
Building or restoring drystone dykes	£26.40/sq. m
Bracken control, mechanical or chemical removal	£225/ha

Two illustrative budgets (using the grant rates in the previous table) have been prepared based upon the current FGS to indicate typical incomes and expenditures between the various planting models and specifications for smaller farm woodlands. Some allowance has been made for the costs of grant application, general management, protection or game-keeping, insurance or long-term maintenance in these examples. Supplier and contractor costs are typical of those that apply for the stated quantities and land type and will vary with the circumstances.

Example 1 - 40ha site for conifers

Assumptions:

- Planting conifers in standard area.
- Up to 10% of the area can be retained as open ground and still get the full grant on it.
- Up to 5% of the area must be planted with broadleaves.
- Stocking densities of 2,500 stems/ha for conifers and 1,100 stems/ha for broadleaves are required.

Item	Quantity	Typical supplier/ contractor cost	Grant
Design/grant application fees	-	£5,000	-
Supply and erect fencing (m)	2,600	£10.00/m	£8.40/m ¹
Supply and hang deer gates	2	£200/each	£172 each
Ploughing (ha)	36	£270/ha	-
Conifers (incl. planting)	85,000	43p each	-
Broadleaves (incl. planting) ²	2,200	75p each	19p each ³
Contract supervision fees	-	£8,350 over 4 yr	-
Replacement planting	-	£2,000 over 3 yr	-
Weeding with herbicide	87,200	8p each	-
Contingency	-	5% of costs	-
Initial planting grant	40ha	-	£1,920/ha
Maintenance grant (5 years)	40ha	-	£208/ha/yr

Cash flow summary	Year 1	Years 2-3	Years 4-6	Total
Establishment costs	£86,820	£14,500	£6,000	£107,320
Grant income	£99,402	£16,640	£24,960	£141,002
Cumulative balance	£12,582	£14,722	£33,682	£33,682

¹ includes £6.80/m for deer fencing and 1.60/m for rabbit proofing

² also includes vole guards

³ grant for vole guard only

If the proposal is located in a target area the planting grant and maintenance grant will increase by 12.5%, giving an additional income of £14,800.

If the proposal is located within the Central Scotland Green Network (CSGN) core area, an additional top-up grant of £2,500/ha is available, giving an additional income of £100,000.

Example 2 - 20ha site for native broadleaves

Assumptions:

- Planting native broadleaves in a standard area.
- Up to 15% of the area can be retained as open ground and still get the full grant on it.
- Stocking densities of 1,600 stems/ha for broadleaves are required.

Item	Quantity	Typical supplier/ contractor cost	Grant
Design/grant application fees	-	£4,000	-
Supply and erect fencing (m)	1,800	£10.00/m	£8.40/m ¹
Supply and hang deer gates	2	£200/each	£172 each
Ploughing (ha)	17	£270/ha	-
Broadleaves (incl. planting) ²	27,200	75p each	19p each ³
Contract supervision fees	-	£6,350 over 4 yr	-
Replacement planting	-	£2,000 over 3 yr	-
Weeding with herbicide (2/yr)	27,200	8p each	-
Contingency		5% of costs	-
Initial planting grant	20ha		- £1,840/ha
Maintenance grant (5 years)	20ha		- £272/ha/yr

Cash flow summary	Year 1	Years 2-3	Years 4-6	Total
Establishment costs	£55,560	£8,500	£4,000	£68,060
Grant income	£57,432	£10,880	£16,320	£84,632
Cumulative balance	£1,872	£4,252	£16,572	£16,572

¹ includes £6.80/m for deer fencing and 1.60/m for rabbit proofing

² also includes vole guards

³ grant for vole guard only

If the proposal is located in a target area the planting grant and maintenance grant will increase by 12.5%, giving an *additional* income of £8,000.

If the proposal is located within the Central Scotland Green Network (CSGN) core area, an additional top-up grant of £2,500/ha is available, giving an *additional* income of £50,000.

When planning farm woodlands it is important to consider other benefits and costs. For example:

- Additional benefits can include shelter, conservation, sporting, amenity and carbon sequestration. See pages 387-388 for further information on forestry and climate change.
- The loss of agricultural production from the land is an opportunity cost and this can be minimised by planting less productive land, such as where bracken has established. If a significant proportion of the farm is planted it may be possible to reduce fixed costs.
- Potentially one of the largest financial impacts is the effect on land values. Generally the more productive the land that is planted with trees, the greater the potential loss in capital value; but in some circumstances capital values can be improved by new woodland, for example through better shelter, amenity or sporting.

Woodland Improvement Grant

This grant aims to support forest management, activity to enhance the environment and the public's enjoyment of existing woodlands. There are five options in this category:

1. Habitats and Species
2. Restructuring Regeneration
3. Low Impact Silvicultural Systems (LISS)
4. Woodlands In and Around Towns (WIAT)
5. Planning including Long-term Forest Plan, Forest Plan Renewal, Woodland Grazing Plan, WIAT Urban Woodland Management Plan and Deer Management Plan

Grant payments for options under the Woodland Improvement Grant are as follows:

Option	Grant payment
Habitats and Species	Standard costs for capital works and items from a set list. Actual costs are available for work in woodland SSSI and Natura sites where it can be demonstrated that the actual costs of the eligible capital items will be higher than the set standard costs list for this option
LISS	Standard costs for capital works and items from a set list
WIAT	Standard costs for capital works and items from a set list
Long-term Forest Plan	£25/ha for first 200ha, £5/ha thereafter (minimum £500; maximum £15,000)
Forest Plan Renewal	£10/ha for first 200ha, £5/ha thereafter (minimum £500; maximum £10,000)
Woodland Grazing Management Plan	£1200 per plan

Option	Grant payment
WIAT Urban Woodland Management Plan	£1000 for any area up to 10ha, £25/ha thereafter
Deer Management Plan	£12/ha for first 500ha, £1/ha thereafter (minimum £5,000; maximum £15,000)

Payments for restocking, (known as restructuring regeneration) comprise a single capital payment. An approved long-term Forest Plan or Woodland Management Plan must be in place to be eligible for these grants. The payments are:

Delivering UKFS Woodland (no more than 75% of area as a single species)	£300/ha
Delivering Diversity and Resilience Woodland (no more than 60% of area as a single species)	£550/ha
Improved Vegetative Stock for Sitka Spruce	£60/ha

Sustainable Management of Forests

These grants are designed to support a range of activities in existing woodlands that will:

- increase species and structural diversity through Low Impact Silvicultural Systems (LISS) management.
- encourage natural regeneration to expand native woodlands.
- bring native woodlands and designated woodland features into active management and good ecological condition.
- support management of rural and urban woodlands for public access.
- control grey squirrels where they are a threat to the red squirrel population.
- control predators to benefit Capercaillie and Black Grouse.
- reduce deer impacts to a level that will allow regeneration of conifer and broadleaved species.

The grant support for this category comprises nine options. All payments are made for up to a maximum of five years. An approved long-term Forest Plan or Woodland Management Plan must be in place to be eligible for these grants. Approved Deer Management Plans and/or Woodland Grazing Plans may also be required to be eligible for some options.

Grant	Payment rate
LISS	£30/ha/yr
Native woodlands	£25/ha/yr
Livestock exclusion	£43/ha/yr
Woodland grazing	£100/ha/yr
Public access - Rural Woods	£100/ha/yr
Public access - WIAT	£100/ha/yr for first 10ha £10/ha/yr for any additional areas

Grant	Payment rate
Grey squirrel control	£200 per trap/yr
Predator control for Capercaillie & Black Grouse	£6.60/ha/yr
Reducing deer impact	£6.00/ha/yr

Forest Infrastructure

This option provides support for new access infrastructure that will bring small-scale, undermanaged woodlands or inaccessible woodlands back into active management with the following aims:

- to improve the economic value of forest and woodland through timber production
- to increase the area of woodland in Scotland that is in sustainable management
- to improve the environmental and social benefits of woodland

This option is limited to woodlands of up to 50 hectares in size except in cases where low-level water crossings are being replaced.

Grant support is available for a number of capital grant operations associated with new forest infrastructure. The capital grant operations and payment rates available are:

Grant	Payment rate
Construction of:	
- forest road with on-site material	£25.80 per linear metre
- lay-bys, turning areas, and loading bays	£6.60 per square metre
Bell-mouth junction	£32.40 per square metre
Replacement of low level water crossings	tbc

Agro-forestry

Agroforestry can be described as an integrated approach to land management, where trees and agriculture co-exist to provide multiple benefits. This option provides grant support to help create small-scale woodlands within sheep grazing pasture. These trees can:

- provide shelter for livestock
- provide timber
- increase biodiversity
- enhance the landscape

This grant has two payment types:

- a capital grant for initial establishment
- an annual maintenance grant that is paid for five years

The rate of capital grant that can be claimed depends on the number of trees that are planted per hectare. Two stocking levels and grant rates are available:

Planting density	Initial payment	Annual maintenance
400 trees/ha	£3,600/ha	£84/ha/yr
200 trees/ha	£1,860/ha	£48/ha/yr

The rate per hectare has been set to cover:

- purchase of trees and stakes
- purchase or construction of appropriate protection
- planning, site assessment, supervision, ground preparation, and planting

A contribution is also included to the cost of beating-up and weeding.

Tree Health

This option provides support to prevent the spread of *Phytophthora ramorum* (see page 289 for more detail).

This option helps with the restoration of forests affected by the disease by supporting the work to remove infected trees and carry out subsequent replanting.

Grant support consists of a number of standard cost capital items. These are available for work to help prevent the spread of disease and restore affected woodlands. The eligible items and payment rates for eligible operations on infected land are listed in the following table:

Grant	Payment
Agent services - Advisory	£200
Agent services - Compliance	£500
Agent services - Harvesting and marketing	£1,000
Tree clearance (clearing saw)	
- Larch under 26 years - first 5ha	£600/ha
- Larch under 26 years - >5ha up to 10ha	£450/ha
- Larch under 26 years - >10ha	£300/ha
Tree clearance (other mechanised equipment)	
- Larch under 26 years - first 5ha	£1,200/ha
- Larch under 26 years - >5ha up to 10ha	£900/ha
- Larch under 26 years - >10ha	£600/ha
Un-economic felling	
- Larch older than 26 years - first 5ha	£1,200/ha
- Larch greater than 26 years - >5ha up to 10ha	£900/ha
- Larch greater than 26 years - >10ha	£600/ha
Restocking - Delivering Diversity and Resilience in Woodlands	£1,400/ha
Manual Rhododendron Eradication	
- Light	£3,500/ha
- Medium	£5,500/ha
- Difficult	£7,300/ha
Mechanised Rhododendron Eradication	
- Light	£2,200/ha
- Medium	£3,400/ha
- Difficult	£5,600/ha
Foliar Spray Treatment Rhododendron Eradication	£200/ha
Follow-up Rhododendron Eradication	£200/ha

Grant	Payment
Stem Injection Rhododendron Eradication	
- Medium	£3,000/ha
- Difficult	£4,500/ha

Harvesting and Processing

This option supports investments in new specialised equipment which will increase the local small-scale harvesting and processing capacity with the aim of:

- helping to bring woodlands into management
- promoting the economic and sustainable production of timber and timber products through processing
- adding value to local economies on a non-industrial scale (processing less than 10,000 tonnes per annum)
- providing support to facilitate and support diversification and to assist with the creation of new small enterprises and related employment

Grant support is based on actual costs with a maximum contribution of 40%. In any single application, the minimum grant award will be £2,500 and the maximum will be £35,000. Support will be given for the outright purchase of new equipment by the applicant and not acquisition through a hire purchase agreement.

The grant cannot be used for purchase of chippers. A business case must be submitted as part of the grant application.

Co-operation

This option aims to encourage landscape-scale collaborative projects between two or more landowners by providing support for project facilitation and co-ordination. The subsequent management activity can be supported through other options within the Forestry Grant Scheme.

Grant support of £250 per day is available for up to 40 days to support the cost of a project co-ordinator for the following stages of a project:

- Feasibility – this stage is the initial exploratory phase
- Consolidation – this stage focusses on the detail of the project.

Trees and taxation

Forestry enjoys several benefits in relation to taxation. Their value to stimulating the forestry sector was recognised in the Land Reform Review in 2014. A short description of taxation considerations for forestry are listed below:

Income Tax - All income from timber sales are exempt from Income Tax. Any surplus generated by forestry grants is exempt from Income Tax (e.g. in a woodland creation project with FGS funding). This does not apply to Farmland Premium.

Capital Gains Tax (CGT) - There is no CGT applied to the gain in value of commercial trees. CGT does however apply to a gain in value on the land.

Inheritance Tax (IHT) - Where commercial woodland has been in individual ownership for at least two years, it will normally attract 100% IHT Business Property Relief.

Corporation Tax (CT) - Where a company owns woodland which is independent of their trading operations, there is no CT liability on income generated by timber sales or surplus resulting from forestry grants.

For more detail on taxation, please see the Taxation section on pages 485.

Renewable Energy

Introduction

Fluctuating energy prices, government incentives and a growing awareness of the impact of climate change has prompted many farmers to consider generating renewable energy, as well as assessing where energy efficiency savings can be made. The introduction of the Feed-in Tariff (FIT) and Renewable Heat Incentive (RHI) has greatly reduced the payback periods for farm-scale renewable energy projects. This section provides an introduction to the government's financial incentives and the renewable energy technologies that are most relevant to the rural sector: wind, hydro, anaerobic digestion, biomass heating, ground source heat pumps, biodiesel and energy crops. Landowners pursuing renewable energy projects are advised to seek independent advice to verify likely energy yields, costs and technical and economic viability, rather than rely solely on information supplied by equipment manufacturers who may be pursuing their own agenda.

Energy efficiency

Before considering installing any renewable energy generation technologies it makes sense to review what opportunities there may be to improve energy efficiency. Undertaking an energy audit helps to identify energy uses and highlight potential opportunities to reduce energy bills as well as to improve your business's carbon footprint (see page 386 for more detail on carbon footprinting). The first step in reducing energy use is to measure current usage levels in order to set a baseline. Energy use can be measured by taking meter readings or by using figures from business trading accounts. Using more regular physical and financial records will provide greater detail and understanding of energy uses. Comparing the level of energy used in subsequent years against the baseline figure will then give an idea of trends in energy consumption. Sources of energy inefficiency can then be identified and addressed, both in terms of technical solutions and management changes.

Benchmarking energy use against other similar farms can also highlight where improvements need to be made. There can be differences in energy use of 30% or more with comparable businesses. The greatest savings in energy use will come from changes to farming systems and practices and therefore agricultural knowledge is vital to be able to exploit these potential savings.

Renewables options appraisal

Each renewable energy technology has different characteristics, which will influence whether or not it is suited for use on a particular farm. It is vital to carefully consider what your objectives are and what you want from a renewable energy installation at an early stage. The following factors are important to consider before deciding which renewable energy technology option(s) you wish to investigate:

- What is the scale and pattern of your energy demand?
- What energy resources do you have available on your farm?

- How much capital do you have access to for investment?
- What level of risk are you willing to take?

For general information on energy efficiency and renewables, see:

- SAC Consulting Renewables Database (www.sruc.ac.uk/renewableenergy)
- Farming for a Better Climate (<http://www.sruc.ac.uk/farmingforabetterclimate>)
- Energy Savings Trust (www.energysavingtrust.org.uk)
- Carbon Trust (www.carbontrust.com)
- Scottish Renewables (www.scottishrenewables.com)
- Renewable Energy Association (www.r-e-a.net)

Grants and Incentives

Renewable electricity – Feed-in Tariffs

Feed in Tariffs (FITs) are aimed at renewable or low carbon electricity production developments of less than 5 MW. The FIT is paid in two parts: the Generation Tariff and the Export Tariff. The Generation Tariff is paid for every kWh of energy generated (even if the energy is used on site) and varies depending on technology and scheme size. On top of this, generators are also eligible for an Export Tariff payment for exporting to the grid which guarantees a minimum payment (currently 5.03p/kWh). Generators also have the option to forego the export tariff and make their own deal to sell power to an energy company, which can return a higher price. Both parts of the FIT payment are index linked and will be adjusted in line with inflation each year.

Since the scheme has been introduced there have been various consultations and changes to the tariff rates for technologies in order to either control the budget in response to higher than anticipated levels of uptake, e.g. photovoltaic (PV), or to encourage greater uptake of certain technologies, e.g. anaerobic digestion (AD).

All new installations applying for FITs are subject to two forms of depression:

1. Default Depression – this is applied every quarter regardless of deployment levels, and depending on the technology ranges from 0.1% - 1.5% per quarter.
2. Deployment Caps – a capping system as of 8 February 2016. This system operates each quarter.

If any particular technology reaches the government set cap for that quarter (based on MW installed in that quarter) it would trigger a depression of 10%. Additionally if the total installed capacity is reached for a quarter then all other applications for this quarter will be entered into a queuing system to wait until the next quarter that can accept applications. However, if capacity for each quarter is not reached it will

roll over into the next quarter. Given the frequent changes to FIT rates due to the degression mechanisms, rates change on a regular basis, therefore, for the most up-to-date tariff rates please refer to the Ofgem website at:

<https://www.ofgem.gov.uk/environmental-programmes/fit/fit-tariff-rates>.

The current (1 April 2017 to 30 June 2017) tariffs are:

Renewable technology	Development size (kW)	p/kWh
Wind Power	<50	8.39
	50-100	4.95
	100-1.5M	3.22
	>1.5M	0.83
Hydro Power	100	7.80
	100-500	6.26
	500-2M	6.26
	2M+	4.54
Photovoltaics* (PV)	<10 Higher	4.14
	<10 Middle	3.73
	<10 Lower	0.48
	10-50 Higher	4.36
	10-50 Middle	3.92
	10-50 Lower	0.48
	50-250 Higher	1.99
	50-250 Middle	1.79
	50-250 Lower	0.48
	250-1M	1.63
>1M	0.48	
Anaerobic Digestion (AD)	Stand Alone	0.35
	<250	6.24
	250-500	5.90
	>500	2.24

* The Government have introduced an energy efficiency requirement for solar PV installations with a total installed capacity of 250 kW or less. Applicants now need to demonstrate the energy performance rating of the building that the PV installation is attached or wired to and this determines the FIT rate that will be applied to the scheme.

For further information on degression and cumulative capacity totals, please refer to the Government response to the consultation on a review of the Feed-in Tariff scheme which can be found at:

https://www.ofgem.gov.uk/system/files/docs/2017/04/tariff_table_april_2017.pdf and

<https://www.ofgem.gov.uk/environmental-programmes/fit/contacts-guidance-and-resources/public-reports-and-data-fit/feed-tariffs-deployment-caps-reports#block-views-publications-and-updates-block>

The UK government has recently been reviewing the sustainability criteria for FIT's for Anaerobic Digestion. The intention was to have the new regulations in place by spring 2017. However, it now will not be laid before UK Parliament until at least July 2017 at the earliest. The changes include:

- A minimum of 50% of biogas must be derived from wastes or residues. As most non-fatty wastes have low methane potential, this normally means far more than 50% of the feedstock needs to be residues and wastes.
- However, it's not all or nothing but scaled proportionally to the amount the 50% threshold is missed by. Even where 100% crops are used 50% of the electricity produced would still receive FITs.
- Carbon limits on the ELECTRICITY produced by feedstocks will be introduced of 66.7gCO₂eq/MJe until 2020 then tightening to 55.6gCO₂eq/MJe. Compare this to the RHI limit 34.8gCO₂eq/MJth. Most engine based CHP units produce approximately 1:1 electricity to heat, this means the RHI criteria appears almost twice as tight, in reality once the complex calculations have been carried out, the FIT limit is about 30% lower (more strict) than the RHI.
- Land Criteria will also be introduced in line with those already used for the RHI. The aim is to exclude fuels or feedstocks being grown on land that has high biodiversity or carbon stock. As far as UK AD operators are concerned they would need to prove the land crops were grown on was not; designated for conservation purposes, highly biodiverse grassland, peatland, formerly afforested or former wetland. The simplest way to evidence this is farm records such as IACS from 2007/08.

The full government response to the FIT consultation can be found at: <https://www.gov.uk/government/consultations/review-of-support-for-anaerobic-digestion-and-micro-combined-heat-and-power-under-the-feed-in-tariffs-scheme>

Renewable Heat - Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is a Government scheme that provides financial support for the generation of renewable heat and production of biomethane. Renewable systems suitable to the farm scale such as biomass boilers, solar thermal panels, heat pumps (ground, water and air source) and heat recovered from anaerobic digestion systems (non-domestic scheme only) are eligible.

There are two distinct RHI schemes; non-domestic and domestic. The non-domestic RHI opened at the end of November 2011, while the domestic RHI only launched in April 2014.

The **non-domestic RHI** scheme makes a tariff payment for every kWh of heat produced over a 20 year term, with payments being adjusted annually in line with inflation. The RHI cannot be claimed if a grant is also being claimed for the installation of a scheme. Tariff levels have been

calculated to bridge the financial gap between the cost of conventional and renewable heat generation systems, plus a financial profit.

RHI tariffs are reviewed and potentially degressed on a quarterly basis according to the level of uptake of the various eligible technologies. A quarterly forecast made by DECC advises whether any tariffs will be reduced, what the new tariffs will be, and if any reductions are to be implemented, applicants are only given just under one months notice. However, due to the monthly forecast updates from DECC it is possible to predict with a certain degree of certainty the reductions about 2-3 months in advance. Because of these frequent rate changes, please refer to the Ofgem website for the most up-to-date tariff rates: <https://www.ofgem.gov.uk/environmental-programmes/non-domestic-renewable-heat-incentive-rhi/tariffs-and-payments>

The farm scale relevant current (June 2017) tariffs are:

Renewable technology	Development size (kWth)	p/kWh
Biomass	<200 Tier 1	2.85
	<200 Tier 2	0.75
	200-1M Tier 1	5.32
	200-1M Tier 2	2.31
	>1M	2.08
Solid Biomass CHP	All	4.29
WSHP/GSHP	Tier 1	9.09
	Tier 2	2.71
ASHP		2.61
Deep Geothermal	All	5.22
Solar Collectors		10.44
Bio-methane	First 40,000 MWh Tier 1	3.56
	Next 40,000 MWh Tier 2	2.10
	Tier 3	1.61
Biogas Combustion	<200	3.20
	200-600	2.51
	>600	0.95

For more information on the non-domestic RHI scheme, see Ofgem: <https://www.ofgem.gov.uk/environmental-programmes/non-domestic-renewable-heat-incentive-rhi>

The **domestic RHI** scheme is open to single domestic premises, including farmhouses. A building is considered to be a single domestic premises if it is defined as a ‘separate and self-contained premises for Council Tax purposes’.

There are a number of eligibility criteria for the scheme. If you are considering a renewable heat project it is vital that you familiarise yourself

with these criteria to avoid installing a system, which is not eligible for tariff payments. Tariff levels have been calculated to bridge the financial gap between the cost of conventional and renewable heat generation systems only, unlike the non-domestic scheme there is no financial profit built in. Therefore, the domestic scheme gives about half the total income of the non-domestic scheme, notwithstanding the various depressions in the domestic and non-domestic scheme, which have at times altered this for some technologies. It is important to note that payments for the domestic scheme are made over a seven year term (rather than the 20 year term for the non-domestic scheme), and the tariff levels are currently set at:

- 7.63 p/kWh for air to water heat pumps;
- 4.28 p/kWh for biomass boilers and pellet stoves with back boilers;
- 19.64 p/kWh for ground source heat pumps;
- 20.06 p/kWh for flat plate and evacuated tube solar thermal panels.

The domestic RHI tariff rates are subject to review and possible depression on a quarterly basis, in much the same way as for the non-domestic tariffs. For the most up-to-date tariff rates refer to the Ofgem website at:

<https://www.ofgem.gov.uk/environmental-programmes/domestic-rhi/contacts-guidance-and-resources/tariffs-and-payments-domestic-rhi/current-future-tariffs>

In addition, new applications on or after 1 April 2016 will now have future tariffs adjusted in line with the Consumer Price Index, which varies from the Retail Price Index of applications submitted before 1 April 2016.

Payments are made on the basis of the expected annual heat demand of the building concerned, rather than by metering the actual heat use or heat generation. The exception is solar thermal systems where by payments are calculated using the estimated annual generation figures calculated by your MCS installer on your MCS certificate.

To be eligible your scheme must only heat a single property and have an Energy Performance Certificate (EPC), which includes heat demand figures, no more than 24 months old. Furthermore your renewable heating product must be certified by the Microgeneration Certification Scheme (MCS). Any product or installations that do not have an MCS certificate will not be eligible for the Domestic RHI.

After your scheme is installed you have 12 months to apply to the domestic RHI scheme, starting from the commissioning date shown on your MCS certificate. If you fail to submit within this timeframe, you will not be eligible under the new scheme rules. All applications could be audited so you must ensure that you have all the relevant paper work ready for an audit. Where applicable you would need to produce:

- A copy of your MCS Installation Certificate
- Copy(s) of your MCS Compliance Certificates

- Copy(s) of your domestic EPC
- Copy of your utility bill or council tax bill
- Purchase receipts for the renewable technologies
- Fuel receipts for biomass boilers and stoves
- Calibration certificates, if applicable (where the heating system is metered)

For further information on the domestic RHI scheme see:

<https://www.ofgem.gov.uk/environmental-programmes/domestic-renewable-heat-incentive>

As of 5 October 2015, the **RHI Biomass Sustainability Criteria** came into effect for the domestic and non-domestic RHI schemes. These criteria are in place to ensure any biomass used in systems receiving the RHI is sourced from sustainable sources. They have to be sustainable from both a carbon point of view and also a “land use” aspect (i.e. growing of the biomass does not involve damaging protected land types). These criteria are designed around imported timber, which has far higher risk of breaching the carbon and land use criteria. As a result, evidence requirements for end users using UK timber are more stringent than what is necessarily required. The type of end user will dictate how these criteria are met, for example:

- Biomass boiler end users who buy in woodfuel (i.e. chips, pellets, firewood or briquettes), have to buy all their fuel from an RHI approved supplier on the *Biomass Suppliers List*, (<http://biomass-suppliers-list.service.gov.uk/find-a-fuel>). For end user in the domestic scheme this is the *ONLY option*.
- Biomass boiler end users who “self-supply” their own woodfuel from their own land, will need to register as a self-supplier on the *Biomass Suppliers List* (<https://biomass-suppliers-list.service.gov.uk/supplier-registration>). Self-supply is deemed to be sustainable therefore they do not need to demonstrate the carbon or land use sustainability. However, they do usually need some kind of woodland management plan in place.
- Biomass boiler end users who produce their own woodfuel (e.g. buy in roundwood from the commercial market and chip it to produce their own fuel), will need to register as a full supplier on the *Biomass Suppliers List*. As long as you are a small business you are able to use the online simple application process. This includes a simplified carbon calculator, which needs a few basic questions about the raw material wood, where it comes from and how it is processed. This will give an estimated carbon footprint for your fuel and needs to be less than 34.8gCO₂e/MJ heat. Most woodfuels (even pellets) pass this with ease with typical values for chip from UK timber in the range of 5-8gCO₂e/MJ heat.
- Biomass boiler end users using straw for the year for the first time, have an equivalent to the BSL for non-woody crops – the **Sustainable Fuels Register** was launched to enable users of straw, *Miscanthus*

and other non-woody biomass to register their fuels for a 1 year period, which will avoid the need to report directly to Ofgem on a quarterly basis and carrying out complex calculations. If the straw is purchased on the commercial market then this enables suppliers of straw to sell to RHI boilers, without the end user having to trace the exact growing location of every load. However in the case of straw, the market is fairly buoyant already, it remains to be seen if commercial straw merchants will consider registering themselves unless there is a higher price for use as fuel, which currently there does not appear to be. Full details can be found at:

<https://www.sfregister.org>.

- Anaerobic digestion end users using the spare heat from the CHP unit, or burning the gas directly for heat, will need to report directly to Ofgem with evidence that the feedstocks meet the criteria. This will involve using a complex piece of software to calculate the carbon footprint, and also evidence of the land use any crop feedstocks were grown on was not one of the protected categories in the last 7-15 years. If it is your own land then IACS data should be sufficient, however, if the crop is purchased on the commercial market then this is going to be very difficult.

Changes to the RHI

The UK government has recently concluded reviewing RHI regulations. The intention was to have the new regulations in place by spring 2017. However, a drafting error in the RHI regulations meant it had to be withdrawn and now will not be laid before UK parliament until after the General Election, delaying implementation until at least July.

Biomass combustion, will go through the greatest financial reductions. No longer will there be three separate scales with three separate tariffs, a single tariff (2.91p/kWh for tier 1, 2.05p/kWh for tier 2) will cover all scales of boiler. However the percentage of kilowatt-hours eligible for tier 1 has increased from 15% up to 35%. The consequences of these changes is that once the changes come into effect in the spring, in most cases the most financially viable projects will have both a high heat usage, relative to the boiler size, and a high existing fuel bill i.e. Projects will most likely be viable if they have RHI income and fuel savings.

Heat from Anaerobic Digestion, will need to meet the same 50% of biogas from wastes or residues as the FIT (see previous FIT section for more details).

Drying digestate is no longer eligible, therefore it will be more difficult to find a use for the heat. Things worth considering are glasshouses, absorption-chillers for cold stores and possibly poly-tunnels.

Renewable electricity - Renewable Obligation Certificates (ROCs) and Contracts for Difference (CfDs)

Large-scale renewable electricity production in the UK is now supported by the Contracts for Difference. The Renewables Obligation (RO) ended to new entrants on the 31st March 2017.

Contracts for Difference (CfD) are available for all low carbon electricity generation (including nuclear and Carbon Capture and Storage - CCS) and guarantee operators a set price (known as the 'strike price') for each MWh of energy that they produce over the duration of the contract. Investors are able to lock in for a 15 year term to a given strike price, which is set at a level intended to be sufficient to cover the long-run costs of their low carbon technology. Key terms of the contract cannot be altered, even in the event that a future government seeks to change policy objectives, thus this should help to provide more certainty to investors.

The CfD works by drawing up a contract between the government and the generator that agrees a reference price or a strike price (based on wholesale rates). The generators will then sell some energy to suppliers, and the cost at which they sell it at may be the same as the strike price; below it; or slightly above it. If the sales of energy by the generators are the same as the strike price, then there is no further action. If the price is below that price, it will trigger top-up payments by the suppliers, while if the sales by the generators are at a higher price, it will result in generators paying back the difference.

The latest round of contracts for innovative technologies (this basically means anything apart from onshore wind or solar farms and biomass power stations) opened and closed in April for initial applications. With a budget of £290million of a proposed total of £730 million until 2026, suggests there may only be a few more rounds over the next 9 years. This makes planning developments very difficult and only probably accessible to the larger projects.

For more information, please view details on-line at:

<https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference>.

Renewable transport fuels (biofuels)

Support for biofuels is provided by the Renewable Transport Fuels Obligation (RTFO). Small biodiesel producers are also entitled to a duty free allowance for the first 2,500 litres that they produce if this is used for personal consumption only.

The RTFO requires suppliers of transport or non-road mobile machinery fuel in the UK to show that a percentage of the fuel that they supply comes from renewable and sustainable sources. Fuel suppliers who supply at least 450,000 litres of fuel a year are affected; this includes suppliers of biofuels as well as suppliers of fossil fuel. Companies

supplying less than 450,000 litres a year in the UK can still register if they want to claim Renewable Transport Fuel Certificates (RTFCs). Any company that supplies sustainable biofuel for use in road transport or non-road mobile machinery in the UK can claim RTFCs. These RTFCs can then be traded or sold to companies that need them to meet their obligations under the RTFO.

The RTFO came into effect on 15 April 2008 and the amount of biofuel that must be supplied by volume increased annually up to April 2013 when it reached 4.75%, a percentage considered safe in standard vehicle engines, where it will remain until further consultation.

In 2016-17, bioethanol comprised 52% of supply, biodiesel 44% and biomethanol 3%. There was also a small volume of off-road biodiesel, biodiesel HVO and biomethane. 66% of biofuel covered by the RTFO is made from wastes, principally used cooking oil and tallow. 29% of raw material was sourced from UK feedstocks.

As well as obliging fuel suppliers to meet targets for the volumes of biofuels supplied, the RTFO requires companies to submit reports on carbon emission savings and the sustainability of biofuels.

The UK government closed a major consultation on the RTFO in January this year, they have yet to respond. Some of the major points in the consultation are:

- Set a maximum level for crop based biofuels at current levels.
- Raise the RTFO to 9.75% (by volume) in 2020, and maintain at least that percentage to 2030.
- Define and categorise wastes and introduce structures to ensure wastes with higher value end uses are less likely to be used for biofuel production.
- Maintain double rewards, to encourage the production of fuels made from wastes.
- Introduce a sub-target for advanced or 'development' waste-derived fuels and some non-biologically derived fuels such as hydrogen.

For further information on the RTFO please see:

<https://www.gov.uk/guidance/renewable-transport-fuels-obligation>

Wind Power

On-farm wind power has two main scales of operation to consider, with commercial wind farm sites having a focus on exporting power to the grid, while small to medium scale generation is more concerned with offsetting purchased power within the farm business. Even if the power generated is primarily being used on the farm, demand may not always be constant, therefore it is likely that a proportion of the power produced will have to be sold to the grid at certain times.

For landowners with suitable sites for large-scale wind developments there are a number of development options available:

- Allow a developer to install the turbine(s) in exchange for an annual payment;
- Install the turbine(s) independently either by self-funding or using bank finance, or any combination of the two;
- Joint venture scheme with developer or neighbour;
- Community project with local buy-in.

Wind turbines

Wind turbines are best located in exposed areas with open fetch especially in the direction of the prevailing wind, away from residencies, but though situated as close as possible to a grid connection and with good road access. Farmland is often ideal because the total footprint of a turbine development is relatively small and does not lead to a significant loss of agricultural land.

Larger wind turbines take advantage of the higher wind speeds that exist at greater altitude and so are more efficient and economic, however, they also require a larger capital investment.

When comparing the potential benefits of wind power, it is important to be able to compare like with like, therefore an understanding of the following terms is key:

Rated power - the maximum power that can be produced when the turbine is operating within its safety limits. It is quoted in kW, which is a measure of the energy produced per second.

Theoretical power production - rated power x number of hours of production per day x number of days operation per year: 500 kW x 24 hrs x 365 days = 4,380,000 kWh.

Capacity factor - wind is not always blowing at a speed sufficient to spin the turbine and generate power, therefore the capacity factor refers to the percentage of the total available time that the turbine is actually generating power, e.g. 30%.

Actual power production per year - theoretical power x capacity factor: 4,380,000 kWh x 30% = 1,314,000 kWh.

The actual power produced will depend on the average wind speed in the area and other factors such as the height of the turbine, diameter of the rotor and the proximity of any feature that shelters the turbine or creates turbulence such as buildings, trees, walls, and the like.

With conventional energy prices rising year-on-year the finances of generating power also improves. Examples of the economics of turbine projects are detailed in the following pages, based on generation tariffs and export tariffs that are correct as of July 2016.

Example One - Small 50 kW wind turbine:

Assumptions:

- Output of the turbine is 131,400 kWh per annum (30% capacity factor)
- Cost of turbine is £200,000 installed (approximate)
- Current cost of power is 11.50 p/kWh
- There is an easy grid connection to a 3 phase farm electricity supply
- Calculations do not account for inflation, interest rates on capital borrowing, or operation and maintenance costs

Income from power, if all exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	131,400	6,609
Generation tariff	8.39	131,400	11,024
		Total:	<u>17,634</u>
		Approximate payback (years):	<u>11.34</u>

Income from power, if 50% exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	65,700	3,305
Generation tariff	8.39	131,400	11,024
Reduction in purchased power cost	11.50	65,700	7,556
		Total:	<u>21,885</u>
		Approximate payback (years):	<u>9.14</u>

Example Two - Medium/Large scale 800 kW wind turbine:

Assumptions:

- Turbine - 50m to the hub with a 50m diameter rotor
- Output of the turbine is 2,102,400 kWh/annum (30% capacity factor)
- Installed turbine cost is £1,900,000 (approximate)
- Current cost of power is 11.50 p/kWh
- Calculations do not account for inflation, interest rates on capital borrowing, or operation and maintenance costs

Income from power, if all exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	2,102,400	105,751
Generation tariff	3.22	2,102,400	67,697
		Total:	<u>173,448</u>
		Approximate payback (years):	<u>10.95</u>

Income from power, if 50% exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	1,051,200	52,875
Generation tariff	3.22	2,102,400	67,697
Reduction in purchased power cost	11.50	1,051,200	120,888
		Total:	<u>241,461</u>
		Approximate payback (years):	<u>7.87</u>

Hydro Power

Small-scale run-of-river hydro schemes can be a viable source of renewable electricity on a suitable site, particularly when feed-in tariffs are available.

The key factors that determine the power produced by a hydro scheme are:

Head - The vertical distance through which the water will fall.

Flow Rate - The quantity of water that will be available for power production.

Developers of hydropower schemes require a water use licence from Scottish Environment Protection Agency (SEPA) who will seek to ensure a balance between the benefits to renewable energy generation and the adverse impacts on the water environment. Schemes where the fall in the river between the intake and discharge points has a gradient of 1 in 10 or steeper will be more likely to obtain a water use licence.

Civil engineering costs vary greatly from site to site. Development costs for very small schemes are much higher per kW capacity than larger schemes. Small sites where the available head is 3 m or less are unlikely to provide a reasonable return on investment unless existing infrastructure can be utilised to reduce capital cost. Higher head schemes need lower flows and hence smaller and cheaper equipment to generate the same power as low head schemes.

The flow rate will vary during the year, however, for a scheme to be viable there must be sufficient flow to keep the system operating at near its rated power for a large proportion of the time. Some flow must usually be left in the stream for environmental sustainability and consideration of the needs of migrating fish is important.

An indication of the power production of a scheme can be obtained from the following equation:

$$\text{Power produced (kW)} = 7 \times \text{Flow rate (m}^3\text{/s)} \times \text{Head (m)}$$

A capacity factor of 50% can be expected where a scheme is sized on the mean flow of the river, therefore a 10 kW scheme may have an annual output of approximately 43,800 kWh, which is sufficient for about 10 houses. An example of the economics of a hydro project is detailed overleaf.

Further information can be obtained from British Hydropower Association (www.british-hydro.org).

Example - Small high head 25kW hydro scheme:

Assumptions:

- Output of the turbine is 109,500 kWh per annum (50% capacity factor)
- Installed cost is £140,000 (very site specific)
- Current cost of power is 11.50 p/kWh
- Easy connection to a 3 phase farm electricity supply
- Calculations do not account for inflation, interest rates on capital borrowing, or operation and maintenance costs

Income from power, if all exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	109,500	5,508
Generation tariff	7.8	109,500	8,541
		Total:	<u>14,049</u>
	Approximate payback (years):		<u>9.97</u>

Income from power, if 50% exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	54,750	2,754
Generation tariff	7.80	109,500	8,541
Reduction in purchased power cost	11.50	54,750	6,296
		Total:	<u>17,591</u>
	Approximate payback (years):		<u>7.96</u>

Solar Photovoltaics

The sun's energy has always been used by farmers for growing and drying crops. With electricity prices on the increase, farmers can now look to harness the power of the sun in a rather different way. Solar photovoltaic (PV) panels, which produce electricity from sunlight, have become an increasingly common sight on farms in recent years. Despite the comparatively low solar insolation levels in Scotland when compared to the south of England, solar PV can still be a very viable option north of the border.

PV panels can be either roof or ground-mounted. Roof mounted arrays are more efficient in terms of land use because they make use of an existing area of space that is not currently adding value to a farm business. Farms also commonly have large areas of roof available in the form of barns and sheds, although it is important to check that roofs are strong enough to support a system if retrofitting to an existing structure. Another issue is that roofs do not always face in the optimum direction (south) or at the optimum angle (usually around 30-40 degrees) and may be shaded by other structures, and in these cases ground-mounted arrays can be an alternative option.

Ground mounting allows for the ideal positioning of panels, which maximises the efficiency of a scheme. However, it can also mean that

land use is diverted away from food production and into energy production, which can be controversial. Land used for small-scale livestock such as sheep and poultry is ideal for ground-mounted solar development because panels can be mounted on a framework at a height that allows animals to graze and forage beneath them without damaging or compromising the operation of the system. Advice on the impacts of installing ground mounted solar panels on area based agricultural subsidy payments should be taken.

The introduction of the FIT Scheme in 2010 triggered a rush of solar PV installations in the UK. FIT rates for solar PV have been severely cut back in recent years, however, the capital costs of panels have also fallen over the same period, meaning that solar PV can still be a viable long-term investment in the right location and under the right conditions.

There are now energy efficiency requirements linked to FIT payments for solar PV installations, as of 15 January 2016. The FIT rates for standard solar PV installations (those installations, which are wired or attached to a building) now fall into 3 categories, higher, middle and lower with the FIT decreasing respectively. To qualify for the higher category the building you are attaching your installation to must have an Energy Performance Certificate rating of level D or above issued on or before the commissioned date. The middle rate applies to multi-installations and all other installations would receive the lower rate. There is a significant difference between the higher and lower rate which can make a scheme viable at the higher rate and not at the lower so it is important to ensure that your building complies with the new regulations.

Example - Medium scale 50kW roof mounted scheme:

Assumptions:

- Output of the scheme is 40,300 kWh per annum
- Installed cost is £45,000
- Current cost of power is 11.50 p/kWh
- Barn roof angle is 15 degrees to the horizontal
- There is an easy grid connection to a 3 phase farm electricity supply
- Calculations do not account for inflation, interest rates on capital borrowing, or operation and maintenance costs
- The installation is fitted to a building with an EPC rating of level D or above.

Income from power, if all exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	40,300	2,027
Generation tariff	4.36	40,300	1,757
		Total:	<u>3,784</u>
Approximate payback (years):			<u>10.57</u>

Income from power, if 50% exported:

	p/kWh	Output (kWh)	Income (£)
Export tariff	5.03	20,150	1,014
Generation tariff	4.36	40,300	1,757
Reduction in purchased power cost	11.50	20,150	2,317
		Total:	<u>5,088</u>
		Approximate payback (years):	<u>7.86</u>

Biomass Heating

Biomass heating can be an attractive option for farms, even where the farm does not have its own source of biomass fuel. This is because the RHI has transformed the economics of installing biomass systems and is increasing the demand for woodfuel (see pages 309-313 for information on RHI).

Biomass boilers are a well proven, efficient and reliable technology that has been developed over many years in countries such as Austria and Germany. These boilers are generally technologically advanced and highly efficient, but it is important to be aware that more basic boilers are available, which are less efficient and have very little automation, and consequently come at a significantly lower capital cost.

There are four main types of biomass boiler: woodchip boilers, pellet boilers, log boilers and straw boilers. All four options have pros and cons and care must be taken to ensure the right type of system is selected to match user requirements, including factors such as the degree of automation required, the scale and patterns of heat demand, capital cost and local fuel availability.

A few key facts about different woodfuel options include:

- Woodchip and pellet boilers can be fully automated.
- Log and straw boilers can be an economic option where farms have their own log or straw supply. However, they must be loaded manually, and generally on a daily basis as a minimum.
- Woodchip is a lower cost fuel when compared to pellets, but is more bulky and can be difficult to handle.
- Wood pellets are clean, easier to handle, require less space to store and have a higher energy output, but are more expensive than chip, and cannot be produced on-farm. However, the capital cost of a pellet boiler is lower than a chip boiler.
- Woodchip boilers and their fuel supply systems have higher capital costs, and for technical reasons they are generally not suited to smaller, domestic applications (e.g. below 50kW).

Costs for biomass boilers are highly variable depending on the individual system requirements. There may also be significant costs associated with

installations such as constructing a fuel store, or purchasing specialist vehicles to use for handling or loading fuel, etc.

The introduction of the RHI has resulted in non-domestic woodfuel systems that are creating demand for poor quality timber and creating an additional driver for poor quality farm land to be used for agri-forestry.

In most small-scale situations it is not practical to produce electrical power from biomass, because such systems are complex and expensive. For this reason generating power is only worth considering when there is a large demand for both heat and power.

The following examples give an indication of the economics of biomass heating projects:

Example One - 950 kW wheat straw fired boiler for grain drying:

Assumptions:

- 250,000 kWh annual heat demand (drying 2,000 tonnes of grain per year, no district heating system)
- Installed cost of £200,000 (approximate)
- Current cost of oil is 3.90 p/kWh
- Wheat straw supplied from the farm at £50/t
- Calculations do not account for inflation, interest rates on capital borrowing or operation and maintenance costs

	p/kWh	Output (kWh)	Income (£)
Income from Tier 1 RHI	5.32	250,000	13,300
Income from Tier 2 RHI	2.31	0	0
Oil bill savings	2.29	250,000	5,714
		Total:	19,014
		Approximate payback (years):	10.52
		Income & savings over 20 years:	380,286

Example Two - 450 kW chip boiler for estate district heating scheme:

Assumptions:

- 558,000 kWh annual heat demand (based on figures from oil bills)
- Installed cost of £420,000 (approximate)
- Current cost of oil is 4.90 p/kWh
- Chips supplied from the farm at £65/t
- Calculations do not account for inflation, interest rates on capital borrowing or operating and maintenance costs

	p/kWh	Output (kWh)	Income (£)
Income from Tier 1 RHI	5.32	558,000	29,686
Income from Tier 2 RHI	2.31	0	0
Heating bill savings	2.83	450,000	12,735
Income from heat sales to cottage	2.83	108,000	3,056
		Total:	45,477
		Approximate payback (years):	9.24
		Income & savings over 20 years:	909,540

Example Three - 200 kW wood pellet boiler for poultry sheds:

Assumptions:

- 320,000 kWh annual heat demand (based on figures from LPG bills)
- Installed cost of £160,000 (approximate)
- Current cost of LPG is 5.60 p/kWh
- Pellets supplied in bulk delivery at £200/t
- Calculations do not account for inflation, interest rates on capital and maintenance costs

	p/kWh	Output (kWh)	Income (£)
Income from Tier 1 RHI	5.32	262,800	13,981
Income from Tier 2 RHI	2.31	57,200	1,321
Heating bill savings	-0.03	320,000	-107
		Total:	15,196
		Approximate payback (years):	8.56
		Income & savings over 20 years:	303,912

Farm Scale Biodiesel

On-farm biodiesel production is not currently competitive with diesel due to the high cost of rapeseed and vegetable oil, the low price of diesel and difficulties accessing support payments. Biodiesel can be made from a wide range of vegetable oils and animal fats (tallow). High quality straight vegetable oil (SVO) can also be used as a fuel at higher inclusion rates in certain engines. The use of biodiesel and SVO above 5% inclusion could impact on engine manufacturer's warranties.

On-farm biodiesel production from rapeseed involves two stages; cleaning and crushing the seed to extract oil using and esterification of the oil by mixing with methanol in the presence of a catalyst to remove glycerol. Although chemically this is a simple process there is a need for careful quality control to achieve the required standards. Handling methanol and the catalyst (usually potassium hydroxide) on the farm is hazardous and requires attention to health and safety and insurance. To produce SVO is the same as for biodiesel without the esterification reaction step. Rapeseed meal is an important co-product of the crushing process and a useful protein supplement for animal feed.

Growers should calculate an 'on the road' price taking into account the costs of feedstock, capital and operating costs, allowing for income from production of rapeseed meal, and adding the full fuel duty and VAT. Small-scale producers may benefit from a 2,500 litre tax free personal allowance. Production costs for SVO are considerably lower.

Renewable Transport Fuel Obligation (RTFO) Certificates offer the potential for increased returns however it may prove difficult for smaller operators to access this income. Biodiesel from waste materials such as tallow receive double RTFC's. Data on carbon and sustainability performance must be independently verified before RTFCs are awarded. The RTFO buy out price is currently 30p/litre and certificates could range in value from 0 to 30p/litre.

Anaerobic Digestion

Anaerobic digestion (AD) uses bacteria to convert organic matter into methane and carbon dioxide (referred to as "biogas"), in the absence of oxygen. The biogas can be used to provide heat, generate electricity or upgraded to biomethane (carbon dioxide is removed) for injection into the gas grid. In addition AD can provide other benefits; utilising wastes, reducing emissions of methane, cutting odours and enhancing water quality.

Feedstock can be any biodegradable non woody plant, animal matter (manures/slurry), energy crops (grass, rye or maize silage, beet) and food waste. Food wastes are becoming less attractive due to falling gate fees for accepting them, complex licensing and regulation and higher capital costs of the plant for pasteurisation. It is important that the mix is kept relatively consistent and that the balance of carbon to nitrogen is suitable for the bacteria. Feedstock can comprise conventional grass silage, however, specialised energy crops are likely to perform better overall in an AD plant, as they are not selected for feed quality, just dry matter yield and nitrogen efficiency.

The high degree of automation and control in a modern biogas plant means that on-farm plant costs are high; in the region of £0.75/m³ to £1.50/m³ of biogas produced. Government incentives are essential for the viability of the sector, so any change to support payments, FITs and RHIs (see pages 309-313) should be closely monitored. For any proposed plant, the cost and availability of feed stock will be the main factors determining viability. If you do not have enough of your own land available to produce sufficient feedstock, securing long term contracts for off-farm feedstocks will be essential if you are seeking a bank loan. A thorough feasibility study is also recommended to assess the viability of any project being considered.

For larger scale AD plants, whether gas-to-grid or Combined Heat and Power, farmers are mainly involved as feedstock suppliers. The capital

costs of gas-injection plants are higher due to the need to “scrub” the gas to meet grid standards (remove carbon dioxide). The location of these plants is also dependent on local gas grid capacity. Where feasible, gas to grid AD plants have a clear economic advantage, and this is reflected in the increasing number of new plants following this approach. For farmers supplying feedstock the principles are the same though there may be greater seasonality of pricing in gas to grid plant reflecting payment structures for wholesale gas (higher prices in the winter).

Farmers growing crops for AD feedstock will find that prices vary from plant to plant and will reflect the basis of the sale; standing crop or delivered plant. Typical feedstock payment rates are; £65 to £85/t Dry Matter standing and £85 to £105/t Dry Matter delivered. Prices will also reflect shared costs such as specialist machinery and the value assigned to digestate.

Based on recent prices AD energy crops had been attractive for many arable growers in part due to the low prices for conventional cereals. However, in the last year feed wheat and barley prices have risen around £20/t and spring malting barley prices around £30/t depending on contract. This has made conventional cropping relatively more profitable for many growers. AD plant operators are unique in offering relatively long contracts of 5 to 10 years for feedstock crops. Therefore the best approach for most farmers is likely to be to include AD crops as part of mixed cropping system. This will deliver some security of income from long term AD contracts alongside flexibility to benefit from any rise in grain prices that may occur.

AD crops may also offer other potential benefits to the farm business including; spreading the workload, providing early entry for oilseed rape and enabling grass to be brought back profitably to all-arable rotations.

Farmers growing AD feedstock must now meet key sustainability standards to receive support. Ofgem require all RHI claimants to demonstrate their feedstocks meet sustainability criteria regarding land use change (rarely relevant in UK) and carbon emissions. For the RHI the carbon intensity of the feedstock must be less than 34.8 g CO₂ equivalent per MJ of energy produced. In crop production the main source of greenhouse gases is inorganic nitrogen fertiliser, so usage needs to be minimised. In AD systems this is partly achieved by the application of digestate back to the crop. With careful planning it is likely that most crops grown for AD will be able to meet these carbon targets. Ofgem provide an online calculator and guidance though it is advised that expert advice is also sought when preparing this information especially for the first time. See www.ofgem.gov.uk for full details.

Crop Costs for Anaerobic Digestion

PHYSICAL DATA

(a) Yield and harvest

Yields are based on crops grown in southern and central Scotland assuming average weather conditions and SRUC's experience from recent trials. Actual yields will vary widely and are much less certain in the north with maize not recommended outwith south west Scotland. Trial results indicate that rye yields are more consistent year to year than beet, reflecting the crop's longer growing period. Harvest of winter hybrid rye is typically around the middle to end of July with maize and energy beet harvests in late October.

(b) Seed

Certified seed has been assumed for all crops and hybrid seed for rye and maize.

(c) Fertiliser

Full rates of artificial fertiliser have been calculated to match crop offtake. Where digestate from an Anaerobic Digestion (AD) plant is applied fertiliser rates should be adjusted accordingly. In practice digestate use is likely to reduce but not entirely replace the requirement for artificial fertiliser due to mismatches in nutrient availability and timing between crops.

(d) Sprays

Full rates based on current best practice have been assumed.

(e) Contract

These include the cost of specialist contractors for harvesting and transporting the roots or silage produced to a nearby (within 3 miles) AD plant. Transport costs should be adjusted accordingly to the distances involved.

(f) Output prices

The price in the market for AD feedstock will be determined by local feedstock supply and demand issues and the conditions of the contract. The contract price will reflect the basis of the sale; standing crop, ex-farm or delivered to plant. It will also reflect the method agreed to share other costs such as specialist machinery and the value and costs assigned to any digestate applied to the land (see previous pages).

Crop Costs for Anaerobic Digestion

COST OF PRODUCTION DATA

	Energy beet	Hybrid rye	Grass silage	Maize
Yield: fresh (t/ha)	65.0	40.0	36.0	38.0
Dry matter (%)	22%	34%	29%	30%
Yield : dry matter (t/ha)	14.30	13.60	10.44	11.40
Methane yield (m ³ /fresh t)	99	108	95	106
Energy (MWhr TH/fresh t)	1.2	1.3	1.1	1.3
Energy (MWhr TH/ha)	76.7	51.5	40.9	48.0
	£/ha			
COSTS				
Seeds	194	154	21	167
Fertiliser	144	207	240	175
Sprays	181	57	13	60
Contract cultivation	235	182	47	204
Contract harvesting	267	118	263	117
TOTAL COSTS (£/ha)	1,021	718	585	723
TOTAL COSTS (£/t)	16	18	16	19
TOTAL COSTS (£/MWhr TH)	13	14	14	15

Note: The above costs exclude charges such as land rental, interest, management time and any margin requirements which will be important to include when considering any contract price agreement.

Biomass Crops for Energy

Willow short rotation coppice

Willow is a perennial biomass crop grown principally for energy production. Returns from the crop are highly dependent on yield and woodchip price. The main market for the woodchip is on contract to power generators and large-scale thermal plants. The woodchip is not generally suitable for small-scale biomass heating schemes without significant grading and drying costs due to the high bark and moisture content and oversized chips.

The crop is established by planting cuttings in the spring using specialised planting equipment. The first year of establishment requires effective weed and pest control. After the first year, the crop is cut back to encourage coppicing (multiple stems). The crop can then be harvested every 2-5 years. Currently coppice plantations are predicted to have a working life of up to 30 years with 6 to 14 harvests. Annual maintenance requirements are generally low, though fertilising and some weeding will be required after each harvest.

Yields are measured in oven dried tonnes (ODT) adjusted to zero per cent moisture, although in practice the crop averages around 55% moisture at harvest. Like other crops, the best yields are achieved on sheltered, fertile sites which can be readily cultivated while unimproved rough grazing land should be avoided. Average annual increments are estimated between 5-9 ODT/ha per year on good sites, but can be less than half of this.

Willow SRC is classified as an agricultural crop and will not affect the eligibility of land for CAP direct payments. Total planting costs can range from £1,200 to £2,000/ha depending on site. Planting grants are no longer available in Scotland or other UK countries. The removal of grant incentives renders the crop largely uneconomic.

Short rotation forestry

A number of tree species can be used for short rotation forestry (SRF), e.g. Alder, Northern Beech, Birch, Poplar, Eucalyptus and Sycamore. Large-scale trials with a number of species and sites are currently being carried out by the Forestry Commission. As with conventional forestry, a wide range of sites will be suitable for cultivation of these species, including sites which have a lower nutrient status and a poorer land classification.

Trees are grown to butt size 15-20 cm at 8-20 years before harvest. Current advice is to plant at 2m square and apply broad spectrum herbicide to control weeds during establishment. Nitrogen application in the first year should be avoided as there is no benefit to growth. SRF has not been examined on a sufficiently extensive scale or time period to derive crop data as yet. Yields will vary from site to site, with average annual increments estimated at between 4 to 9 m³/ha/yr or around 1.5 to

3.2 ODT/yr. Planting grants may be available as part of the forestry grant schemes being offered under Rural Development across the UK. See the Forestry Commission (www.scotland.forestry.gov.uk) for updates on the energy forestry trials work underway.

Miscanthus

Miscanthus is a perennial energy crop suited to the southern half of the UK with viability dependent on yields, contract prices and proximity to biomass power stations or other market outlets. The crop has also found a higher value outlet as poultry and horse bedding due to its high level of moisture absorbency and low dust levels. The miscanthus chips are also less favoured than woodchips for fuel due to low bulk density and high chlorine content. As a result growing the crop for bedding is becoming the preferred end use in many areas. The crop uses a C4 photosynthetic pathway, like maize, requiring high light intensities and temperatures. Yields at suitable sites south of a line from the Severn to the Wash are expected to be 12-15 ODT/ha. Lowground sites north of this may also be feasible but as with maize, yields and viability are likely to be reduced.

The crop is established using rhizomes, typically at 15,000 plants/ha. Like willow coppice, planting requires specialist equipment, considerable labour input and relatively costly planting material resulting in high establishment costs. After the first year the crop can be harvested annually and has a useful life of 15-20 years. Weed control is necessary in the establishment year and possibly in the first spring. Nutrient demand is low with typically an application of 40N:40P:40K kg/ha in year one. Most crops are unlikely to require further applications although up to 150 kg/ha N may be applied over the first 2 years in some situations. The need for pest and disease control is low.

Reed canary grass

Reed canary grass is a perennial plant well suited to cultivation in northern and western parts of the UK and commonly grown in Scandinavia for fodder and increasingly for AD. In the UK the plant is widely used as a game cover crop. It grows well under marginal conditions, including upland areas and brownfields sites in northern and western areas. It is a perennial crop established from seed (unlike Miscanthus) leading to considerable cost advantages.

Establishment and cultivation are undertaken with existing farm equipment with the need for some nitrogen fertiliser to achieve maximum yield. Trial yields vary from 5 to 14 ODT/ha with the crop performing better at more northern sites where average yields of over 10 ODT/ha have been achieved. Further work is needed to determine viability but it has cost saving and land use flexibility advantages compared to other perennial crops and can utilise more marginal land. The crop also has useful flexibility in its end use; in the summer it can be cut for AD production or grazed by cattle; in the winter and spring it can be baled for biomass fuel or animal bedding.

Fuel

Introduction

This section provides information on fuel prices, calorific values, relative costs accounting for efficiency of conversion and costs and regulations for liquid fuel storage.

When comparing different fuels it is essential to include any losses from conversion to heat as different fuels and technologies differ significantly.

Fuel Prices

The figures provided below are an approximation of the price in summer 2017. These should be used as a guide only and should be supported by actual quotes that take into consideration site specific information. In most cases fuel prices change on a daily basis and the price will depend on many factors including the volume purchased, location, length of contract and supply profile.

All prices are all exclusive of climate change levy (CCL), where applicable, and VAT.

Electricity

The following prices apply to Scottish businesses in each of the two distribution areas:

		North <i>p/kWh</i>	South
Business -			
'03' profile*	Single rate	13.135	11.688
'04' profile*	Day/night rate	14.055/8.755	12.907/8.140
Domestic -			
'01' profile*	Single rate	13.387	12.047
'02' profile*	Day/night rate	11.530/9.012	13.188/8.033

* first 2 digits of MPAN/supply number – denotes type/size of supply

Standing charges vary widely. For large supplies they are less relevant, however, for small supplies the standing charge will be a much greater proportion of the annual cost.

Gas

<i>Tariff type</i> (piped gas for farms and businesses)	unit <i>p/kWh</i>	daily charge	average <i>p/kWh</i>
Credit (domestic)	3.04	25.56	3.67
Debit (domestic)	2.80	16.67	3.21
Pre-pay (domestic)	3.26	23.84	3.73
Business - <5,000 kWh	4.97	24.41	5.56
Business - <30,000 kWh	4.06	20.00	4.29
Business - >245,000 kWh	2.62	n/a	2.62

Propane

	Price
Propane (bulk, not in a long term contract)	38.14 p/litre
Propane (47 kg cylinders)	£65.73 per cylinder
Butane (13 kg cylinders)	£28.55 per cylinder

Diesel oil

	p/litre
Gas oil (red diesel), 35 sec, tractor	54.99
Kerosene, 28 sec, Aga Cookers, etc	39.54
Derv (white diesel)	195.00

Coal

	£/t
House coal (100 x 10kg bags)	252.00

Biomass Fuels

	Price
Firewood - seasoned hardwood logs (delivered)	£95/m ³
Firewood - seasoned softwood logs (delivered)	£71/m ³
Woodchips (G30, 30% moisture)	£105/t
Wood pellets (5 t blown, including delivery)	£200/t
Wood pellets (100 x 10kg bags, including delivery)	£250.26/t

Straw

	£/t
Large round bales (ex farm)	48

Calorific Values of Fuels

These values are only approximate and may vary quite considerably:

Electricity	3.60 MJ/kWh
Gas	3.60 MJ/kWh
Propane/Butane	50.00 MJ/kg; 25.50 MJ/litre
Gas oil	42.50 MJ/kg; 35.70 MJ/litre
Kerosene	43.50 MJ/kg; 36.64 MJ/litre
Coal	31.40 MJ/kg
Firewood (20% moisture content)	14.71 MJ/kg
Woodchips (30% moisture content)	12.50 MJ/kg
Wood pellets	16.85 MJ/kg
Straw (20% moisture content)	13.80 MJ/kg

Note: 1 tonne liquefied propane gas = 1,957 litres (approx.)
1 m³ of loose seasoned hardwood timber = 0.35 tonnes (approx.)
1 m³ of loose seasoned softwood timber = 0.25 tonnes (approx.)

Fuel Cost Values

The fuel cost values have been corrected for efficiencies:

	p/MJ	Efficiency (%)	p/MJ	p/kWh
Electricity	3.45	100	3.45	12.41
Gas	0.78	80	0.97	3.50
Propane (bulk)	1.50	80	1.87	6.73
Propane (47 kg)	2.80	80	3.50	12.61
Butane (15 kg)	4.40	80	5.50	19.80
Gas oil	1.54	70	2.20	7.92
Kerosene	1.08	70	1.54	5.55
Coal (open fire)	0.80	25	3.21	11.56
Firewood (efficient log boiler) ¹	1.93	80	2.41	8.69
Firewood (basic log boiler) ²	1.79	60	2.98	10.72
Woodchips ³	0.84	80	1.05	3.78
Wood pellets (blown)	1.19	85	1.40	5.03
Wood pellets (bagged)	1.49	85	1.75	6.29
Straw (cereal)	0.35	60	0.58	2.09

¹ burning softwood 20% moisture content

² burning hardwood 20% moisture content

³ 30% moisture content

Fuel Storage

Safe storage for fuel on farms, rural businesses and dwellings should be a high priority. Regulation for the storage of fuel is covered by the Water Environment (Oil Storage) (Scotland) Regulations 2006. These regulations are applicable for farms, although there are exclusions. For example: where oil is stored for use exclusively as a fuel for heating a farmhouse or other residential premises and where that oil storage capacity is less than 2500 litres (in this case Building Regulations (Scotland) 2004 apply to new tanks) and if any storage tank is underground.

The regulations apply to both new and existing oil storage tanks storing petrol, diesel, mineral oil, heating oil, lubricating oil, waste oil and vegetable/plant oil above ground (inside or outside a building). One of the main requirements for new and existing above-ground tanks where there is a storage capacity of 200 litres or more, is the provision of a secondary containment system (bund) of sufficient capacity to contain at least 110% of the largest tank or 25% of the total storage capacity. For further detail on the regulations, guidance should be sought from your local SEPA office or see:

<https://www.sepa.org.uk/regulations/water/pollution-control/scottish-oil-storage-regulations/> or refer to NetRegs, more detail on page 388.

Fuel storage tanks come in various types, shapes and sizes. When choosing your fuel tank, siting should be taken into consideration. Guide prices for storage tanks are shown below:

Plastic tanks	Capacity (litres)				
	1200	1500	2000	2500	5000
Single skin	£385	£450	£525	-	-
Bunded	£995	£995	£1,200	£1,350	£1,800
Dispensing (bunded)	-	-	-	£1,550	£2,675
Underground	£1,115 (1250 litres)		£1,645 (3000 litres)		

All tank prices are ex VAT and do not include delivery and, design and installation charges.

Labour and Machinery

Introduction

The largest component of fixed costs on farm is labour and machinery and this is also the most variable between farms. For these reasons it is essential to fully understand and manage both labour and machinery costs as they can have a large bearing on the financial viability of the farm business. This section details the key elements including standard labour requirements by enterprise, machinery operating data such as rates of work per hour, methods to calculate the cost of owned machinery, detailed contractors charges for a wide range of farm operations and regulations for on-road use. The final section details essential information on labour costs, regulation and health and safety requirements.

Standard Labour Requirements

Enterprise CROPS (per hectare)	Hours/ annum	Enterprise LIVESTOCK (per animal)	Hours/ annum
Cereals	18	Dairy cows	
Oilseeds	16	50 cows	42
Hops	60	100 cows	35
Sugar beet	33	150+ cows	28
Field beans and peas	16	Beef cows	26
Potatoes		Other cattle	12
early	200	Sheep	
main crop	110	ewes and rams (lowland)	5.2
Fodder crops	6	ewes and rams (LFA)	3.7
Miscanthus	16	other sheep (lowland)	2.9
Outdoor vegetables/salad	280	other sheep (LFA)	3.1
Other peas and beans	500	Pigs and poultry	
Vining peas	12	sows	28
Top and soft fruit	425	finishing and rearing pigs	2.3
Hardy nursery stock	1,900	piglets (<20 kg)	0.2
Fruit/vegetables under cover	7,000	broilers	0.09
Flowers/plants under cover	13,000	laying hens	0.36
Mushrooms	7,220	growing pullets	0.24
Fallow	2.9	other poultry	0.10
Grassland	3.1	Goats	12
Silage (made by farm)		Deer	15
1 st cut	12	Horses*	40
2 nd cut	10		
Rough grazing	1.5		

Note: There are difficulties in standardising labour requirements and these figures represent 'typical' labour requirements under typical

conditions for enterprises of average size and performance. They are not necessarily reflective of economic viability.

If calculating farm labour demand, note that crop coefficients should be reduced proportionately for operations carried out by contractors. Livestock coefficients should be reduced pro rata if an animal is not on farm for a full year.

These figures relate to those published in a report of the UK Farm Classification Document (October 2014) and which recommends that 1900 hours of labour are equivalent to one standard annual labour unit. To reflect smaller field sizes, the standard labour requirements for field enterprises should be increased by 50% for Northern Ireland.

* Detailed figures for horses can be found in the following publication: The Equine Business Guide, ABC, 6th Edition, 2015.

Machinery Operating Data

Rates of work

The following figures are typical rates of work for conditions in northern UK. Actual rates of work can vary widely from these figures depending on the organisation of the system. Methods of calculating rates of work are shown later.

For 'stand alone' operations such as ploughing and cultivating, factors such as soil type and conditions, field size and shape, topography and operator experience will affect the overall work rate.

Rates of work for planting, drilling, spraying and fertilising operations will depend on application rates and external field factors such as ease and speed of refilling and location of materials (e.g. water, fertiliser, seed potatoes).

For other operations, which require a system approach, such as grain, silage and potato harvesting, additional factors such as crop yields, labour and transport availability can have a marked effect on work rate.

	Typical rate of work (ha/8 h day)
Ploughing (reversible plough):	
4 furrows	4.8
6 furrows	7.2
Cultivating:	
heavy disc, 3 m, 100 mm deep	11.2
light tine, 3.5 m, 100 mm deep	17.2
harrows, 4.5 m	20.8
combination cultivator (for seedbed preparation), 3 m	13.6

	Typical rate of work (ha/8 h day)	
power harrow, 3 m, 150 mm deep		8.0
roller, 2.4 m, heavy		6.4
roller, 7.3 m, light		24.0
potatoes, bedforming, 1.83 m bed		6.0
potatoes, stone windrowing basic, 2 row (Reekie)		4.5
Fertilising:		
twin disc, 1,000 kg capacity		24.0
lime spreader, 2 machines and 1 loader		32.0
slurry, 6,000 litre size, 0.8 km haul		29.6
Grain drilling: establishment (following ploughing)		
3 m grain only drill		15.2
3 m grain/fertiliser drill		11.2
3 m combination power harrow/grain only drill		9.6
4 m combination power harrow/grain/fertiliser drill		11.3
4 m trailed machine/grain/fertiliser drill		32.5
Grass: seed sowing - drill 3.7 m wide		10.4
Roots: precision sowing, 2 row		2.4
Potatoes: planting, 2 row, cupped design (narrow spacing)		6.0
Potatoes: planting, 6 row, belt design (wide spacing)		15.0
	<i>Application rate</i>	
	<i>200 litres/ha</i>	<i>100 litres/ha</i>
Spraying:		
tractor mounted, 850 litre tank, 12 m boom, no bowser	33.6	40.0
tractor mounted, 800 litre tank + 600 litre on front, 18 m boom	52.0	64.0
tractor mounted, 800 litre tank + 600 litre on front, 18 m boom, with bowser	60.8	72.0
sprung LGP vehicle, 800 litres, 12 m boom, with bowser	68.0	87.2
self-propelled, 2,500 litres, 24 m boom, with bowser	144.0	176.0
Grain:		
combine harvesting, drum width 1.05 m, typical cutter bar width 3-3.7 m		12.0
combine harvesting, drum width 1.30 m, typical cutter bar width 6.6 m		22.0
combine harvesting, drum width 1.6 m, typical cutter bar width 7.7 m		26.0
combine harvesting, drum width 1.7 m, typical cutter bar width 9.12-11.97 m		39.0

		Typical rate of work (ha/8 h day)
Potatoes:		
haulm pulverising: 1.8 m, 2 row		6.5
harvesting: two row trailed, elevator discharge		3.5
Turnip harvesting		1.6
Silage making:		
(i) 5 men, 75 kW + precision chop harvester, 3 trailers, buckrake		
800 m haul:		9.0
1,500 m haul:		7.4
(ii) 6 men, 90 kW + precision chop harvester, 3 trailers, buckrake		
800 m haul:		16.0
1,500 m haul:		10.0
(iii) 6 men, self propelled harvester, 4 trailers, buckrake (will usually involve a rake operator at some point to 'group' the smaller mower bouts into a single larger bout)		20.0
(iv) 2 men, forage wagon, buckrake (depending on distance to pit)		15.0-20.0
Grass:		
mowing, disc or drum, 2.4 m width of cut		13.0
mowing, disc or drum, 3.0 m width of cut		16.3
baling hay, conventional baler		6.4
baling straw, conventional baler		9.6
baling straw, round baler		16.0

Days available for field work

(e.g. ploughing, cultivating, drilling, root harvesting)

Calculated for Bush Estate, Midlothian, altitude 200 m.

Month	Field work days for three soil types and two month probability levels					
	Light soil		Medium soil		Heavy soil	
	50%	75%	50%	75%	50%	75%
January	25	24	22	18	20	12
February	25	23	21	17	19	12
March	25	24	21	18	20	15
April	27	25	22	19	24	17
May	28	26	25	22	26	20
June	28	26	27	24	27	24
July	29	27	28	26	28	26
August	28	26	27	25	27	24
September	27	25	25	23	24	20
October	26	23	23	19	22	17
November	26	22	23	18	23	17
December	26	23	22	18	23	14

Probability levels of 75% (18 years out of 24) and 50% (12 years out of 24) are shown in the table so that different risk levels can be compared. The 75% probability level is recommended for machinery and labour planning.

If machinery and labour are adequate for 18 years out of 24, other facilities such as contractors, overtime and casual labour can be used during the remaining years. Alternatively the operation can be performed in wetter conditions.

Soils data used for the calculation of these figures are based on three drainage categories:

Light soils	Freely drained sandy loam	e.g. Darvel series
Medium soils	Moderately drained loamy clay	e.g. Macmerry series
Heavy soils	Imperfectly drained clay loam	e.g. Winton series

Workday figures in the table are based on the daily fluctuations of soil moisture content, predicted from daily values of rainfall, sunshine hours and mean air temperature.

A day is assumed to be a work day if the soil moisture content at 9 am is below the lower plastic limit and the total rainfall during the same day does not exceed 10 mm.

Meteorological data spanning 24 years has been used.

The following example uses the figures in the previous table to help calculate the work rate of a tractor.

Example: A tractor has to be purchased to plough 120 ha of heavy soil between mid-August and mid-September. What work rate will be required?

From the preceding table, at 75% probability, the number of days available on a heavy soil during the months of August and September are 24 and 20 respectively.

▪ Therefore, days available second half of August	=	24/2	=	12
▪ Therefore, days available first half of September	=	20/2	=	10
				<u>22</u>

Assuming an eight-hour working day, the total time available is 176 hr. In order to complete the work within the desired period the tractor should be capable of ploughing at least 0.68 ha/hr (calculated by dividing 120 ha by 176 hr).

Alternatively, if the lower probability of 50% is chosen for the same soil and area the tractor work rate would be calculated as:

▪ Days available second half of August	=	27/2	=	13.5
▪ Days available first half of September	=	24/2	=	12.0
				<u>25.5</u>

Assuming an eight-hour working day, the total time available is 176 hr. In order to complete the work within the desired period the tractor should be capable of ploughing at least 0.58 ha/hr (calculated by dividing 120 ha by 204 hr).

Typical field efficiencies

Field efficiency is a measure, as a percentage, of a machine's field capacity after taking into account for failures to utilise the full operating capacity. These failures result from items such as overlapping, turning and other routine time delays associated with the operation. Typical figures, shown in the following table, are expressed as a percentage.

Ploughing	90%	Grain only drilling	75%
Power harrow + grain only drill	60%	Combining	85%

Calculating workrate

$$\text{Workrate (ha/hr)} = \frac{\text{working width (m)} \times \text{forward speed (km/hr)} \times \text{field efficiency (\%)}}{10}$$

For example, a 9.1m combine travelling an average of 6km/hr has a work rate of 4.64 ha/hr as per the calculation below:

$$\text{Workrate (ha/hr)} = \frac{9.1 \text{ (m)} \times 6 \text{ (km/hr)} \times 85 \text{ (\%)}}{10} = 4.64 \text{ ha/hr}$$

Estimating Machinery Costs

Machinery costs on many farms can be a major contributor to high levels of fixed costs. Part of the reason for this is that often farmers do not have a clear idea of what their machinery is costing them. Consequently, to improve machinery management the first step is to establish current machinery costs.

To compare the cost of doing the job in-house against the rates charged by a local contractor, the actual machinery costs must be costed. This is a straightforward task for an operation like combining where one machine is involved. But for more complex operations, such as sowing or silage harvesting, the task is more difficult as only part of the tractor's duties are attributable to the operation. In such cases a wider assessment of the farm's annual machinery usage must also be undertaken.

Example calculation - cost estimate for purchasing and operating a combine harvester

To illustrate the principle behind estimating machinery costs this example has been shown on pages 344-347, showing the purchase of a combine harvester for £200,000 versus using contractors.

This method is based on estimating the annual fixed and operating costs of the machine given expected annual use and machine life. These

estimates can then be used in a partial budget for comparison with alternative policies such as the use of a contractor.

The following three tables provide the supporting information for the steps in the machinery calculation.

Table 1: Depreciation - average annual fall in value

Frequency of renewal	Complex (high depreciation rate) ¹	Established (many moving parts) ²	Simple (few moving parts) ³
1	34.0%	26.0%	19.0%
2	24.5%	19.5%	14.5%
3	20.0%	16.5%	12.5%
4	17.5%	14.5%	11.5%
5	15.0%	13.0%	10.5%
6	13.5%	12.0%	9.5%
7	12.0%	11.0%	9.0%
8	11.0%	10.0%	8.5%
9	10.0%	9.5%	8.0%
10	9.5%	8.5%	7.5%

	Typical frequency of renewal with heavy use
	Typical frequency of renewal average use
	Typical frequency of renewal with light use

¹ e.g. Potato Harvesters, Pea Viner

² e.g. Tractors, Combines, Balers, Forage Harvesters

³ e.g. Ploughs, Trailers

Table 2: Fuel consumption

Fuel is a significant cost for farming and rural businesses. Actual fuel consumption will vary depending on variables such as the power and size of machine used, depth of operation, correct calibration, appropriate maintenance of machinery, speed and care of operation. The table below gives an indication of the fuel cost of some farming operations based on red diesel costs of 55 p/l (Jun 2017).

	Fuel consumption (l/hour)	Time taken for operation (hours/ha)	Diesel usage (l/ha)	Diesel cost (£/ha)
Subsoiling	18.9	1.11	21.00	11.55
Ploughing (6 furrow)	26.8	1.11	29.75	16.36
Heavy Cultivation	26.8	0.71	19.13	10.52
Light Cultivation	8.6	0.47	4.02	2.21
Power harrow	26.8	1.00	26.78	14.72
Fertiliser spreading	8.6	0.18	1.57	0.86
Grain drilling 3m	18.9	0.53	9.95	5.47

	Fuel consumption (l/hour)	Time taken for operation (hours/ha)	Diesel usage (l/ha)	Diesel cost (£/ha)
Rolling 7.3m light	8.6	0.33	2.88	1.58
Potato Planting 2 row	10.8	1.33	14.40	7.92
Mowing 3m	18.4	0.49	9.01	4.96
Baling straw, round bales	26.8	0.50	13.39	7.36
Forage harvesting	61.2	0.40	24.48	13.46
Spraying 24m	10.8	0.18	1.96	1.08
Towing (trailer)	16.2	0.40	6.48	3.56
Combine harvesting 7.7m	37.8	0.31	11.63	6.40
Potato harvesting 2 row	21.6	2.29	49.37	27.15

Table 3: Estimated annual cost of spares and repairs (as a percentage of purchase price at various levels of use)

	Approximate Annual Use (Hours)				
	500	750	1000	1500	+ each additional 100
Tractors	5.0%	6.7%	8.0%	10.5%	5.0%

	Approximate Annual Use (Hours)				
	50	100	150	200	+ each additional 100
Harvesting machinery					
Combine harvesters, balers, potato harvesters	1.5%	2.5%	3.5%	4.5%	2.0%
Other implements					
Ploughs, cultivators, toothed harrows, hoes	4.5%	8.0%	11.0%	14.0%	6.0%
Rotary cultivators, mowers, pea cutter windrowers	4.0%	7.0%	9.5%	12.0%	5.0%
Disc harrows, fertiliser spreaders, FYM spreaders, combine drills, potato planters (with fertiliser), sprayers, hedge cutters	3.0%	5.5%	7.5%	9.5%	4.0%
Swath turners, tedders, side delivery rakes, unit drills, forage harvesters, semi-automatic potato planters	2.5%	4.5%	6.5%	8.5%	4.0%

	Approximate Annual Use (Hours)				
	50	100	150	200	+ each additional 100
Corn drills, milking machines, hydraulic loaders	2.0%	4.0%	5.5%	7.0%	3.0%
Grain driers, grain cleaners, rolls, hammer mills	1.5%	2.0%	2.5%	3.0%	0.5%

Example calculation - Purchase of combine harvester versus using contractors

Cost element	Value	ref	Factor	Calculation
Area harvested (ha)	600	A	-	-
Work rate (ha/hr)	2.75	B	-	-
Annual hours worked (hr)	218	C	-	A / B
Machine life (yr)	6	D	-	-
Purchase price (£)	200,000	E	-	-
F'cast 5yr selling price (£)	24,000	F	12%	E*depreciation% (table 1)
Average value (£)	112,000	G	-	(E+F) / 2
Depreciation (£)	29,333	H	-	(E-F) / D
Interest (£)	5,600	I	5%	G*interest rate (%)
Insurance (£)	1,680	J	£15	G*£ per £1k
Annual fixed costs (£)	<u>36,613</u>	K	-	H+I+J
Fuel use (l/ha)	12	L	-	(table 2)
Fuel cost (£)	3,959	M	£0.55	A*L*fuel price (£/l)
Spares and repairs (£)	9,000	N	4.5%	E*% (table 3)
Labour (£)	2,727	O	£12.50	labour (£/hr)*(A/B)
Annual operation costs (£)	<u>15,687</u>	P	-	M+N+O
Annual cost (£)	<u>52,300</u>	Q	-	K+P
Annual cost (£/ha)	87	R	-	Q / A
Contractor charge (£/ha)	95			(incl. fuel)

Based on these assumptions, owning a combine is cheaper (£87/ha) than average contractor's charges (£95/ha) but other factors must be considered:

- If the farmer increases the area harvested the overall cost of the combine increases to reflect higher fuel, repairs and depreciation costs. But this increase is spread over a much larger area and consequently reduces cost per ha.

- Work rate has a major effect on machinery cost. Many factors influence work rate efficiency, some of which are beyond the control of the farmer, while others can be improved upon.
- Contractor's charges are also highly variable depending on the above and other factors such as the level of local competition amongst contractors which can greatly affect charges.

For more information on payment terms involved in purchasing machinery see credit options on pages 464-465.

Machinery Contractors' Charges

Prices are indicative market rates taken from various contractors and machinery rings throughout Scotland with the costs of the driver (generally) included. Fuel is not normally included in contract charges. However, as prices and contractors arrangements (e.g. farm fuel used) vary considerably within areas, the prices listed below only serve as a guide and local information should be sourced for specific operations.

Costs of carrying out specific operations, i.e. arable stubble to stubble and preserved forage are illustrated on pages 42, 73 and 85.

	Average price	Price range
Arable cultivation		
Ploughing	£55.05 /ha	£42.01-£64.25
with press	£6.46 /ha	£4.94-£7.41
Discing	£40.26 /ha	£29.65-£50.66
Power harrow	£50.82 /ha	£31.33-£70.05
Min till cultivations	£42.62 /ha	£22.24-£65.48
Cambridge roller	£13.34 /ha	£7.41-£19.77
with paddles	£6.18 /ha	-
Subsoiling	£64.47 /ha	£42.01-£91.27
Topping - fallow	£30.10 /ha	£22.24-£34.59
Rotovating	61.78 /ha	£46.95-£70.42
Grassland maintenance		
Heavy flat roller	£23.89 /ha	£18.53-£29.65
Topping - grass	£29.55 /ha	£22.49-£34.59
Chain harrowing	£21.37 /ha	£8.65-£32.12
Spring tine harrowing	£23.29 /ha	£8.65-£33.38
Aeration	£22.65 /ha	£11.12-£29.65
Sward lifting	£56.03 /ha	£50.66-£66.59
Sowing		
Grass seed - broadcast	£25.51 /ha	£22.98-£29.65
Grass seed - with harrows	£30.19 /ha	£18.53-£39.54
Grass seed - direct drilling	£55.27 /ha	£39.54-£72.89
Grain (no fert.)	£37.58 /ha	£24.71-£49.42

	Average price	Price range
Oilseed rape (no fert.)	£43.82 /ha	£18.53-£58.56
Turnips	£63.42 /ha	£44.48-£81.54
Beet	£51.89 /ha	£49.42-£54.36
One pass cultivation/drill (cereals, no fert.)	£54.01 /ha	£42.01-£61.78
with fertiliser	£5.77 /ha	£4.94-£7.41
One pass cultivation/drill (OSR, no fert.)	£56.91 /ha	£53.42-£65.48
with fertiliser	£5.77 /ha	£4.94-£7.41
Maize (without plastic)	£49.42 /ha	£44.48-£54.36
Maize (with plastic)	£121.08 /ha	-
Fertiliser spreading		
Spinner	£10.66 /ha	£8.03-£13.84
with variable rate	£2.93 /ha	£1.85-£3.71
Liquid fertiliser (surface)	£14.00 /ha	£12.36-£16.06
Irrigating (/25mm)	£123.55 /ha	-
Manure and lime		
Rotary - medium	£36.91 /hr	£30.00-£49.50
Rear discharge - medium	£40.56 /hr	£34.00-£49.50
Rear discharge - large	£45.07 /hr	£41.50-£51.20
Slurry - medium	£32.20 /hr	£30.00-£35.00
Slurry - large	£41.03 /hr	£33.75-£50.00
Lime	£4.83 /t	£3.50-£6.10
with gps	£2.93 /t	£2.00-£3.86
Umbilical - splash plate	£74.33 /hr	£70.00-£77.00
- injection	£79.60 /hr	£78.20-£81.00
with additional pumps	£37.05 /hr	£31.10-£40.05
Spraying		
Spraying	£12.78 /ha	£9.88-£17.99
with gps	£2.47 /ha	-
Slug pellet application	£7.91 /ha	£6.18-£9.88
Combinable harvesting		
Cereals	£88.25 /ha	£74.13-£105.26
with yield mapping	£4.94 /ha	-
with chopper	£7.66 /ha	£6.18-£9.88
Oilseed rape - direct	£89.46 /ha	£77.84-£104.10
Oilseed rape swathing	£42.21 /ha	£39.54-£44.48
Peas and beans	£97.19 /ha	£88.96-£106.25
Crimping/bruising grain/pulses	£11.67 /t	£9.82-£16.50
Straw chopping	£34.29 /ha	£27.18-£38.30
Forage		
Mower	£20.59 /ha	£18.53-£22.24
Mower and conditioner	£29.19 /ha	£21.00-£33.36

	Average price	Price range
Tedding/raking	£13.49 /ha	£9.51-£17.30
Precision chop - self-propelled	£62.57 /ha	£42.01-£80.31
Cutting, raking, chopping and carting	£155.50 /ha	£140.85-£164.32
Forage box	£122.64 /hr	£107.20-£161.56
Forage harvester (whole crop)	£101.28 /ha	£88.78-£111.20
Maize (including forager, 3 trailers and buckrake)	£167.66 /ha	£160.00-£174.95
Baling and wrapping		
Silage/hay - 4x4	£2.33 /bale	£1.90-£2.73
Silage - 4x2.3	£3.90 /bale	£3.50-£4.60
Hay - small square	£0.57 /bale	£0.43-£0.65
Straw - 4x4	£2.25 /bale	£1.90-£2.60
Straw - 4x5	£2.92 /bale	£2.15-£3.43
Straw - 8x4x2.3	£4.13 /bale	£3.60-£4.60
Straw - 8x4x4	£5.97 /bale	£3.43-£7.80
Straw - small square	£0.55 /bale	£0.43-£0.65
Wrapping - round, 4 layers	£2.03 /bale	£1.20-£2.60
Wrapping - square, 4 layers	£3.48 /bale	£2.40-£5.65
Wrapping - tube-line, silage	£2.50 /bale	£1.75-£3.50
Wrapping - tube-line, straw	£2.14 /bale	£1.50-£2.80
Stacking	£0.44 /bale	£0.30-£0.52
Ag bagging	£6.00 /t	-
Baling and wrapping	£7.15 /bale	£5.40-£7.80
Root and potato work		
Deep plough	£62.83 /ha	£53.13-£74.01
Deep ridge	£61.78 /ha	£37.07-£85.25
Bed tilling	£136.32 /ha	£81.54-£222.39
Destoning	£223.33 /ha	£177.91-£276.75
Bed forming	£72.89 /ha	£34.59-£111.20
Potato planting - without fertiliser	£121.08 /ha	£54.36-£222.39
Potato planting - with fertiliser	£131.58 /ha	£69.19-£222.39
Potato pulverising	£55.19 /ha	£39.54-£69.19
Potato harvesting - excl. pickers	£454.66 /ha	£350.88-£630.11
Turnip harvesting	£40.00 /hr	-
Tractor hire - including driver		
4 WD up to 100 hp	£26.32 /hr	£20.00-£33.50
4 WD 101 - 150 hp	£30.31 /hr	£23.00-£36.90
4 WD 151 - 220 hp	£34.19 /hr	£25.00-£40.30
4 WD 220 - 300 hp	£42.67 /hr	£27.00-£56.00
4 WD over 300 hp	£58.05 /hr	£30.00-£77.50
Tracked	£42.75 /hr	£28.00-£55.00
with loader	£2.50 /hr	-
with trailer	£5.00 /hr	-
4 WD telescopic fork lift	£39.21 /hr	£25.00-£105.00

	Average price	Price range
JCB type excavator	£30.00 /hr	£26.50-£33.25
Tracked excavator 15-25t	£35.38 /hr	£30.00-£40.00
with rock pecker	£13.75 /hr	£12.50-£15.00
Skidsteer	£76.67 /day	£60.00-£100.00
Tractor with post chapper (+ man)	£34.50 /hr	£28.00-£38.00
Labour		
Casual	£9.72 /hr	£8.50-£10.50
Experienced/skilled ¹ (weekdays)	£14.19 /hr	£11.75-£17.50
Cereal/potato roguing	£13.25 /hr	£11.50-£15.00
Secretarial	£13.50 /hr	£10.00-£17.00
Livestock services		
Sheep shearing - Blackface ²	£1.00 /hd	£1.00 - £1.10
- Crossbred ewe ²	£1.25 /hd	£1.20 - £1.40
- Tups ²	£2.50 /hd	£2.40 - £2.80
Rolling and packing wool	£0.20 /hd	-
Sheep dipping	£0.93 /hd	£0.25-£1.45
Sheep showers	£0.98 /hd	-
Crutching sheep	£0.70 /hd	-
Scanning - sheep ²	£0.70 /hd	£0.65-£1.05
Scanning - cattle ²	£2.05 /hd	-
Foot trimming - sheep	£1.05 /hd	-
Foot trimming - cows	£11.00 /hd	-
Foot trimming - bulls	£24.50 /hd	-
Haulage - sheep ³	£2.30 /hd	£1.50-£35.00
Haulage - cattle ³	£20.00 /hd	£5.00-£70.00
Automatic handler for sheep	£100 /day or £20 /hr	-
Miscellaneous		
Strimming	£17.50 /hr	£17.00-£18.00
Hedge cutter	£35.18 /hr	£28.00-£42.50
Log splitter	£33.00 /hr	£31.00-£35.00
Snow plough	£75.00 /day	-
Road brush	£33.17 /day	£30.00-£37.50
Feed mixing/processing (mobile)	£19.50 /t	-
Haulage - forage (hay and straw) ²	£20.00 /t	£10.00-£35.00
Haulage - concentrates ²	£20.00 /t	£10.00-£40.00

¹ includes skilled relief milkers, stockmen, shepherds, sprayer operators and forklift/digger/HGV drivers.

² for small flocks/herds a minimum fee £100-150

³ haulage charges are highly dependent on distance travelled, weight of load and options for a back load.

Grain Drying

All costs for drying include a price for handling and loading.

Grain

Reduction to 15% moisture content from:

16%	17%	18%	19%	20%	21%	22%	23%
£7.00/t	£9.00/t	£11.00/t	£13.00/t	£15.00/t	£17.00/t	£19.00/t	£21.00/t

Contractor's weight loss (including drying and cleaning):

From	16%	17%	18%	19%	20%	21%	22%	23%
Weight loss	4%	6.3%	7.2%	8.2%	9.2%	10.2%	11%	13%

See page 43 for equivalent grain weights at varying moisture contents.

Oilseed rape

Reduction to 8% moisture content from:

10%	11%	12%	14%	16%	18%	20%	22%
£9.00/t	£11.00/t	£13.00/t	£17.00t	£21.00t	£25.00t	£29.00/t	£33.00/t

Contractor's weight loss (including drying and cleaning):

From	10.5%	11.5%	12.5%	14.5%	16.5%	18.5%	20.5%	22.5%
Weight loss	3%	4.5%	6%	9%	12%	15%	18%	21%

Drainage

Drainage costs and work rates will vary considerably depending on specific site circumstances (current drainage system and terrain) and requirements. All drainage work should be fully discussed, inspected, designed and quoted (materials and labour split) prior to work commencing to prevent discrepancies at a later date.

Draining

3t mini-digger + man + diesel	£20.00-£22.00/hr
7 ½ ton JCB + man + diesel	£27.00-£29.00/hr
15 ton tracked digger + man + diesel	£32.00-£37.00/hr
Typical Work Rate (32" depth)	40 - 65m/hr
Trencher (+ man + diesel + handling gravel + pipe)	£2.25-£9.00/m
Typical work rate	125 - 175m/hr
Trenchless (+ man + diesel + handling gravel + pipe)	£2.00-£8.50/m
Typical work rate	150 - 200m/hr
Tractor + gravel wagon + man + diesel	£35.00-42.00/hr or
	£5.00-£6.00/ton handling charge

Approximate draining costs on an area basis are shown in the following table:

Lateral spacing	Method	Materials	Price £/ha
7m	Digger	no gravel	3,410
15m	Digger	purchased gravel	5,670
15m	Digger	own gravel	2,940
15m	Digger	twinwall plastic pipe & own gravel	4,305
15m	Trenchless	purchased gravel	3,780
20m	Digger	purchased gravel	3,780
20m	Trenchless	purchased gravel	2,625

Materials

Gravel		£15.00-£22.00/ton
Corrugated plastic pipe	60mm (150m coil)	£76.00 (or 51p/m)
	80mm (100m coil)	£65.00 (or 65p/m)
	100mm (100m coil)	£90.00 (or 90p/m)
	160mm (35m coil)	£50.00 (or 1.43p/m)
Twinwall plastic pipe (6m lengths incl. coupling)	100mm	£9.00 (or £1.50/m)
	150mm	£18.50 (or £3.08/m)
	225mm	£39.50 (or £6.58/m)

Pipe requirements

Lateral spacing	m/ha	m/acre
7m	1,500	600
15m	750	300
20m	500	200

Gravel requirements

Gravel requirements in tonnes per 1 metre run are shown in the table below.

Depth of gravel	18"	24"	30"	36"
100mm	0.09	0.11	0.14	0.17
125mm	0.13	0.17	0.21	0.25
225mm	0.19	0.26	0.32	0.39
300mm	0.26	0.34	0.43	0.51
450mm	0.39	0.51	0.64	0.77
600mm	0.51	0.68	0.86	1.03

Secondary drainage treatments

Subsoiling (1-3 acres/hr)	£57.00-£111.00/hr or £19.00-£37.00/acre
Moling (1-3 acres/hr)	£57.00-£111.00/hr or £19.00-£37.00/acre
Flat lifter (1-3 acres/hr)	£62.00-£81.00/hr or £20.50-£27.00/acre
Aerator (5-7 acres/hr)	£23.00-£84.00/hr or £4.50-£12.00/acre

Drain jetting

Drain jetter with tractor	£35.00-£54.00/hr
Drain jetter with tractor + digger + tractor with bowser	£700-£800/day

Ditch cleaning

Ditch cleaning (20-125m/hr)	£1.25 - £1.75/m or £38.00-£48.00/hr
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Fencing

The costs in the following table will vary considerably depending on fence purpose, fence length, site difficulty (such as access, ground conditions, presence of rock, and number of turns) and, type and quality of materials.

Net fences	£/m
Mild steel netting, 2 mild steel plain wires, 1 mild steel barb wire assuming stobs every 2m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	3.33
High tensile netting, 3 high tensile plain wires, 1 barb wire assuming stobs every 3m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	2.97
High tensile steel netting, 2 high tensile plain wires, 1 high tensile barb wire assuming steepleless steel posts every 4.5m, a steepleless steel strainer with stay kit at either end, a steepleless steel turning post every 50m and 8 gripples every 200m	3.98

Plain wire fence	£/m
8 hi tensile plain wire, 1 barb wire assuming stobs every 2m, a strainer at either end and a turning post every 50m	3.08

Scare fence	£/m
2 barb wire assuming stobs every 5m, a strainer at either end and a turning post every 50m	1.75

Electric fences (energisers not included)	£/m
Hi tensile netting, 4 hi tensile plain wires assuming stobs every 3m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	3.20
8 hi tensile plain wires assuming stobs every 2m, a strainer at either end and a turning post every 50m	3.47
2 hi tensile plain wires, assuming stobs every 5m, a strainer at either end and a turning post every 50m	2.00

Deer fence	£/m
Deer netting, rabbit netting, 3 mild steel plain wires assuming stobs every 3m, a strainer at either end and a turning post every 50m	5.19

Post and rail fence	£/m
5 rails assuming stobs every 2m, a strainer at either end	9.96

Hedges	£/m
Hedge laying	15.00

There are regional and contractor variances on fence types. It is important to ensure the materials are chosen with purpose in mind, e.g. net fencing for sheep can differ from that suitable for cattle so as to help prevent loss of sheep ear tags. All fencing work should be fully discussed, inspected and quoted (materials and labour split) prior to work commencing to prevent discrepancies at a later date.

Labour costs for fencing will vary between £10.00-16.50/hr. Chapping costs are £25.00-38.00/hr and for strainers, £15/post. Dismantling existing fencing, site preparation and fence disposal are added charges.

Dry Stone Walling

Excluding provision of material	£25-50 /m ²
Stone	£60-100 /t

Regional and contractual variations will apply in terms of the price of dry stone walling, in part depending on ease of access to site, availability of stone and nature and size of the wall. In general terms the price quoted for labour will be based on a metre square rate and will include the building of both sides of the wall, where a free-standing structure is required. Prices will vary for retaining walls. It is good practice to discuss and inspect the work with the dry stone waller beforehand, which will help identify whether additional stone is required. As a rough guideline, 1t of stone will be required for every linear metre of a free-standing wall approximately 1.3m high. Specialist stones, such as throughbands, quoins or copes may need to be sourced separately.

The Dry Stone Walling Association (www.dswa.org.uk) has a list of current professional members available on its website.

Agricultural Vehicles on the Road

Below are some key points that should be adhered to when agricultural vehicles are to go on the public road. Vehicles must be used for 'agricultural purposes' before it can be licenced as an agricultural vehicle.

Drivers licence – Usually a full car licence will include the 'F' category which is the tractor section. For some vehicles (combines etc) category 'B' will also be required. Vehicles fitted with tracks depending on the steering arrangement may require the 'H' category on the drivers licence.

Farm ATV's can be registered as light agricultural vehicles and driven on the road provided they have the full road legal kit.

Drivers ages – After passing the 'tractor' test a 16 year old can drive an agricultural vehicle on the road provided it is mounted on wheels, is no wider than 2.45m and is not pulling a trailer exceeding a single or double axle close coupled design which is also below 2.45 m wide. Once over 17 years old they can then operate most agricultural machines apart from tracked machines which is over 21 years of age. You must sit a separate test, category H, for tracked vehicles. Drivers aged 17-20 will be restricted to a Maximum Authorised Mass (MAM) of no more than 3,500kg. Anyone wishing to tow a trailer behind a car, van or 4x4 and has passed their driving test after the 1st January 1997 is required to sit a separate B + E trailer test.

Speed limits – An agricultural tractor must not exceed 25mph (includes ATV's). High speed tractors (JCB Fastrac, Unimog etc) can exceed this and have a maximum speed of 40mph (dependent on specification).

Trailer brakes – If a vehicle is travelling up to 25mph then hydraulic brakes are sufficient. Over 25mph then progressive brakes should be fitted along with ABS and a failsafe system.

Vehicle weights – Depending on axle spread the maximum authorised mass (MAM) should not exceed 31,000kg (tractor and implements attached). The trailer on its own again depending on axle load limits should not exceed 18,290kg. The additional axle load on the rear axle of the tractor imposed from the trailer should not exceed 3,000kg.

Vehicle widths – Up to 3m wide no notification is required. 3.0m - 3.5m, the police have to be notified, max speed 20mph. 3.5m - 4.3m, notification to police, attendant vehicle and lights fitted in reduced visibility, max speed 12mph. Over 4.3m, notification to secretary of state, attendant vehicle and lights fitted in reduced visibility. In all cases any projections must be marked and lights fitted when required.

Pick up hook rings – Ensure the gap between the top of the hook and the upper part of the hitch does not exceed 10mm gap when locked. The minimum thickness of the trailer ring should be no less than 30mm.

Tyre condition – Up to 20mph the tyres have to be in a safe condition and roadworthy. Over 20mph and there can be no cuts exceeding 25mm in length, have a minimum of 1mm tread depth and no obvious damage or wear and tear.

Lights – All lights when fitted must be visible, working and correctly positioned. Amber beacons are only required on unrestricted dual carriageways unless used as a warning for wide vehicle etc. No rear facing white lights are allowed.

Registration plates – Plates fitted to towing vehicles must match the vehicle and the registered keeper of the vehicle.

Fuel – Red diesel is permitted only if the vehicle is registered as an agricultural vehicle and being used for an agricultural related purpose.

MOT testing – Most agricultural vehicles will be MOT test exempt but must still meet the construction and use regulations when on the public road.

Labour Legislation and Policy

National hourly wage rates

From 1 April 2016 the UK Government introduced the mandatory National Living Wage (NLW) as an upper tier to the National Minimum Wage (NMW).

The table below shows the NLW and the NMW hourly rates for age categories.

Age	NMW and NLW hourly rates (£/hr)			
	2017	2016 ^a	2016 ^b	2015
25 +	7.50*	7.20*	7.20*	6.70
21-24	7.05	6.95	6.70	6.70
18-20	5.60	5.55	5.30	5.30
16-17	4.05	4.00	3.87	3.87
Apprentice	3.50	3.40	3.30	3.30

* NLW

^a October 2016 to March 2017

^b April 2016 to September 2016

Minimum hourly wage rates for agriculture

Scotland

The following table summarises the rate of pay figures as set in the Agricultural Wages (Scotland) Order (No.64) with effect from 1 April 2017.

Agricultural minimum hourly wage (£/hr) - Scotland from 1 April 2017	
Minimum hourly rate of pay for all ages of workers ¹	7.50
Apprentice ²	4.40
Additional sum for workers with qualifications ³	1.14
Overtime ⁴	11.25
Dogs (£/dog/week - up to a max. of 4 dogs)	5.60

¹ hourly rate applies to workers whether full time, part time, students etc. and no matter what type of work is done.

- 2 minimum hourly rate of pay in the first 12 months (after which the minimum hourly rate of pay as set for the year will apply) for an apprentice who has been continually employed by the same employer for up to 12 months and who undertakes a Level 2 Modern Apprenticeship in Agriculture/Horticulture as agreed in the terms of their contract.
- 3 for workers in the same employment for more than 26 weeks and who hold formal qualifications, or in some circumstances for those who are skilled with no formal qualifications - for specific details see Agricultural Wages in Scotland 21st Edition.
- 4 based on the minimum hourly rate of pay to which the worker is entitled multiplied by 1.5 - e.g. £7.50 x 1.5 = £11.25

England

From 1 October 2013, the payment terms and conditions for new employees changed for agricultural workers in England after the Agricultural Wages Board in England and Wales was abolished. Agricultural workers in England must be paid at least the NMW (see page 356). Where an employment contract dated before 1 October 2013 exists and mentions the Agricultural Wages (England and Wales) Order 2012 the employee still has the right to be paid the agricultural minimum wage for the graded pay rate that they are entitled to. The agricultural minimum hourly wage rate for those above compulsory school age is £6.21 (Grade 1) after which the rates rise to £9.40 (Grade 6) in accordance with a graded scale relating to specific job definitions and qualifications.

Wales

From 1st of April 2017, increased pay rates for some agricultural workers in Wales were set in line with the NMW and NLW. Some categories and grades of workers will be subject to the rates set in the Agricultural Wages (Wales) Order 2016. The agricultural minimum hourly wage rate for those above compulsory school age is £6.72 (Grade 1) after which the rates rise to £9.97 (Grade 6) in accordance with a graded scale relating to specific job definitions and qualifications.

Northern Ireland

In Northern Ireland from 1st April 2017 the minimum agricultural hourly pay rate, applicable for the first 40 weeks cumulative employment, is £6.88 (Grade 1) to £9.70 (Grade 6) in accordance with a graded scale relating to specific job definitions and qualifications. Where at any time the NMW and NLW becomes higher than the agricultural hourly rate set out above, then the minimum rate shall be equal to the NMW and the NLW.

Estimated annual labour costs

The following example calculates the estimated annual labour costs to an employer based in Scotland. The earnings of the worker, based on the same assumptions, are also shown.

Assumptions:

- Employee in employment for over 26 weeks
- 39 hr/wk, 5 days/wk, 52 wk/yr less 30 days holidays
- Minimum hourly rate - £7.50
- 10 hr/wk overtime
- Employers National Insurance Contributions (NIC) @ 13.8%
- Employers liability insurance @ 1%
- Overtime rate - £11.25
- £11,500 personal allowance

Labour cost to employer	Annual	Weekly	Hourly
Minimum wage for employee	£15,210.00	£292.50	£7.50
Employers NIC	£269.10	£5.18	£1.04
Employers liability insurance	£109.20	£2.10	£0.08
	£15,588.30	£299.78	£8.61
Overtime	£5,220.00		£11.25
Employers NIC	£720.36		£1.55
Employers liability insurance	£52.20		£0.11
	£5,992.56	£115.24	£12.92
Total labour cost incl. overtime	£21,580.86	£415.02	£9.49

Employees earnings	Annual	Weekly	Hourly
<i>Workers earnings (gross)</i>	£20,430.00	£392.88	£8.99
<i>Less tax</i>	£1,786.00	£34.35	£0.79
Workers earnings (after tax)	£18,644.00	£358.54	£8.20

For more information on National Insurance Contributions and Income Tax, see pages 468-470 and 482-483).

Redundancy

An employee having worked for an employer for 2 years or more will normally be entitled to Statutory Redundancy Pay. The following table lays out the basis of calculating a redundancy pay amount:

Employee Age	No. weeks pay for each full year worked
under 22 years old	0.5
22-41 years old	1.0
over 41 years old	1.5

An upper limit on weekly pay is set at £489 per week for redundancy pays on or after 6 April 2017. The maximum statutory redundancy pay that can be received is £14,670. Different rates apply prior to 6 April 2017.

Length of service is capped at 20 years with service over this period having only the last 20 years of employment taken in to account. Only complete years are counted.

There is no upper age limit for an employee receiving redundancy pay.

For example, a 50 year old has worked for their employer for 25 years earning £650/week would be entitled to 24.5 weeks pay (11 years @ 1.0 plus 9 years @ 1.5). This equates to a redundancy pay of £11,980.50.

Higher levels of redundancy pay can be agreed between employees and employers. Redundancy pay less than £30,000 is tax free.

Rates above do not apply to Northern Ireland.

Maternity/paternity

Maternity leave arrangements will differ according to specific job arrangements. Statutory leave is 52 weeks with the first 26 weeks as ordinary leave and the last 26 weeks as additional leave. You do not have to take 52 weeks but must take 2 weeks following the birth of the baby. The earliest time to start leave is 11 weeks before the expected birth of the baby.

Maternity pay is paid up to 39 weeks with 90% of average weekly earnings (before tax) for the first 6 weeks and £140.98 or 90% of average weekly earnings (whichever is lower) for the next 33 weeks.

For paternity leave, the entitlement is, either, 1 or 2 weeks. This leave must be taken in one go, not odd days. Paternity pay is £140.98 or 90% of average weekly earnings (whichever is lower).

Labour arrangements

When employing staff the following should be considered at the outset of employment:

- Holidays and holiday pay
- Sick pay
- Maternity and paternity arrangements and pay
- Pension provision
- Provision of appropriate PPE (personal protective equipment)
- Dog allowance (where necessary)
- Other benefits, e.g. accommodation, vehicles, bonuses, subsistence
- Dismissal
- Redundancy

The options for labour on farm include casual/irregular workers, self employed contractors (with or without machinery) or hiring permanent staff/employees.

Self employed contractors are generally hired to carry out a specific task, i.e. harvest work, shearing, fencing, rather than being available at all times to carry out general farm work. Contracting rates are summarised on pages 247-350. Self employed contractors will invoice for work done and it is their responsibility to pay all income tax and national insurance contributions unless other arrangements are made. It will be important to consider farm insurance implications of hiring in contractors.

More formal arrangements with contractors exist that would see all or most of the physical farm labour being carried out by the contractor. In this case the contractor would also, in most circumstances, provide machinery and additional labour requirement. The farmer/land owner would provide the land, capital and fixed infrastructure. These arrangements include contract farming and share farming. The agreements can be devised to suit each circumstance specifically but the main theme is that the farmer/landowner retains an active interest in the business both from a management point of view and financially. For more details, see pages 392-402.

Other labour opportunities would involve hiring employees on a full-time or part-time basis and the following aspects should be considered as part of the decision making process:

- Job requirements
- Qualifications required/training provision
- Provision of a house and vehicle
- Payment terms (see minimum hourly wage rates on page 356-357)
- Employment contracts
- Performance related employment incentives
- Legality of a person being hired
- Employment insurance
- Health and safety
- Registration with HM Revenue and Customs (HMRC)

Sources of information

Full and specific details of agricultural wage arrangements and conditions across the UK can be found at the following websites:

- UK: <https://www.gov.uk/national-minimum-wage-rates>
- Scottish Government: <http://www.gov.scot/Topics/farmingrural/Rural/business/18107>
- England: <https://www.gov.uk/agricultural-workers-rights>
- Wales: <http://www.legislation.gov.uk/wsi/2016/107/made> and <http://gov.wales/topics/environmentcountryside/farmingandcountryside/agricultural-sector-wales-act-2014/interim-order/?lang=en>
- Northern Ireland: <https://www.daera-ni.gov.uk/articles/agricultural-wages-board-northern-ireland-awb>

Further information on labour suppliers, training, pensions, redundancy and other statutory obligations can be found at the following websites:

- Gangmasters Licensing Authority (GLA): <http://www.gla.gov.uk/>
- LANTRA: <http://www.lantra.co.uk/>
- Department for Work and Pensions (DWP): www.dwp.gov.uk
- HM Revenue and Customs: <https://www.gov.uk/government/organisations/department-for-work-pensions>

Health and Safety

Health and safety should be regarded as an essential part of firm business management. Along with the construction industry, agriculture has the worst safety record of any sector. The Health and Safety Executive (HSE) is responsible for ensuring compliance with legislation and also provides a source of advice and guidance for businesses (see www.hse.gov.uk).

The Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations (MHSW) 2003 place duties on businesses and individuals to ensure that adequate provision is made for health and safety at work. Employers must ensure, so far as is reasonably practicable, the health, safety and welfare of employees and any others who may be affected by what they do.

Every business should have a health and safety policy. The policy should identify the aims for the employees' health and safety and outline the various responsibilities, systems and communication to ensure that health and safety objectives are fully met. This should be in writing if five or more people are employed. Guidance on this is available from the HSE (www.hse.gov.uk/pubns/indg275.pdf).

The MHSW Regulations place duties on employers and the self-employed to make a suitable and sufficient assessment of the risk to their own health and safety and that of others from the work they do. This includes employees, any casual workers, part-timers, trainees, customers or contractors. It will also include those who may be affected by work activities, e.g. neighbours, sales people and members of the public. The assessment can be conducted by the business itself, or can be contracted out to a specialist. The people carrying out the risk assessments must be competent, it is not essential to hold a qualification in health and safety. The HSE provide useful guidance on conducting a risk assessment – 5 Steps to Risk Assessment (www.hse.gov.uk/pubns/indg163.pdf). The 5 steps are:

1. Identify the Hazards
2. Decide who might be harmed and how
3. Evaluate the risks and decide on precautions
4. Record your findings and implement them
5. Review the risk assessment and update if necessary

Health and safety within the business - there must be a clear chain of command on who is responsible for each area of work and equipment. The final responsibility generally lies with the business owner.

It is good practice to produce a written risk assessment and it is a statutory requirement if five or more people are employed by the business. The risk assessments must be communicated to staff and all relevant people.

A further assessment should be made for Control of Substances Hazardous to Health (COSHH). This is similar to a risk assessment but considers the risks from substances such as dust, gases, fumes, pesticides and zoonoses.

If an accident or near miss occurs it should be reported to the HSE in accordance with the Reporting of Injuries Diseases & Dangerous Occurrences Regs (RIDDOR).

When carrying out risk assessments for an agricultural related business be aware that one of the biggest causes of death in agriculture is falls from height. Given that most workers spend probably less than 1% of their time working at height this represents the most dangerous part of the year. Every business should examine what tasks are being carried out at height and try to eliminate these or find safer methods.

Many deaths and injuries are caused by transport and machinery. One of the most important pieces of relevant legislation is the Provision and Use of Work Equipment Regulations 1998 (PUWER) which states that:

- All equipment must be fit for purpose
- All equipment must be properly maintained
- All equipment must be properly commissioned
- Equipment must be inspected after difficult conditions
- Operators and maintenance mechanic must be sufficiently trained
- Guards over all dangerous parts
- Safety features all working
- Lighting sufficient to operate machinery

All staff have a legal obligation to co-operate with their employers and follow safe procedures.

Particular care should be taken to ensure the safety of children on farms, and the minimum ages for operating or travelling in certain vehicles and machines must be observed.

There are many other pieces of relevant legislation relating to health and safety at work that agricultural businesses should comply with. In some instances training and certification is required.

A useful source of information for farmers is the HSE publication "Farmwise" (<http://www.hse.gov.uk/pubns/books/hsg270.htm>) which provides practical advice and guidance on health and safety.

For specific health and safety on farm advice, contact SAC Consulting on 01334 654 055. The NFU and independent safety consultants can also assist.

Land and Buildings

Introduction

This section gives detail on the main legislative, technical and finances related to land and buildings.

Land tenure is a topical subject at the moment due to the Land Reform Act (2016) and the detail that follows gives brief descriptions. Full details and legal expertise should be sought for specific tenure related circumstances.

Building spaces guidance and costs are laid out to allow users to budget space requirements and capital requirements for existing and new buildings.

Property operating costs for different types of farms can be found in the Whole Farm Data section on pages 404-424.

Land Tenure

There are four types of agricultural tenancy currently available for use in Scotland, although this will shortly change with the implementation of the Land Reform (Scotland) Act 2016.

To establish what law applies to any agricultural tenancy, it is necessary to determine which type of tenancy is involved. The 1991 Act applies only to 1991 Act Tenancies. The 2003 Act applies to Grazing or Mowing Tenancies, Short Limited Duration Tenancies (SLDT) and Limited Duration Tenancies (LDT), but parts of it also applies to 1991 Act Tenancies.

Agricultural Holdings (Scotland) Act 1991

All tenancies entered into prior to 27th November 2003 are 1991 Act Tenancies.

Tenancies granted under this act give security of tenure to the tenant for unlimited successive generations (i.e. a secure tenancy). The act sets out how rents should be calculated; how improvements should be compensated; how fixed equipment should be maintained and how disputes should be settled.

In order to circumvent the security of tenure granted by a full 1991 Act Tenancy, "Limited Partnerships" were developed.

A Limited Partnership is a 1991 Act Tenancy and all the legislation that governs this type of tenancy applies. The difference is that the tenancy is granted to a partnership between the landowner (Limited Partner) and the farmer (General Partner). The Partnerships were normally agreed to last for a defined period (15-20 years) and thereafter on a year to year basis (tacit relocation). Once the initial term has run its course, the tenancy can be ended by the landowner withdrawing from the partnership. This can be done by serving notice on the General Partner.

Agricultural Holdings (Scotland) Act 2003

The 2003 Act came into force on 27 November 2003.

Grazing or mowing tenancies (grass lets)

These are agricultural tenancies where the land is let for grazing or mowing only and for a specific period of the year not exceeding 364 days.

When a Grazing or Mowing Tenancy has ended, the land may only be let again for the same purpose to the same tenant provided one clear day has elapsed between tenancies.

If, with the landowner's agreement (actual or assumed), the tenant continues to occupy the land after the tenancy period has ended, the tenancy is automatically converted to a SLDT of 5 years or any shorter period which may be agreed between the two parties.

Short Limited Duration Tenancies (SLDT)

These are agricultural tenancies where the letting is for not more than 5 years. If, with the landlord's consent, the tenant under a SLDT of less than 5 years continues to occupy the land after the tenancy period has ended, the tenancy period is automatically extended to 5 years or any shorter period agreed between the two parties.

If the tenant continues in occupation (with the landlords consent) at the end of a 5-year SLDT then a Limited Duration Tenancy (LDT) is automatically granted. There are no statutory rent provisions for a SLDT. SLDT's cannot be assigned to 3rd parties, but relatives can succeed to the tenancy. Statutory rules on fixed equipment and compensation for improvements at the end of tenancy apply.

Limited Duration Tenancies (LDT)

These are agricultural tenancies where the letting is for a minimum term of 10 years - with no upper limit (the early LDT's were for a minimum of 15 years).

To end a LDT a Notice to Quit needs to be served by the landlord (this is a 2-staged process over three years). If the LDT is not terminated by notice at the expiry of the lease, there is instead a cycle of continuations. Initially, a 3 year continuation takes place. A further 3 years will be added to the tenancy if a notice is not served again. Finally, if no notice is served at the end of the second 3 year period a further 10 year continuation takes place. This cycle can repeat itself *ad infinitum*. The tenant may terminate a LDT at the expiry of the contractual term or the expiry of a continuation by written notice given not less than one year and not more than two years notice.

The rules regarding repairs, improvements and rent reviews for LDT's are similar to those for 1991 Act Tenancies. LDT's can be assigned to a third party, subject to landlords consent (landlords can only object on the grounds of the ability, finance or character of the assignee). Landlords can also pre-empt an assignation by matching the highest offer. A LDT

also gives the tenant the ability to use land for a non-agricultural purpose (diversification).

Changes to Agricultural Holdings (Scotland) Act 1991

The 2003 Act makes some changes to the 1991 Act:

- *Fixed Equipment* – Post Lease Agreements (PLA) can be removed by the tenant giving notice to the landlord following a rent review; writing-down agreements for tenants improvements are no longer valid (there is some debate to whether improvements fully written-down before 2003 are included in this); record of condition no longer required to be completed by a Recorder appointed by Government.
- *Rent* – Various instructions on how to set rents were included, for which recent court cases have provided legal interpretation.
- *Diversification* – now allowed on agricultural holdings. The landlord has the right to object. The tenant is able to appeal to the Land Court
- *Compensation for Vacant Possession* - compensation may be payable to a tenant where a tenant voluntarily gives up possession of a holding.
- *Assignment* – details in following sections.
- *Miscellaneous* – leases can no longer be terminated on grounds of non-residency; Consent from the Land Court is required on a Notice to Quit in most circumstances; the definition of good husbandry now extended to include conservation activities and diversification, as permitted under the 2003 Act.
- *Tenants Right to Buy* – provides a pre-emptive right of a tenant (under a 1991 act tenancy) to buy land tenanted by him if the landlord intends to sell i.e. the tenant has the right of first refusal, provided the tenant has registered his interest. Registration is required with the Register of Community Interests and needs to be renewed every 5 years.

Land Reform (Scotland) Act 2016

The Land Reform (Scotland) Act 2016 received Royal Assent on 22nd April 2016. Much of the detail is being dealt with through “Secondary Regulation”, which will take place over the next couple of years. The Act becomes “live” through a series of “Commencement packages”. The first two packages are now in place and cover widening of assignation and succession rights (1991 Act Tenancies).

Assignment

A tenant has the right to assign the interest in the tenancy to any one of the persons mentioned in a new subsection of the 1991 Act: *any person who would, or would in any circumstances have been, entitled to succeed to the tenant's estate on intestacy by virtue of the Succession (Scotland) Act 1964*. The landlord's right to withhold consent, if there are reasonable grounds for doing so, continues to remain in force, unless the person to whom the assignation is being made is a near relative. The following list shows who qualifies as a near relative:

- A parent of the tenant

- A spouse or civil partner of the tenant
- A child of the tenant
- A grandchild of the tenant
- A brother or sister of the tenant
- A spouse or civil partner of such a brother or sister
- A child of a brother or sister of the tenant
- A grandchild of a brother or sister of the tenant
- A brother or sister of the tenant's spouse or civil partner
- A spouse or civil partner of such a brother or sister
- A child of such a brother or sister
- A grandchild of such a brother or sister

Where the assignee to a tenancy is a near relative the grounds upon which the landlord can object are restricted to the following:

- That the person is not of good character
- That the person does not have sufficient resources to enable the person to farm the holding with reasonable efficiency
- That the person has neither sufficient training in agriculture nor sufficient experience in the farming of land to enable the person to farm the holding with reasonable efficiency

The provisions in relation to limited duration tenancies (LDT's) and Modern Limited Duration Tenancies (MLDT's) have been amended so that where the assignee is a near relative the grounds for objection are restricted to those mentioned above.

Succession

The succession provisions in relation to 1991 Act tenancies, repairing leases, LDT's and MLDT's are also made uniform.

The existing time limits to notify the landlord that a tenancy has been inherited remain in place. Where the lease permits a bequest of the tenant's interest, the tenancy must be accepted within 21 days of the death. In the case of intestate transfers, the deceased tenant's executors must transfer the tenancy to a suitable beneficiary within a year of the death. The beneficiary then has 21 days to notify the landlord that the acquisition has taken place. Where the successor, whether by bequest or on intestacy, is a near relative, the landlord has one month to object to the succession. However, the grounds of objection are limited to these to those listed in the previous section (character, resources and experience).

The 2016 Act abolishes the viable unit test in relation to the unit that is being inherited and it also removes the specific challenge that the successor is already in occupation of an independent viable unit elsewhere.

Landlord's Improvements

Tenants now have the right to object to improvements proposed by their landlord. The landlord has the right of appeal to the Land Court.

Diversification

There are new rules regarding the ability of a landlord to object to a tenant's diversification notice.

Amnesty for tenant's improvements

The tenant's improvements amnesty came into effect on 13 June 2017. This provides a 3 year window for tenants with 1991 Act Tenancies, SLDT's, LDT's and MLDT's. The tenant will be required to serve an "amnesty notice" on the landlord detailing improvements carried out by the tenant, prior to the legislation coming into force. The landlord will have certain grounds to object. Correctly registered improvements should be taken into account for way-go compensation. The amnesty could also prove important in determining the "Productive Capacity" of the farm for rent negotiations under the proposed new rent test.

The rules allow landlords and tenants to enter into amnesty agreements without following the procedures set out in the Act. The Scottish Land Commission has issued a code of practice to guide landlords and tenants through this process, please see:

<http://landcommission.gov.scot/tenant-farming/codes-of-practice/>

Irritancy for non-payment of rent

Irritancy Notices (a notice to quit) cannot be served for non-payment of rent on SLDT, LDT, MLDT & Repairing Tenancies unless a demand for payment within 2 months has been issued in writing by the landlord. This is not the case for 1991 Act Tenancies. For 1991 Act Tenancies, if rent is not paid, an Incontestable Notice to Quit can be served by the landowner (no rent demand is required).

Land Reform (Scotland) Act 2016 reforms that have not commenced (at the time of writing)

Modern LDT

A new tenancy is to be created, which will be known as a Modern Limited Duration Tenancy (MLDT), this will replace the current LDT. The tenancy will be for a minimum of 10 years and has many of the same features as the current LDT.

Repairing Tenancies

A Repairing Tenancy has a minimum term of 35 years. The lease requires the tenant during the "repairing period" to improve the land into a state capable of being farmed. The repairing period will last 5 years, or longer if agreement between landlord and tenant or it can be extended by the Land Court.

Tenants' rights to buy

The requirement for a 1991 Act Tenant to register a right to buy has been removed. Tenants will now have a pre-emptive right to buy if a landlord "proposes to transfer the land or any part of it to another person". Until

this section becomes live, the requirement for tenants to register their right with the Registers of Scotland continues. For more information see: <https://www.ros.gov.uk/>

Sale where landlord in breach

This provision allows a tenant to apply to the Land Court for an “Order of Sale” if a landlord fails to comply with an order or award of the Land Court, regarding a material breach of the landlord’s obligations in relation to the tenant. The “order of sale” gives the tenant the right to buy the land comprised in the lease through the tenant’s pre-emptive right.

Rent review (1991 Act Tenancies)

The rent is to be a “fair rent”, which is to be a move away from the “open market” rent which has operated over recent years. The “fair rent” is to take account of the productive capacity of the holding; the open market rent of any surplus residential accommodation provided by the landlord; and the open market rent of any fixed equipment provided by the landlord or any land forming part of the holding not used for agriculture.

In the absence of agreement on rents, either party may apply to the Land Court to determine the rent.

The Scottish Government has appointed a group to carry out rent modelling. The favoured model will then undergo “road-testing” prior to being implemented. In the interim period, the industry has agreed to hold rents to inflationary rises only, this is been overseen by the Tenant Farming Commissioner. This is a voluntary agreement, supported by the industry stakeholders.

Rent review (LDT’s, Modern LDT’s and Repairing Tenancies)

The rent is to be set under the same guidance as the 1991 Act Tenancies. If there is no rent review provision in the lease, or the lease stipulates upward or landlord only initiated rent reviews, the statutory alternative applies.

Relinquishing and assignation of 1991 Act Tenancies

This part of the Act allows a tenant to assign their tenancy for value to a person “who is progressing in farming” or a “new entrant”. The landlord has a right of pre-emption. If a tenant wants to go down this route, they must offer to relinquish the tenancy to the land owner in the first instance (it is independently valued). If the landlord does not accept the tenants notice to relinquish, the tenant may then assign the tenancy.

Tenanted agricultural land rental figures (Scotland)

The following tables show median rental values for agricultural land by farm type, by region and by tenancy agreement in Scotland for 2014-2016.

Rents for sub regions of Scotland (all agreements excluding crofts and seasonal lets):

	2014		2015		2016	
	£/ha	£/ac	£/ha	£/ac	£/ha	£/ac
North West	36	15	40	16	38	15
North East	99	40	99	40	98	40
South East	118	48	130	53	122	49
South West	64	26	72	29	73	30

Rents for farm type (all agreements excluding crofts and seasonal lets):

	2014		2015		2016	
	£/ha	£/ac	£/ha	£/ac	£/ha	£/ac
Cereals	132	53	133	54	142	58
General Cropping	132	53	146	59	140	57
Dairy	124	50	127	51	133	54
C&S Lowland	111	45	123	50	127	52
C&S LFA	46	19	44	19	50	20
Mixed	109	44	113	46	113	46
Pigs & Poultry	153	62	148	60	154	62

Rents for tenancy agreement types:

	2014		2015		2016	
	£/ha	£/ac	£/ha	£/ac	£/ha	£/ac
Crofts/Small L'holdings	2	1	3	1	3	1
1991 Act						
<i>LFA</i>	50	20	50	20	53	21
<i>nLFA</i>	124	50	129	52	135	55
<i>P'ship</i>	86	35	80	32	94	38
SLDT	103	43	114	46	112	45
LDT	98	42	94	38	94	38
Seasonal LFA	98	40	120	49	129	52
Seasonal nLFA	135	55	138	56	166	67

It must be noted that there will be a wide variation in rental values within each category illustrated above. Variables will include topology of the land, remoteness, length of tenancy, age of tenancy, facilities (e.g. houses, farm-buildings and equipment) included, and the amount of land rented. More detail can be sourced from the "Tenanted Agricultural Land in Scotland" publications produced by RESAS.

Space Requirements for Livestock and Storage

The following space requirements are included here as a guide (minimum area required) only. For livestock, appropriate welfare codes and quality assurance regulations should be referred to in all cases.

Cattle space requirements

<i>Liveweight (kg)</i>	Total floor area (m²/hd)						
	200	300	400	500	600	700	800
Beef cattle - solid floors	3.00	3.95	4.90	5.85	6.80	7.75	8.70
Beef cattle - slatted courts	1.10	1.50	1.80	2.10	2.30	2.50	-
Cow and calf - straw	-	-	-	6.65	8.00	-	-
Cow and calf - slats	-	-	-	2.50	3.00	-	-
Dairy cows - solid floors	3.00	3.95	4.90	5.85	6.80	7.75	8.70

<i>Liveweight (kg)</i>	Total floor area (m²/hd)					
	60	85	140	200	250	400
Calves - loose housed	1.10	1.80	2.40	3.00	-	-

<i>Liveweight (kg)</i>	Cubicle/pen dimensions (m)					
	Calve pens			Cow cubicles		
	< 60	60-80	350	500	600	800
Long	1.50	1.80	2.10	2.15	2.40	2.50
Wide	0.75	1.00	1.10	1.15	1.20	1.30

<i>Liveweight (kg)</i>	Trough/access length requirements (mm/hd)							
	100	200	300	400	500	600	700	800
Simultaneous feeding	350	400	500	550	600	650	700	700
Ad-lib feeding	150	150	150	170	220	260	300	340

Sheep space requirements

	Total floor area (m²/hd)		
	Hoggs	Pregnant ewes	Ewes w/ lambs
Sheep - bedded courts	0.75 - 0.90	1.00 - 1.40	1.80 - 2.20
Sheep - slatted courts	0.40 - 0.60	0.80 - 1.10	1.00 - 1.70

	Trough/access length requirements (mm/hd)	
	Hoggs (45-65kg)	Ewes (60-90kg)
Simultaneous feeding	300	450 - 500
Ad-lib feeding	100 - 125	120 - 225

Pig space requirements

<i>Liveweight (kg)</i>	Total floor area (m²/hd)						
	<10	10-20	20-30	30-50	50-85	85-110	>110
Group loose housed	0.15	0.20	0.30	0.40	0.55	0.65	1.00

<i>Liveweight (kg)</i>	Trough/access length requirements (mm/hd)						
	5	10	15	35	60	90	120
Restricted feeding	100	130	150	200	230	280	300

Poultry space requirements

Laying Hens		
Enriched Cages	Stocking density	750 cm ² (approximately 13 birds/m ²)
	Nest/perch length	150 mm/bird
	Feed trough length	120 mm/bird
Barn or free range	Stocking density	9 birds/m ²
	Minimum litter area	0.025 m ² /bird
	Nest/perch length	150 mm/bird
	Feed trough length	100 mm/bird
	Nest space (only)	120 birds/m ²
Free range	Range area	<2500 birds/ha

Broiler Chickens		
Conventional	Stocking density	<33 kg/m ²
	Possible with permission	>33 - <39 kg/m ²
Free range	Stocking density	27.5 kg/m ²
	Range area	1 m ² /bird
Organic fixed housing	Stocking density	21 kg/m ²
	Range area	4 m ² /bird
Organic mobile housing	Stocking density	30 kg/m ²
	Range area	2.5 m ² /bird

Storage space requirements for crops, feeds and manures

Product	Space requirement
Wheat - whole grain	1.35 m ³ / t
Barley - whole grain	1.45 m ³ / t
Oats - whole grain	1.95 m ³ / t
Oilseed rape	1.45 m ³ / t
Beans and peas (combined)	1.16-1.19 m ³ / t
Distillers dark grains	1.82 m ³ / t
Draff (highly variable)	0.95-1.25 m ³ / t
Potatoes - bulk	1.42-1.59 m ³ / t
Potatoes - boxes	2.00-2.30 m ³ / t
Turnips/swedes	1.80 m ³ / t
Farm yard manure	1.1 m ³ / t

Weight and dimensions of hay, straw and silage bales

The weight of baled forages can vary a lot depending on the material being baled, type of baler and packing density, so weighing a selection of bales, if possible, is the best estimate. Allowance should also be made for spoilage. The following table can be used as a guide.

Bale Type	Average weight (kg)		
	Hay	Straw	Silage
Round:			
1.20m x 1.20m	220-250	200-220	400-750
Rectangular:			
0.36m x 0.40m x 0.80m	19	16	36
0.40m x 0.46m x 0.90m	26	19	-
0.80m x 0.90m x 2.50m - mini hesston	290	250	350-650
1.20m x 1.30m x 2.50m - hesston	860	600	-
1.20m x 0.70m x 2.50m - quadrant	380	330	450-600
1.20m x 0.90m x 2.50m - 187	450	410	500

Silage density

To calculate the fresh weight of silage (tonnes) in pits (clamps) the following equation should be used:

$$\text{Silage (t FW)} = \text{pit volume (m}^3\text{)} \times \text{density (kg/m}^3\text{)}$$

The following table provides estimates for the density (kg/m³) for silages by considering the dry matter of the silage and the height of the pit. Grass, maize and wholecrop silages are of similar density.

Silage dry matter (%)	Clamp height (m)			
	2.0	2.5	3.0	4.0
20	780	840	890	950
25	690	730	775	830
30	620	660	690	740
35	570	600	625	670
40+	520	550	570	610

Source: DairyCo.

Water storage requirements

Water requirement for livestock and crops on farm will depend on various factors including animal size, feed intake, feed DM content, stage of production, crop type, rainfall, ground conditions, environmental temperature and management practices.

Significant volumes of water can be used on farm amounting to high water charges if metered mains water is the only water supply. The main water usage on farms includes, livestock drinking, dairy machinery (plate coolers), machinery (plant) and yard washing, crop spraying and irrigation and domestic use. There is potential to reduce annual water charges by investigating other water sources. These include boreholes, reservoirs (lagoons) and rain water harvesting. With increasing climate change concerns (for more information on climate change see pages 384-388), such systems will improve business efficiencies with both economic and environmental benefits.

There are pros and cons to alternative water sources and planning and preparation is important when investigating new systems. Monitoring

water use and ensuring there are no 'leaks' in the system (wastage, e.g. broken pipes, entry into slurry systems) is a key starting point. For further information on water use and for saving water on farms, see the following resources:

- <https://dairy.ahdb.org.uk/technical-information/buildings/housing/water-provision/#.WbK61P6WyM8>
- <http://beefandlamb.ahdb.org.uk/wp/wp-content/uploads/2016/03/BRP-plus-Rainwater-factsheet-080316.pdf>
- <http://www.ukia.org/>

Simple water storage tanks up to 10,000 litres cost in the region of £1,000 while a rain water harvesting system will be up to £2,600 for a large tank. These costs are ex VAT and do not include delivery and installation. For costs for reservoirs/lagoons see page 381. For all the systems it is important to source specialist advice on storage requirements, regulation (local council, SEPA and quality assurance), design specifications (including water filters and treatment equipment) and installation.

The data below may be useful to help calculate water storage requirements on farm. All livestock figures are given as the volume of drinking water for one animal of the type described.

Cattle	
Dairy cow (in milk)	75-125 litres/day
Dairy cow (dry)	40-75 litres/day
Suckler cow (spring calving)	16-34 litres/day
(autumn calving)	27-69 litres/day
Calves	5 litres/day
Store cattle	15-50 litres/day
Finishing cattle	25-75 litres/day
Bulls	30-80 litres/day

Sheep	
Pregnant ewe	3-6 litres/day
Rams	3-6 litres/day
Intensively finished lamb	2 litres/day

Pigs	
Newly weaned	1.0-1.5 litres/day
Up to 20kg	1.0-2.0 litres/day
20-40kg	2.0-5.0 litres/day
Finishing pigs up to 100kg	5.0-6.0 litres/day
Sows and gilts (pre-serve and in-pig)	5.0-8.0 litres/day
Sows and gilts (in lactation)	15.0-30.0 litres/day
Boars	5.0-8.0 litres/day

Poultry	
Pullets	0.09 litres/day
Laying hens - caged	0.19-0.20 litres/day
Laying hens - non caged	0.19-0.22 litres/day
Broilers	0.19-0.20 litres/day
Ducks	1.22 litres/day
Turkeys	0.45-0.71 litres/day

Hose wash	
High pressure hose - typical flow rate (pumped)	1-2 m ³ /hr
Volume wash hose - typical flow rate (pumped)	5-10 m ³ /hr
Mains fed tap (example)	2.5 m ³ /hr
General parlour usage	18-45 litres/cow

Crop irrigation		
Spray gun	to apply 25 mm of	250 m ³ /ha
Spray boom	water per ha	126 m ³ /ha
Drip tape		18 m ³ /ha

Planning Permission and Building Warrant

In all cases of building work or change of use, it is advisable to consult with the local planning authority or take professional advice before development progresses.

As a general rule, planning permission is required for all new developments and extensions including buildings, engineering, mining and other operations in, on, over or under land and for change of use of buildings or land.

Developments involving agriculture in Scotland require an approval from the local planning authority either in the form of planning permission or a more straightforward process known as a Determination of Prior Approval Notification. Scottish Planning Policy sets out the following requirements and fee structures:

Planning permission

Planning permission is always required if any of the following apply to the proposed development:

- a) carried out on farm holdings of less than 0.4 ha
- b) the construction, alteration or extension of a building (excluding permitted development)
- c) any buildings or works not designed for the purpose of agriculture
- d) the construction, extension or alteration of any building or structure or plant over:
 - i. 465 m² in area (this is calculated by adding the area of the proposed development and the area of any development within the

unit that is to occur or has occurred within the preceding 2 years and would be within 90m of the proposed development), or

- ii. 12 m in height, or
 - iii. 3 m in height where the building is within 3 km of an aerodrome
- e) within 25m of a metalled trunk or classified road
- f) the construction or carrying out of any works to a building used, or to be used, for housing intensive livestock or for storage of slurry or sewage sludge where that building is within 400m of a protected building (a building normally occupied by people but buildings which form part of a working farm or certain specialist industrial buildings).

From 1 June 2017, planning fees are as given below:

<i>Dwellinghouses</i>	
Planning permission in principle	
- dwellinghouse	£401 each (maximum 50 dwellinghouses)
Detailed planning permission	
- dwellinghouse	£401 each (maximum £20,050)
- enlargements, improvements or alterations to an existing dwelling house or flat and development within the cartilage of an existing dwelling house	£202
- erection or extension of buildings (other than dwelling houses or plant and machinery)	
- not exceeding 40m ²	£202
- 40-75m ²	£402
- 75-3,750 m ²	£401 for each 75 m ² (maximum £20,050)
- exceeds 3,750m ²	£200 for each 75 m ² (maximum £125,000)
- ancillary buildings, fences, walls, roads, carparks etc.	£202

<i>Agricultural buildings</i>	
Planning permission in principle	
- agricultural building (excluding glasshouses) based on area covered by development	£401 per 0.1 ha (maximum £10,028)
Detailed planning permission	
- buildings up to 465 m ² floor area	nil
- buildings 465 – 540 m ² floor area	£401
- each additional 75 m ² floor area > 540 m ²	£401 (maximum (20,055)
- erection, alteration or replacement of plant or machinery	
- not exceeding 5ha	£401 per 0.1 ha (maximum £20,050)
- in excess of 5ha	£200 per 0.1 ha (maximum £125,000)
- glasshouses used for agricultural purposes	
- ground area exceeding 465m ²	£2,321
- change of use	£401

Land	
Winning, working or storage of minerals and waste disposal	
- site area not exceeding 15ha	£202 per 0.1 ha (maximum £30,240)
- site area exceeds 15ha	£30,240 plus £100 for each 0.1ha (maximum £125,000)
Winning and working of peat	£202 per 0.1 ha (maximum £3,024)
Vehicular access, car parks, service roads for existing uses	£202
Other engineering or operations on land e.g. installation of floodlights, car parks, roads etc. not serving existing uses	£202 per 0.1 ha (maximum £2,016 for 1 ha or more)

Determination of Prior Approval Notification

The Town and Country Planning (General Permitted Development) (Scotland) Amendment (No. 2) Order 2014, grants permitted development rights for some developments subject to conditions. In order to determine if these rights apply an applicant must submit a Determination of Prior Approval Notification (DPA) to the planning authority who, within 28 working days, can ask for a full planning application to be made if it considers that the development is likely to have a significant impact on the surroundings.

Prior Approval Notification fee: £78.

Determination of Prior Approval Notification (DPA) is required if any of the following apply:

- a) build or significantly alter/extend agricultural or forestry buildings. A significant alteration or extension is one which would result in:
 - the cubic content of the original building being increased by more than 10%, or
 - the height of the building exceeding the height of the original building
- b) form or alter a private way
- c) carry out excavation or engineering operations in relation to a farm or forestry undertaking

Prior Notification and Approval in relation to Agricultural and Forestry Private Ways

The Town & Country Planning (General Permitted Development) (Scotland) Amendment (No.2) Order 2014 require that, prior to the formation, or alteration, of agricultural or forestry private ways the applicant must apply to the relevant planning authority for a decision on whether prior approval is needed before development begins.

No fee applicable.

Building warrant

A building warrant is a legal permit to protect people's health, safety and welfare. The requirements are set by the Building (Scotland) Regulations 2004. A building warrant is required before commencing most types of building and alteration work.

All agricultural buildings on agricultural land in Scotland are exempt from the need for a building warrant except for the following: buildings for retail purposes (including storage of goods or exhibiting); buildings over 280m² in area; buildings within 6m (or the equivalent of its height whichever is less) of a boundary, a dwelling, residential building, office, canteen, or visitor centre and a dungstead, slurry or farm effluent tank. Some non-agricultural buildings and extensions such as small garages and porches do not require a building warrant (refer to the Scottish Governments Non-Domestic Technical Handbook 2016 for further guidance, see <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech>).

In general terms, there is no building warrant requirement for agricultural buildings in England and Wales. There is a responsibility to check whether the development is compliant with building regulations which falls under Building Control Bodies. For further information, refer to online guidance found in: www.planningportal.gov.uk.

Fees payable with applications for building warrants depend on the estimated cost of the building. As from 1 July 2017, the fees are:

Building cost (£)	Fee
Up to 5,000	£150
5,001-20,000	£169 + £19 per every £500 thereafter
20,001-100,000	£593 + £63 per every £10,000 thereafter
100,001-500,000	£1,137 + £103 per every £50,000 thereafter
500,001-1,000,000	£3,272 + £178 per every £50,000 thereafter
1,000,001+	+ £253 for every additional £100,000 or part thereof
Amendment of warrant (if additional cost is less than original or increases by no more than £5,000)	£100
Extension to warrant	£100
Conversion only	£150
Demolition only	£150
Amendment of warrant for demolition or conversion only	£100
Application for late building warrant (where work has already started)	200% of the fees above
Application for late building warrant (demolitions only)	£200
Submission of a completion certificate (where no building warrant has been obtained)	300% of the fees above
Submission of completion certificate (demolitions or conversion only)	£300

It is worth considering that the fees above may be reduced where certificates from approved certifiers of design and construction are presented with a warrant application. Discount for each certificate that covers the whole of any section of the functional standards i.e. SER, BRE, RIAS and is provided with the warrant application:

Value of Work	Fee
Up to £5,000	£30
£5,001 - £9,000	£40
£9,001 - £15,000	£50
£15,001 - £20,000	£60
£20,001 - £50,000	£80
£50,001 - £100,000	£100
Over £100,001	10%

1% for each certificate covering a single item in any such section, all subject to a maximum discount of 60%.

Discount where certificate is provided with the completion certificate:
3% for each certificate covering an approved scheme i.e. electrical installation scheme or drainage, heating and plumbing scheme.

Value of Work	Fee
Up to £10,000	£15
£10,001 - £15,000	£20
£15,001 - £20,000	£25
£20,001 - £50,000	£30
£50,001 - £100,000	£35
Over £100,001	3%

20% for a single certificate covering the construction of the entire building, all subject to a maximum discount of 20%.

Guide to Building Costs

This section gives estimated costs for buildings erected by contractors to BS 5502. Costs are gross before deduction of any grant that may be payable. In practice, builders' estimates vary according to:

- site location, conditions and access
- area of the country
- specification and standard of finish of the building
- how familiar the contractor is with the type of work
- the contractor's current workload

Considerable savings can be made by 'do-it-yourself' work using farm staff or, in some cases, by using second-hand materials.

Building prices quoted by suppliers for 'Kits' or 'Packages' can refer to the superstructure only. This may account for only 40-60% of the total cost when substructure, services and site works are included. The 'kit' costs

may amount to an even lower proportion of the total cost, in highly specialist buildings.

Much farm building work includes conversion or alteration work to existing buildings. Costs for this are very difficult to estimate. The only way is to get builders' estimates on well-detailed drawings. A detailed appraisal of site conditions, services and existing building(s), together with a viable and appropriate specification, should be used as the basis for a reasonable estimate.

Costs below have been based on individual component costs and presented to give a guide based on a unit area. The costs include allowance for 'foundation' work but do not take account of possible variation and difficulties in site conditions (e.g. excavation or 'make up' and consolidation and haulage). Costs for equipment are based on suppliers' list prices and all costs are exclusive of VAT.

General buildings

<i>Dutch barn</i>	
<ul style="list-style-type: none"> ▪ Steel portal frame structure (4.8 m to eaves) ▪ Box profile steel roof sheeting ▪ Box profile steel cladding - one gable and one side ▪ Blinded hardcore floor 	£85 /m ²
<i>Storage building</i>	
<ul style="list-style-type: none"> ▪ Steel portal frame structure ▪ Concrete panel or concrete blockwork walls ▪ Box profile steel roof; side and gable cladding ▪ Concrete floor 	£140 /m ²

Cattle and sheep housing

<i>Straw bedded court; central feed pass</i>	
<ul style="list-style-type: none"> ▪ Steel portal frame structure ▪ Concrete panel or concrete blockwork walls ▪ Ventilated box profile steel or timber space-boarding on sides and gables ▪ Concrete floor 	£160 /m ²
<i>Slatted cattle court (shed 10m wide)</i>	
<ul style="list-style-type: none"> ▪ Reinforced concrete slurry tank (to 3.0 m depth) ▪ Concrete panel or concrete blockwork walls ▪ Ventilated box profile steel or timber space-boarding on sides and gables ▪ Reinforced concrete panel slats 	£550 /m ²
<i>Calf hutches</i>	£110-250 /calf
<i>Polytunnels</i> (ideal for sheep and young calves)	£10-15 /m ²

Slurry storage

Above ground circular storage (steel and concrete)

- Stores less than 1,000m³ £65 /m³
- Stores 1,500m to 2,500m³ £50 /m³
- Stores above 2,500m³ £45 /m³

Above/below ground rectangular concrete stores £80-130 /m³

Lagoons (not including earth lined)

- Total installed storage including fencing and gating but not slurry handling equipment £12-20 /m³

Silage clamps

Earth walls

- 3.0 m high, 1,000 t capacity, 1,400 m³
- Reinforced concrete floor with effluent collection system and tank

(In England and Wales, earth walled clamps are not permitted.)

£80 /t

Pre-cast concrete panel walls

- 3.0 m high, 1,000 t capacity, 1,400 m³
- Reinforced concrete floor with effluent collection system and tank

£90-120 /t

Cast in situ reinforced concrete walls

- 3.0 m high, 1,000 t capacity, 1,400 m³
- Reinforced concrete floor with effluent collection system

£90-130 /t

Roofed silage clamp

- as above £120-155 /t

Grain storage

- 1,000/1,200 t capacity
- Steel portal frame structure
- 3.0 m high precast concrete panel wall
- Box profile steel roof, side and gable cladding
- Reinforced concrete floor
- Excludes ducts or grain handling equipment

£150 /m²

Potato storage

- 1,000/1,200 t capacity, box storage system
- Steel portal frame structure
- Insulated box profile steel composite panel roof and wall cladding; reinforced concrete floor
- Environmental control equipment, fans etc.
- Excludes power connection costs which can be substantial

£300-370 /m²

Climate Change and the Environment

Introduction

The UK and Scottish Governments have long standing commitments to reduce greenhouse gas emissions and it is essential that agriculture plays its part. Emissions from Scottish agriculture have declined steadily in recent years and farmers have contributed to recent emissions reduction initiatives including the Farming for a Better Climate programme supported by the Scottish Government.

With the public support system for agriculture expected to change significantly following the UK's planned departure from the EU in 2019, there is the potential for agricultural support to be more closely linked to environmental improvement. This further supports making continued progress on reducing the farming sector's carbon emissions.

This section provides information on; agriculture and forestry and climate change, the Farming for a Better Climate programme and pollution and the environment.

Agriculture and Climate Change

Under the Climate Change (Scotland) Act (2009), Scotland must ensure that their net greenhouse gas (GHG) emissions are at least 42% lower than 1990 levels by 2020 and 80% lower by 2050. Although deemed to be ambitious at the time, in 2014 the interim target of 42% was met. Following this outcome new targets have been outlined by the Scottish Government and include an overall reduction of 90% by 2050 with an interim reduction of 66% by 2032.

With around 22% of GHG emissions in Scotland attributed to agriculture and related land use, the rural sector has an important role to play in helping Scotland achieve its targets. The challenge for the industry is therefore to produce more food with lower emissions.

The three main GHGs produced by agriculture and their sources include:

- Nitrous oxide (N₂O) which is released during the application of synthetic and organic fertilisers to the soil, from urine deposition by grazing animals, cultivations of soils and changes in land use and vegetation.
- Methane (CH₄) is produced as a natural by-product of enteric fermentation during ruminant digestion and, to a lesser extent from management of organic manure.
- Carbon dioxide (CO₂) is produced by burning fossil fuels such as coal, oil and diesel to produce energy.

The above emissions are typically displayed in terms of CO₂e (CO₂ equivalents) based on their relative global warming potential (GWP) over a 100 year period, see table below.

Expressing emissions as CO₂e allows bundles of GHGs to be quantified as a single number allowing year-on-year results to be easily compared.

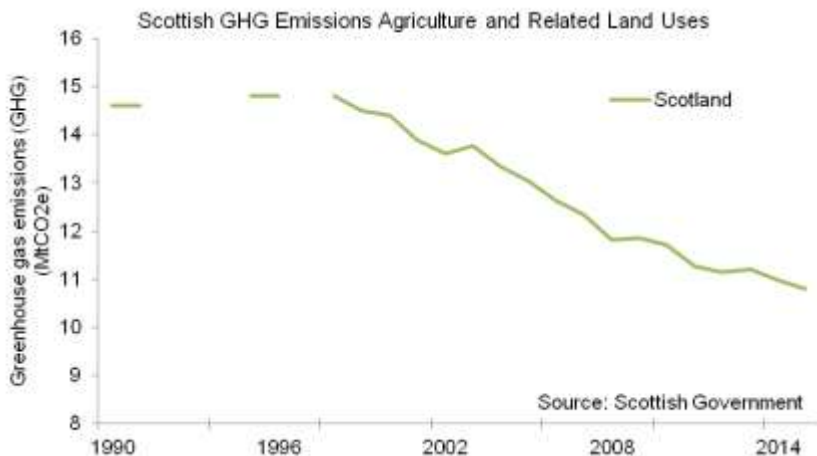
GHG	GWP multiplying factor /kg gas emitted
Carbon dioxide	x1 per kg emitted
Methane	x25 per kg emitted
Nitrous oxide	x298 per kg emitted

PAS 2050 (Source: IPCC 2007)

The following chart shows Greenhouse Gas Emissions from Agriculture and Related Land Use in Scotland between 1990 and 2015 and includes net emissions from cropland and grassland and emissions from livestock, agricultural soils, stationary combustion sources and off-road machinery.

In 2015 Scottish agriculture and related land use was estimated to contribute 10.8 MtCO₂e to Scotland's total net GHG emissions, a reduction of 0.18 MtCO₂e (-1.6%) compared to 2014 and a 3.8 MtCO₂e (25.8%) fall since 1990.

The gradual decline in emissions between 1998 and 2015 is attributed to improvements in practices on agricultural soils, reduced rate by which land has been converted to cropland and a decline in cattle and sheep numbers.



Steps by the industry to reduce GHG emissions from on-farm agricultural sources mainly focus on education and voluntary measures via initiatives such as Farming for a Better Climate (see pages 386-387). Several UK supermarkets and other commodity buyers request that their suppliers deliver lower carbon produce and the preparation of farm carbon audits is now incorporated into some of Scotland's Rural Development Programme Schemes (see 434-440). At the farm level, making more efficient use of resources (inputs) by managing animals, soils, waste and fertiliser better will reduce GHG emissions and save money.

Carbon foot-printing for farms

The amount of GHG emissions produced on-farm in a year can be determined using a carbon calculator. This measure of emissions is known as a carbon footprint, also referred to as a carbon audit or resource use efficiency audit and can be prepared for the whole farm, individual enterprises or products. Carbon calculators typically calculate total emissions and emission intensities (i.e. CO₂e per unit of output). Presenting emissions as an intensity allows changes in production to be taken into account as well as changes in total emissions.

Benchmarking the quantity and source of GHG emissions produced with similar livestock enterprises and crops highlights areas where mitigation actions could be targeted. As well as reducing emissions and benefiting the environment, mitigation can also present cost savings to the farmer. AgRE Calc©, SAC Consulting's Agricultural Resource Efficiency Calculator (www.agrecalc.com) is an available tool that will calculate emissions and benchmark the results against similar enterprises.

Farming for a Better Climate

Based on work with farmers, industry specialists and consultants, Farming for a Better Climate suggests practical tips and ideas to improve business efficiency, reduce GHG losses from the farm and adapt to changing climate.

Practical ideas, which can be easily developed and adapted to suit most farms, are grouped into five key action areas:

1. Optimise livestock management - improve livestock productivity through better grazing management and nutrition.
2. Optimise the application of fertilisers and manures - save through better utilisation of nutrients.
3. Locking carbon into soils and vegetation - protect soils and improve soil quality for future generations.
4. Using energy and fuels efficiently - reduce your spend on fuel and power.
5. Developing renewable energy - save on purchased energy and earn from surplus energy sold to the national grid and from renewable heat production incentives (pages 321-329).

As part of the Farming for a Better Climate initiative, SAC Consulting are working with volunteer Climate Change Focus Farms, forming farmer discussion groups across Scotland to trial and develop a range of practical solutions to reduce emissions and improve farm profitability. The Climate Change Focus Farms host on-farm meetings around five times a year to highlight practical measures and/or new technologies to improve both efficiency on the farm and reduce the farm carbon footprint.

For more information, including practical guides, farmer case studies, details of forthcoming meetings or to register for the free e-newsletter highlighting what other farmers are doing, email climatechange@sac.co.uk, visit www.farmingforabetterclimate.org, find Farming for a Better Climate on Facebook or follow on Twitter [@sacfarm4climate](https://twitter.com/sacfarm4climate).

Farming for a Better Climate is managed by SAC Consulting as part of the Farm Advisory Service. The Climate Change Focus Farms are funded by Scottish Government as part of their VAS (Veterinary and Advisory Services) legacy activities.

Forestry and Climate Change

Afforestation is one of the methods by which climate change reduction targets can be achieved. The Scottish Government's expectation is to see forestry expand to 25% of Scotland's land area by 2050.

Growing trees act as a carbon sink, sequestering carbon dioxide from the atmosphere and converting it to wood. This carbon remains locked away as long as the timber is used in construction, fencing or other wood products.

The permanent planting of trees (not Christmas trees) on agricultural land will result in net sequestration of carbon. Deep peats (greater than 50cm deep) should not be planted as peat itself sequesters carbon, and planting it with trees would cease its function as such.

For more information on forestry and woodlands see pages 288-304.

Carbon value

Tree planting on agricultural land will contribute to reducing a farms carbon-footprint, where:

- It is a permanent change in land use
- The planting conforms to the UK Forestry Standard
- The risks to the planting and the accuracy of sequestration predictions are considered

New woodland may qualify for payments under a carbon brokerage scheme (the Woodland Carbon Code – WCC), as long as additionality can be proven whereby it can be demonstrated that the creation of the woodland would not have happened without the assistance of the WCC.

Current payments for new planting range from £350 to £1,000/ha net dependent on species, contract period, location and management regime.

Wood fuel

Wood can be used as a renewable heat source and is usually sold to the customer as logs, chips or pellets. Woodland owners can sell smaller

sized roundwood as logs. Values vary according to whether the wood is soft wood (conifer) or hard wood (broadleaf); for log prices see page 291.

Standing and lying deadwood can be of considerable ecological value, it may also have a lower calorific value than 'live' wood. Where it is safe to do so, deadwood should be left in the forest.

Short Rotation Coppice (SRC) and Short Rotation Forestry (SRF) are both systems for producing woody biomass for renewable energy projects. For more information on these systems and biomass heating, see pages 321-324 and 328-329.

Woodland as pollution control

Native riparian woodland can provide an effective buffer against diffuse pollution. Woodland acts as a buffer reducing the risk of surface run-off, leaching, spray pesticide drift and fertilisers entering the watercourse. Trees can reduce the risk of erosion and when fenced can secure stock from entering the water courses.

Pollution and the Environment

If mis-managed, our activities can have a number of negative impacts on the environment. A range of legislative requirements are in place across all sectors to help to protect the environment.

A useful starting point for all businesses is NetRegs (www.netregs.org.uk) an initiative to help small businesses reduce pollution risks and improve their environmental performance. NetRegs has a section specific to agriculture providing free, clear guidance on environmental legislation. Issues covered in NetRegs include: agricultural waste, disposal of animal carcasses and oil storage.

Diffuse pollution

Scotland's water quality is generally good and water management has led to huge improvements in water quality over the last 50 years. However, diffuse pollution is now the largest source of pollution affecting Scotland's waters.

The Water Environment (Diffuse Pollution) (Scotland) Regulations are referred to as the Diffuse Pollution General Binding Rules (DP GBRs). These DP GBRs focus on rural land use activities and aim to protect and improve Scotland's water quality.

The DP GBRs state minimum working distances for activities bordering watercourses, such as, application of manures and slurry or in-field cultivation practices. More detail can be found on page 488.

The DP GBRs are the focus of a 'Know the Rules' pocket size guide and 'Mind the Gap' tractor sticker, available free from SAC Consulting offices.

Alternatively you can request free copies or download the information via www.farmingandwaterscotland.org

Further information on funding, environmental policies, statutory requirements and good practice guides can be found at the following websites:

- Agri-Environment Climate Scheme (AECS) includes information on funding for diffuse pollution and greenhouse gas mitigation measures: <https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/agri-environment-climate-scheme/>
- DARDNI: www.dardni.gov.uk/index/farming/countryside-management.htm
- Diffuse Pollution Priority Catchments: www.sepa.org.uk/environment/water/river-basin-management-planning/actions-to-deliver-rbmp/priority-catchments/
- Farming and Water Scotland; information to protect water quality and reduce pollution risks from routine practices: www.farmingandwaterscotland.org
- Pollution Prevention and Control (PPC) Regulations. Large pig and poultry units are covered by the PPC Regulations: www.sepa.org.uk/regulations/pollution-prevention-and-control/
- PLANET Scotland, free nutrient management computer software: www.planet4farmers.co.uk
- Prevention of Environmental Pollution from Agricultural Activity (The PEPFAA Code): Under development. For details see www.farmingandwaterscotland.org
- SEPA: www.sepa.org.uk

New Entrants

Introduction

New entrants to farming and the ideas and energy they bring are essential if the agricultural and rural sector is to adapt and thrive in the uncertain years that lie ahead. This section provides some vital information for those looking to get started in farming including; starting an agricultural business, business planning, financial planning and farming opportunities (such as share and contract farming). There are also links and sign posts to further information resources and initiatives supported by the Scottish Government's SRDP programme, the NFUS and Forestry Enterprise Scotland.

Starting Up an Agricultural Business

There are various and specific rules and regulations that must be adhered to when keeping farm livestock and managing land. The following information provides key points of contact and measures that need to be considered when starting up an agricultural business at any level.

Business registration

A new agricultural business should be registered with the Scottish Government Rural Payments and Inspections Division (SGRPID). This can be done online (<https://www.ruralpayments.org>), by completing a registering a business form or by contacting the local SGRPID office (<https://www.ruralpayments.org/publicsite/futures/topics/contact-us/>). To register a business the following information is required:

- Business details
- Responsible person
- Other personnel involved in the business
- Intention to keep livestock
- Land associated with the business
- Feed business details - for council/trading standards purposes

On completion and submission of the above information, the business will be allocated a unique Business Reference Number (BRN).

The land associated with the business will either have or be allocated a Main Location Code (MLC) which is a unique identification which encompasses numbers associated with the county, parish and holding location of the land.

Both the BRN and MLC are important identifiers when corresponding with various regulatory bodies.

Registering to keep livestock

When keeping livestock or if intending to keep livestock, the business must also register with the Animal and Plant Health Agency (APHA) (<https://www.gov.uk/government/organisations/animal-and-plant-health->

agency). This requires details about the keeper, the business, the type of animals and the land. The MLC of the business is required when registering with APHA, so the above SGRPID registration process needs to have been completed first. Registering with APHA allows for a unique flock/herd mark to be allocated. The flock/herd mark is required, by law, for animal identification and traceability. For more information on livestock traceability see pages 109-111.

Other registrations

Registering for tax, national insurance, PAYE, VAT with HM Revenue & Customs will also need to be considered. Advice from an accountant should be sought while some information can be found in the Taxation section on pages 468-486 or at:

www.hmrc.gov.uk/courses/syob/farm/index.htm

Registering with industry bodies such as quality assurance schemes, health schemes for livestock or farmers associations should be considered as part of good farming practice as well as helping to keep informed of regulation.

Compliance measures

Farmers and land managers must comply with various regulatory measures which are related to the environment, public health, animal health and welfare and plant health. There are two main measures of cross compliance which include Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Conditions (GAECs). Linked to these requirements, the following records should be held and/or submitted:

- Integrated Administration and Control System (IACS) Single Application Form (SAF)
- Nitrate Vulnerable Zone (NVZ) records
- Livestock registers
- Spray records
- Livestock medicine records
- Sheep annual inventory
- Agricultural survey and census returns

In addition and depending on the nature of the business, there may be other statutory requirements to consider including:

- HMRC - business annual taxation accounts, personal tax returns, VAT returns
- Employment - national insurance (NI), pay as you earn (PAYE), pensions
- Insurance - personal, employers, public
- Health and safety
- Quality assurance

Further information on many of the above points is available throughout the Farm Management Handbook.

Record keeping

Land managers and/or keepers of livestock are encouraged to keep records to, not only comply with regulation, but for management purposes to help monitor and improve business performance.

Additional records you may need to keep as a livestock keeper/land manager are:

- Nutrient management plan
- Farm waste management plan
- Crop records
- Livestock feed use records
- Property repairs inventory
- SEPA licences e.g. sheep dipping, waste disposal, water abstraction/irrigation
- Enterprise financial records

Business Planning

The most common reason for developing a business plan is to detail the financial viability of a business. For new entrants, business plans are commonly required when tendering for tenancies and/or seeking finance. Developing a business plan provides a potential landlord or lender with the knowledge that operational, personnel, marketing and financial aspects of the business have been considered thoroughly in order to make the business succeed.

A comprehensive business plan will address the financial viability of the proposed business, as well as describing how the other aspects of the business will operate. The financial section of a business plan should document current and expected income and expenses, along with the ability to repay any debts such as borrowings.

New entrants, or even well established farmers proposing a new enterprise, will find preparing and presenting a business plan very beneficial, as they communicate their ideas to lenders. Farmers now face the commercial reality of having to sell their produce into a market place that is linked into world supply and demand trends. This has shifted risk and potential reward onto farmers, who must now ensure they are producing a product the consumer wants and be able to negotiate a price above their cost of production, in order to secure a successful future.

Uncertainty will always be a feature of farming businesses. There are simply too many factors that are outwith control of the business. With this in mind, factoring sensitivity into the financial aspects of the business will show initiative. The impact of weather on livestock and crop yields and performance and the price of inputs and outputs are obvious factors to make note of.

A business plan should contain the following:

- An overview of the business - a description of the farm (land and buildings) and the enterprises practiced/planned.
- Information about the management team and staff – ownership, skills, experience, capabilities.
- Business objectives - short and long-term.
- Financial position and forecasts - likely profitability when fully established (worthwhileness) and annual budgets detailing expected cash flow, profitability and changes in equity in the years taken to establish the business (feasibility). A lender will also require a clear statement of capital provided at the outset alongside funding required.
- Marketing and sales strategy - planned approach of marketing and selling your chosen product(s).
- SWOT analysis - Strengths, Weaknesses, Opportunities and Threats that show an awareness of internal, external, personal, physical or financial influences and risks on the business.

Financial Planning

Financial analysis and planning is a key aspect of any agricultural business no matter what size. The finances help to provide an overview of what has happened over the period of analysis or when budgeting what is going to happen.

The key points to consider are:

- Profit (loss) - this is used to express annual financial performance as part of the profit and loss account at one point in the financial year showing trading output (adjusted for valuations) less inputs (adjusted for valuation changes). The profit before depreciation is available to cover drawings, tax, and capital investment (the “cash needs” of the business).
- Capital - the net worth is shown on the balance sheet giving a snapshot of the assets and the liabilities of the business at one point in the financial year. Assets should be based on market values to provide a true estimate of net worth.
- Cash - cashflow gives a clear indication, on an ongoing basis throughout the year, of the business bank account and, unlike the profit statement, includes VAT and is not adjusted for valuation changes, debtors, creditors, personal and capital transactions.

Whole farm budgeting

Taking into account farm enterprise information (either historical or predicted using the Farm Management Handbook), a business can benchmark both technically and financially. This information in conjunction with the financial descriptions for profit, capital and cash should help a business to prepare a whole farm budget.

A whole farm budget acts as a model of the business predicting income and expenditure over a period (usually the 12 months of the financial year of the business) and this can be monitored against actual income/expenditure during the year. This information allows the business to analyse performance and to make decisions about future strategies.

Some basic budgeting features are shown in the following text. Any figures that are presented in a budget must be supported by clear assumptions adjusted for sensitivities where applicable.

Profit (loss)

The trading profit and loss account of a business is often expressed in the following format:

OUTPUT
less
VARIABLE COSTS
equals
GROSS MARGIN
less
FIXED COSTS
equals
NET PROFIT/LOSS

Monetary values under the above headings do not necessarily represent all or exact cash transactions through the bank. The profit and loss account also includes adjustments for valuations, debtors, creditors, depreciation, personal income or expense, and capital transactions. Further definitions can be found on pages 1 and 2 while financial data for particular farm types can be found on pages 404-424.

Capital

The capital position of the business is shown by the balance sheet in the following format:

ASSETS
(e.g. land/buildings/machinery valuations, cash at hand, stocks, debtors)
less
LIABILITIES
Long/medium term and Current
(e.g. loans/mortgages, overdraft, hire purchase, other creditors)
equals
NET WORTH or OWNER EQUITY

The net worth of the business is essentially the value of assets available to the business after all liabilities have been cleared. When the net worth

is valued against the total assets as a percentage, the resultant figure gives a clear indication of the business' capital position.

Cash

It is vital to know the cash position of the business as this relates to the bank balance. The cashflow considers the cash values of sales and expenses that would appear in the profit and loss account. In addition, the cashflow also takes into account cash items such as personal drawings, tax payments, and capital repayments for loans and hire purchases. The opportunity to save for future reinvestment can be identified by taking account of the cash needs of the business.

Financial targets and benchmarks

As well as technical enterprise performance targets/benchmarks, such as yield and lambing/calving percentages, a farm business will have financial targets/benchmarks that it should consider while analysing performance or planning.

Analysis of the profit and loss account is an ideal starting point to prepare business figures to allow comparison to industry benchmarks. Businesses should analyse and present their accounts in a similar format to that presented below allowing an easy comparison. The whole figures under each analysis heading, e.g. variable costs, can then be converted to a Gross Output Analysis (GOA) which takes output at 100% and each analysis heading is divided by the output and multiplied by 100 to get a percentage. Current GOA targets are:

	Dairy	General (excl. pigs and poultry)
Output	100%	100%
Variable costs	< 40%	< 30%
Gross margin	> 60%	> 70%
Fixed costs	< 30%	< 45%
Profit	> 30%	> 25%

Pig and poultry farms are similar to dairy farms in that they typically generate high output, high variable costs (because of feed costs) and relatively low fixed costs owing to high output or turnover.

The Whole Farm Data figures on pages 404-424 are industry figures based on real farms thus provide an ideal starting point for benchmarking. A business should consider the average to high performing categories as the main goal. Nevertheless, due to the nature of farming and the varying characteristics (e.g. geography, land quality, local climate, type of stock, etc.) that influence performance, a flexible approach should be taken when benchmarking. Once a farm is up and running and has its own data, benchmarking internally will provide additional information to help assess performance.

Other benchmarks used to ascertain business performance and sustainability are related to the capital aspects of the business such as:

Percentage owned/owner equity:

- owner occupier > 60%
- tenant > 50%

Lenders, such as banks and mortgage companies, will consider, in addition to those described above, several other factors and benchmarks when analysing business performance and assessing ability to service loan funding.

Farming Opportunities

Business structure

The most appropriate business structure for a new rural business depends on the plans for the business, the people involved and issue of land tenure. This will result in different legal and taxation implications, meaning professional advice is recommended from the outset.

There are three common types of business structure:

- Sole trader - This is the simplest form of business since it can be established without legal formality. However, the business of a sole trader is not distinguished from the proprietor's personal affairs.
- Partnership - A partnership is similar in nature to a sole trader but because more people are involved it is advisable to draw up a written agreement and for all partners to be aware of the terms of the partnership. As for a sole trader, the business and personal affairs of the partners are not legally separate. A further possibility is to use what is known as a Limited Liability Partnership (LLP).
- Company - The business affairs are separate from the personal affairs of the owners, but this entails compliance with greater regulations.
- The appropriate structure will depend on a number of factors, including consideration of taxation implications, the legal entity, ownership and liability.

In addition to the above, there are other business formations that can be considered.

Joint ventures

Farmland tends to have a high asset value relative to its income earning potential. Land purchase can, therefore, be a substantial financial barrier to entry for aspiring farmers and expanding businesses alike.

There are various mechanisms currently available to facilitate a step onto the farming ladder including a range of rental arrangements and joint ventures. Traditional formal tenure arrangements (see pages 364-369) are covered by Scottish legislation, but there is growing interest in joint ventures as an alternative route to farming. These include:

- Contract farming
- Share farming
- Business equity partnerships

A joint venture can be considered to be some form of co-operation, formed in a legal manner, between two or more parties to form a business relationship, other than as landlord and tenant. There are various benefits and reasons for the creation of these collaborative agreements including sharing risk, improving return on capital through combined resources and expertise and accelerated growth. They can also avoid the need to create a formal farm tenancy. Examples of common circumstances in which joint ventures can be beneficial include:

- Land coming back in-hand after being let out. The owner may be inexperienced but wishes to retain vacant possession.
- The farm may not be large enough to be a viable holding on its own.
- The farmer may wish to release equity.
- To obtain economies of scale through splitting the cost of farming with others.
- The business may be in need of large capital investment.
- The owner may want to retire, not having a natural successor, but not ready to sell.
- There may be a substantial tax advantage.

Genuine joint venture agreements work well but must be more than a written document. In practice, it is important for both parties to abide by the governing rules in order to retain the advantages (including tax benefits) and avoid it being construed as an alternative legal entity such as a tenancy, partnership, or employer/employee relationship.

Contract farming

A standard Contract Farming Agreement (CFA) is the terms of understanding between two parties. That is, a landowner/occupier (known as the “farmer”) who has engaged the services of another (known as the “contractor”) to undertake farming operations over a fixed period (typically 3 to 5 years) on pre-arranged terms – it may be more simply understood as farming with contractors.

The farmer normally provides the land, buildings, fixed equipment (if required or agreed), a dedicated bank account, pay the required bills, finance to administer the agreement, and any farm knowledge. For this, they will receive what is commonly termed a basic retention/fee. This is agreed with the contractor in advance of the start of the agreement.

The contractor provides the labour, machinery (including its incurred costs) and management expertise. The contractor could be a neighbouring farmer, large farming company or traditional contractor. For this, they receive a basic contractor’s fee (usually quarterly or half-yearly).

Either party, via a separate livestock hire agreement, can supply breeding livestock (if applicable). Both parties agree farming policy and the share of any divisible surplus in advance and meet regularly throughout the duration of the agreement to make management decisions and monitor progress.

Share farming

Share farming is an arrangement between two independent businesses. It is often confused with contract farming but there are some differences, for example:

- They are two entirely separate businesses working the same land.
- As separate businesses they share the value of the farms output (typically sales) rather than a fee plus share of net profit.

There is no standard share farming agreement. The details are a matter for the parties involved but each party needs to bring complementary resources and skill sets. The share farming structure is not as popular as contract farming in the UK but is commonplace in New Zealand. It is possible to start as a share farmer with only a small share then progressively build equity share (within the terms of the agreement) until owning most or all of the stock and/or equipment. There are three conceivable paths for the agreement:

1. It may be a step towards farm succession.
2. If agreed, share farmer equity in livestock could be increased on renewal of the agreement.
3. Terminate the agreement:
 - a. allowing the share owner to follow an alternative plan.
 - b. to allow the share farmer to buy into another or larger farm.
 - c. liquidate to enable the share farmer to purchase their own farm and likely become a share owner.

Typically, the share owner/occupier provides the land, buildings, fixed equipment, fixed machinery, major maintenance of buildings and expertise along with paying a certain percentage of certain input costs. The share farmer/operator will provide the working machinery, moveable equipment, and technical ability and pay the balancing cost of inputs. Livestock are usually held in undivided shares. Output and certain input costs (direct costs) are split using pre-agreed allocations.

Equity partnerships

An equity partnership is an alternative way to invest in farming for those who are unable to finance a farm tenancy or ownership as an individual. It can also be an opportunity for outside investors and for existing farmers to grow their business. It may also benefit those wanting to release capital from land for alternative investments or allow partial retirement as part of a structured succession, particularly with non-family members.

An equity partnership is most likely formed as a company, with potentially multiple investors. These shareholders will pool their capital (equity), and

possibly skills or resources, in the aim of generating higher investment growth. The company will identify and assess an investment option, purchase the land, livestock plus necessary machinery and plant. This is funded through shareholder equity and bank debt, borrowed by the company.

There are various structures and the most appropriate will depend on the type of investor. Often one of the partners is employed as the farm manager, known as an equity manager. The board of directors will run governance. Each partner normally appoints one director to the board. This works well provided directors have the necessary and complementary skills. This responsibility or process can be contracted out, particularly where investor(s) are time limited, remote from the operation or opt to be a 'sleeping partner'.

For all joint ventures, clarity of the mechanics of the systems and all associated advantages and disadvantages to the parties involved must be made prior to delving into such agreements. Investment in advice from legal and financial specialists is highly recommended.

New Entrants Initiatives

Forest Enterprise Scotland (FES)

FES objective to integrate farming and forestry have created opportunities for new entrants to agriculture through their Starter Farms and Starter Business Units.

There are currently nine starter farms from Caithness to Dalbeattie on Scotland's National Forest Estate. The units vary in size, but the model includes farms covering approximately 110 acres of agricultural land. These are leased out on 10-year SLDT agreements to the new entrants. The applicants undergo a rigorous competitive application process including completing a business plan with cash flow projections, completing a series of questions including motivation, income plans, health and safety, training, farming policy, etc. Shortlisted candidates are then called for interview and will face a panel of 5-6 people ranging from FES, local farmer, bank representative and a local Scottish Government representative.

There are also numerous starter business units. A starter unit provides agricultural grazing opportunities to new entrants. There is generally no house or buildings associated with them. The resources and conditions vary with site and will have a focus of enhancing the FES environmental objectives.

More details on the FES starter farm initiative can be found at:
<http://scotland.forestry.gov.uk/supporting/grants-and-regulations/farm-woodlands/starter-farms>

NFU Scotland

NFU Scotland runs a New Generation committee. The group is composed of both new and young farmers from across Scotland. The committee provides a voice for people who are young and new to farming. The group champions getting new and young farmers into the sector. They hold four meetings a year around the country and have a regional structure, which elects representatives.

Scottish Government assistance

The Scottish Government is extremely supportive in encouraging the next generation to farming, and to overcome barriers.

The Scottish Rural Development Programme (SRDP) includes three dedicated funding streams including:

- Young Farmers Start-Up Grant Scheme
- New Entrants Start-Up Grant Scheme
- New Entrants Capital Grant Scheme

More details on the above schemes can be found at:

<https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/new-entrants/> or in the Rural Aid Schemes section on pages 426-454.

The SRDP Farm Advisory Service (FAS) has a dedicated site for new entrants. The FAS provides information and resources aimed specifically at new entrants to farming across Scotland as well as grant support for one-to-one mentoring and specialist advice from experienced peers. For details see page 439 or <https://www.fas.scot/topic/new-entrants/>.

Scottish Government also formed a New Entrants Group to develop and coordinate a Farming Opportunities for New Entrants programme (FONE) aimed at identifying publically owned land that could be released for new entrants to farming, see the below web link for details: <http://www.gov.scot/Topics/farmingrural/Agriculture/NewEntrantsToFarming/meeting5a>

Whole Farm Data

Introduction

This section provides whole farm benchmarking data for typical farm types in England and Scotland.

Benchmarking is a valuable tool to appraise the financial performance of a business year on year, or in relation to the wider industry. In addition, the benchmarks in the following pages, particularly the fixed costs, when used in conjunction with the livestock and crop gross margin budgets shown earlier in the Farm Management Handbook are useful to budget potential future business plans.

Source of Contents for 2017

The data for England and Scotland has been produced using information from the Farm Business Survey 2015/16 (conducted by six University Research Centres in England) and the Farm Accounts Survey 2015/16 (conducted by SRUC in Scotland).

Data has been sourced from the publications listed below:

- Farm Accounts in England 2015/2016, *December 2016*
- Farm Performance in Scotland 2015 Crop Year, *April 2017*

Full information can be found at:

- <https://www.gov.uk/government/statistics/farm-accounts-in-england>
- <https://www.fas.scot/publications/farm-performance-scotland-201516-whole-farm-benchmarks/>

England

The data represented in the following tables shows **2015/16** information presented by performance band rather than farm size. Farms are allocated to performance bands according to the output and input values for farm type. The performance bands reported represent the top 25 per cent (higher) and bottom 25 per cent (lower) against the average for the farm type. This data is seen to be useful when benchmarking.

English data is expressed as Farm Business Income (FBI). FBI reflects actual incomes of farm businesses and is, in most cases, very similar to net profit. FBI is the gross margin less the sum of the fixed costs, less BPS and net margin from diversification enterprises that use farm resources.

The tables present the data on a £ per farm basis. In addition, FBI has been presented as £/ha or £/100 ewes.

Scotland

The benchmark data for Scotland is shown in the following tables for the upper 25% performing farms per farm type. Where less than 40 farms were surveyed no upper 25% benchmarks are calculated.

The Scottish data is shown as a profit figure. This is based on management principles rather than those used for tax accountancy purposes.

The data is represented on a £ per farm, £ per 100 ewe equivalents, £ per adjusted hectare, and % per output basis.

Average benchmarks for each farm type as well as more detailed physical and technical data are published on the FAS website, see link on page 404.

Description of Farm Types

The farm types are characterised with reference to EC typology.

The data for the farm types in England is measured and represented by standard output (SO). The data for farm types in Scotland, shown in the following pages, are distinguished by standard gross margin (SGM).

Note: Scottish data excludes specialist pig, specialist poultry and horticulture. English data excludes specialist sheep and specialist beef.

England farm types

LFA grazing livestock farms: Farms with 50% or more of total area in the less favoured area and with more than two-thirds of the total SO coming from sheep and beef cattle together.

Lowland grazing livestock farms: Farms with less than 50% of total area in the less favoured area and with more than two-thirds of the total SO coming from sheep and beef cattle together.

Dairy farms: Farms where more than two-thirds of the total SO comes from dairy cows, including followers.

Cereal farms: Farms where cereals, oilseeds, peas and beans harvested dry and land set a side account for more than two-thirds of the total SO.

General cropping farms: Farms with more than two-thirds of the total SO coming from arable crops (including field scale vegetables) or a mixture of arable and horticulture crops; and where arable crops account for more than one third of total SO and no other group account for more than one third.

Pig farms: Farms with more than two-thirds of the total SO coming from pigs.

Poultry farms: Farms with more than two-thirds of the total SO coming from poultry.

Horticulture farms: Other farms where more than two-thirds of the total SO comes from fruit, hardy nursery stock, glasshouse flowers and

vegetables, market-garden-scale vegetables and outdoor bulbs and flowers.

Mixed farms: Farms where no enterprise contributes more than two-thirds of the total SO and includes a mixture of cattle and sheep and pigs and poultry.

Scotland farm types

Specialist sheep (mainly hard hill): Farms in the less favoured areas with more than two-thirds of the total SGM coming from sheep.

Cattle and sheep (LFA): Farms in the less favoured areas with more than two-thirds of the total SGM coming from beef cattle and sheep together.

Specialist beef (LFA): Farms in the less favoured areas with more than two-thirds of the total SGM coming from cattle.

Lowland cattle and sheep: Farms mainly not in the less favoured areas with more than two-thirds of the total SGM coming from beef cattle and sheep together.

Dairy: Farms where more than two-thirds of the total SGM comes from dairy cows.

Specialist cereals: Farms where more than two-thirds of the total SGM comes from cereals and oilseeds.

General cropping: Farms where more than two-thirds of the total SGM comes from all crops.

Mixed: Farms where no enterprise contributes more than two-thirds of the total SGM.

Definition of Terms

Enterprise output

Returns for an enterprise plus transfers out and the value of produce used or consumed for which no cash is receivable (by the business) less expenditure on, and transfers in of livestock. Agri environmental payments have been detailed in the English data however this was not available for Scotland. Subsidy output and diversification surplus is shown separately from enterprise output.

Variable costs

Those costs, which can both be readily allocated to a specific enterprise and will vary in approximately direct proportion to changes in the scale of that enterprise. Examples of variable costs are:

- Seeds, fertilisers and lime
- Sprays and sundry crop expenses
- Concentrate feeding stuffs (purchased or home-grown)

- Sundry livestock expenses (purchases of livestock are not treated as variable costs but deducted in the calculation of the appropriate enterprise outputs)

Gross margin

Total farm output less the sum of variable costs of the enterprises comprising the business.

Fixed costs

Examples of fixed costs include:

- Labour - regular and casual labour.
- Power and machinery - repairs, fuel (including drying fuel), oil, electricity, contracting, crop and livestock haulage and leasing and hire.
- Overheads - property repairs, rates, insurance, and miscellaneous (e.g. office).
- Depreciation * - machinery and property depreciation
- Rent and finance - interest (bank, HP and loans) and rent (excluding keep)

* *Machinery depreciation is calculated on a replacement cost basis. Rates of depreciation are intended to reflect the degree of deterioration of the asset.*

England - LFA Grazing Livestock Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	29,700	63,700	74,800
Crops	800	2,500	2,900
Agri-environment	2,300	10,600	23,500
Other	1,300	3,200	3,600
	<u>34,100</u>	<u>80,000</u>	<u>104,800</u>
VARIABLE COSTS			
Livestock specific costs	14,200	29,600	29,900
Crop specific costs	3,200	6,300	6,400
Contract costs	2,400	3,600	4,300
Casual labour	800	1,800	2,000
Sundry costs	82	172	184
	<u>20,682</u>	<u>41,472</u>	<u>42,784</u>
GROSS MARGIN	<u>13,418</u>	<u>38,528</u>	<u>62,016</u>
FIXED COSTS			
Labour	800	1,796	7,800
Power and machinery	10,574	17,382	17,000
Overheads	14,200	22,800	23,100
	<u>25,574</u>	<u>41,978</u>	<u>47,900</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>-12,156</u>	<u>- 3,450</u>	<u>14,116</u>
BPS	7,500	17,200	28,000
Diversification surplus	500	1,300	5,800
FARM BUSINESS INCOME	<u>- 4,156</u>	<u>15,050</u>	<u>47,916</u>
Farm Business Income £/ha	<u>- 62</u>	<u>110</u>	<u>226</u>
No. of farms in sample	34	116	75
Average farm size (ha)	67	137	212
No. of ewes	130	399	478
No. of breeding cows	20	28	29

England - Lowland Grazing Livestock Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	28,300	48,100	85,200
Crops	3,800	8,300	11,900
Agri-environment	1,900	4,700	8,800
Other	3,000	3,900	7,500
	<u>37,000</u>	<u>65,000</u>	<u>113,400</u>
VARIABLE COSTS			
Livestock specific costs	14,900	19,800	29,600
Crop specific costs	5,100	6,700	9,000
Contract costs	4,400	4,600	7,600
Casual labour	400	800	2,400
Sundry costs	54	179	161
	<u>24,854</u>	<u>32,079</u>	<u>48,761</u>
GROSS MARGIN	<u>12,146</u>	<u>32,921</u>	<u>64,639</u>
FIXED COSTS			
Labour	2,726	3,217	5,613
Power and machinery	14,617	14,217	19,578
Overheads	18,100	21,397	29,100
	<u>35,443</u>	<u>38,831</u>	<u>54,291</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>-23,297</u>	<u>- 5,910</u>	<u>10,348</u>
BPS	8,200	11,700	19,800
Diversification surplus	2,200	3,900	13,000
FARM BUSINESS INCOME	<u>-12,897</u>	<u>9,690</u>	<u>43,148</u>
Farm Business Income £/ha	<u>- 179</u>	<u>111</u>	<u>288</u>
No. of farms in sample	49	133	103
Average farm size (ha)	72	87	150
No. of ewes	62	154	271
No. of breeding cows	17	23	26

England - Dairy Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	242,300	428,800	549,300
Crops	15,900	33,200	13,300
Agri-environment	3,300	5,000	3,900
Other	5,000	7,400	6,200
	<u>266,500</u>	<u>474,400</u>	<u>572,700</u>
VARIABLE COSTS			
Livestock specific costs	137,200	206,800	206,100
Crop specific costs	22,700	37,700	30,600
Contract costs	16,600	29,500	25,100
Casual labour	6,300	7,500	7,600
Sundry costs	127	284	546
	<u>182,927</u>	<u>281,784</u>	<u>269,946</u>
GROSS MARGIN	<u>83,573</u>	<u>192,616</u>	<u>302,754</u>
FIXED COSTS			
Labour	27,602	42,633	45,008
Power and machinery	44,112	59,217	53,619
Overheads	60,082	91,175	86,250
	<u>131,796</u>	<u>193,025</u>	<u>184,877</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>- 48,223</u>	<u>- 409</u>	<u>117,877</u>
BPS	14,800	23,400	21,900
Diversification surplus	4,000	5,100	6,400
	<u>- 29,423</u>	<u>28,091</u>	<u>146,177</u>
FARM BUSINESS INCOME	<u>- 29,423</u>	<u>28,091</u>	<u>146,177</u>
Farm Business Income £/ha	<u>- 260</u>	<u>170</u>	<u>968</u>
No. of farms in sample	70	123	62
Average farm size (ha)	113	165	151
No. dairy cows	119	175	219

England - Cereal Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	5,500	12,200	2,900
Crops	115,800	176,600	218,100
Agri-environment	4,000	7,800	9,000
Other	10,009	21,219	32,800
	<u>135,309</u>	<u>217,819</u>	<u>262,800</u>
VARIABLE COSTS			
Livestock specific costs	3,300	6,600	1,800
Crop specific costs	60,900	82,900	87,200
Contract costs	11,300	14,200	24,300
Casual labour	1,400	1,800	2,700
Sundry costs	282	1,000	3,400
	<u>77,182</u>	<u>106,500</u>	<u>119,400</u>
GROSS MARGIN	<u>58,127</u>	<u>111,319</u>	<u>143,400</u>
FIXED COSTS			
Labour	11,495	16,600	9,956
Power and machinery	38,737	48,300	37,053
Overheads	51,733	63,576	62,388
	<u>101,965</u>	<u>128,476</u>	<u>109,397</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>- 43,838</u>	<u>- 17,157</u>	<u>34,003</u>
BPS	21,000	32,400	37,200
Diversification surplus	4,700	13,200	30,900
FARM BUSINESS INCOME	<u>- 18,138</u>	<u>28,443</u>	<u>102,103</u>
Farm Business Income £/ha	<u>-119</u>	<u>131</u>	<u>427</u>
No. of farms in sample	82	183	95
Average farm size (ha)	152	217	239
Cereals (ha)	82	114	122

England - General Cropping Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	4,600	13,600	15,300
Crops	70,500	305,100	555,900
Agri-environment	3,800	5,600	27,400
Other	6,200	23,600	49,234
	<u>85,100</u>	<u>347,900</u>	<u>647,834</u>
VARIABLE COSTS			
Livestock specific costs	2,100	7,300	6,000
Crop specific costs	34,100	117,500	187,400
Contract costs	4,500	17,800	50,700
Casual labour	900	11,400	12,500
Sundry costs	25	1,193	4,600
	<u>41,625</u>	<u>155,193</u>	<u>261,200</u>
GROSS MARGIN	<u>43,475</u>	<u>192,707</u>	<u>386,634</u>
FIXED COSTS			
Labour	7,800	47,500	60,300
Power and machinery	24,382	67,231	93,300
Overheads	34,100	90,700	154,100
	<u>66,282</u>	<u>205,431</u>	<u>307,700</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>- 22,807</u>	<u>- 12,724</u>	<u>78,934</u>
BPS	12,500	31,100	70,200
Diversification surplus	- 300	16,700	36,200
FARM BUSINESS INCOME	<u>- 10,607</u>	<u>35,076</u>	<u>185,334</u>
Farm Business Income £/ha	<u>- 114</u>	<u>162</u>	<u>393</u>
No. of farms in sample	18	79	46
Average farm size (ha)	93	216	472
Cereals (ha)	42	95	162
Potatoes (ha)	2	8.5	17
Other crops (ha)	26	54	169

England - Specialist Pig Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	-	543,000	553,500
Crops	-	50,400	49,000
Agri-environment	-	4,200	2,700
Other	-	7,416	16,900
	-	605,016	622,100
VARIABLE COSTS			
Livestock specific costs	-	391,600	274,900
Crop specific costs	-	21,800	12,500
Contract costs	-	19,000	16,800
Casual labour	-	3,700	2,300
Sundry costs	-	76	-
	-	436,176	306,500
GROSS MARGIN			
	-	168,840	315,600
FIXED COSTS			
Labour	-	66,900	64,569
Power and machinery	-	52,717	67,409
Overheads	-	81,900	86,554
	-	201,517	218,532
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>			
	-	- 32,677	97,068
BPS			
BPS	-	12,400	15,000
Diversification surplus	-	6,900	6,900
FARM BUSINESS INCOME			
	-	- 13,377	118,968
Farm Business Income £/ha			
	-	- 157	1,044
No. of farms in sample			
	-	35	19
Average farm size (ha)			
	-	85	114
No. of sows			
	-	269	287
No. of other pigs			
	-	2,868	4,672

England - Specialist Poultry Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	468,700	819,100	1,316,100
Crops	4,800	39,300	39,600
Agri-environment	1,600	2,100	1,500
Other	26,200	8,100	6,000
	<u>501,300</u>	<u>868,600</u>	<u>1,363,200</u>
VARIABLE COSTS			
Livestock specific costs	273,100	525,300	727,000
Crop specific costs	3,300	18,500	17,800
Contract costs	8,200	13,700	12,400
Casual labour	12,700	3,300	3,900
Sundry costs	2	19	106
	<u>297,302</u>	<u>560,819</u>	<u>761,206</u>
GROSS MARGIN	<u>203,998</u>	<u>307,781</u>	<u>601,994</u>
FIXED COSTS			
Labour	92,900	76,600	78,642
Power and machinery	35,005	63,508	79,787
Overheads	136,032	151,176	140,973
	<u>263,937</u>	<u>291,284</u>	<u>299,402</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>- 59,939</u>	<u>16,497</u>	<u>302,592</u>
BPS	3,900	7,600	8,900
Diversification surplus	6,200	49,600	13,900
FARM BUSINESS INCOME	<u>- 49,839</u>	<u>73,697</u>	<u>325,392</u>
Farm Business Income £/ha	<u>- 1,424</u>	<u>1,249</u>	<u>4,785</u>
No. of farms in sample	20	41	26
Average farm size (ha)	35	59	68
No. hens and pullets in lay	46,280	14,423	9,211
Other poultry	3,399	59,297	132,713

England - Horticulture Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	2,500	800	3,100
Crops	27,300	252,300	585,100
Agri-environment	1,100	2,400	600
Other	300	10,300	8,600
	<u>31,200</u>	<u>265,800</u>	<u>597,400</u>
VARIABLE COSTS			
Livestock specific costs	1,200	600	1,000
Crop specific costs	7,300	103,400	202,200
Contract costs	2,600	8,200	11,300
Casual labour	4,900	34,600	87,900
Sundry costs	2	3,401	200
	<u>16,002</u>	<u>150,201</u>	<u>302,600</u>
GROSS MARGIN	<u>15,198</u>	<u>115,599</u>	<u>294,800</u>
FIXED COSTS			
Labour	3,400	50,722	91,115
Power and machinery	11,414	20,823	39,933
Overheads	10,600	46,782	75,919
	<u>25,414</u>	<u>118,327</u>	<u>206,967</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>-10,216</u>	<u>- 2,728</u>	<u>87,833</u>
BPS	2,400	4,000	5,100
Diversification surplus	2,000	13,000	21,600
FARM BUSINESS INCOME	<u>- 5,816</u>	<u>14,272</u>	<u>114,533</u>
Farm Business Income £/ha	<u>- 233</u>	<u>460</u>	<u>2,664</u>
No. of farms in sample	26	96	71
Average farm size (ha)	25	31	43

England - Mixed Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Livestock	29,600	80,500	152,700
Crops	25,800	64,700	134,100
Agri-environment	3,900	7,000	11,100
Other	2,600	19,900	11,128
	<u>61,900</u>	<u>172,100</u>	<u>309,028</u>
VARIABLE COSTS			
Livestock specific costs	20,800	46,300	70,900
Crop specific costs	15,900	32,000	57,400
Contract costs	4,600	10,900	18,100
Casual labour	1,700	1,300	4,300
Sundry costs	516	1,652	286
	<u>43,516</u>	<u>92,152</u>	<u>150,986</u>
GROSS MARGIN	<u>18,384</u>	<u>79,948</u>	<u>158,042</u>
FIXED COSTS			
Labour	5,700	13,638	28,500
Power and machinery	18,931	35,456	49,657
Overheads	21,984	52,700	58,291
	<u>46,615</u>	<u>101,794</u>	<u>136,448</u>
FARM BUSINESS INCOME <i>(excl. BPS and diversification)</i>	<u>-28,231</u>	<u>- 21,846</u>	<u>21,594</u>
BPS	10,800	20,500	32,900
Diversification surplus	3,400	9,000	17,000
FARM BUSINESS INCOME	<u>-14,031</u>	<u>7,654</u>	<u>71,494</u>
Farm Business Income £/ha	<u>- 171</u>	<u>54</u>	<u>315</u>
No. of farms in sample	36	94	65
Average farm size (ha)	82	142	227
No. of ewes	116	131	234
No. of breeding cows	13	19	25
No. of dairy cows	3.4	3.2	8.2
No. of sows	0.8	5.9	6.5
Cereals (ha)	23.2	45.3	84.1

Scotland - Specialist Sheep (LFA) Farms

	Highland and Southern		
	£/farm	£/100 ee	% output
OUTPUT			
Livestock	39,413	4,677	43
Crops	947	110	1
Subsidies	39,270	4,714	43
Diversification surplus	1,512	176	2
Other	10,258	1,241	11
	<u>91,399</u>	<u>10,916</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	22,812	2,737	25
Crop expenses	3,652	436	3
	<u>26,464</u>	<u>3,172</u>	<u>28</u>
GROSS MARGIN			
	<u>64,935</u>	<u>7,744</u>	<u>72</u>
FIXED COSTS			
Labour	8,651	1,038	10
Power and machinery	11,923	1,428	13
Overheads	15,442	1,839	17
Depreciation	13,721	1,646	15
Rent and finance	6,243	741	7
	<u>55,979</u>	<u>6,690</u>	<u>62</u>
FARM PROFIT			
	<u>8,956</u>	<u>1,054</u>	<u>10</u>
No. of farms in sample	38		
Average farm size (ha)	282		
No. of ewes	795		
No. of breeding cows	7		

Scotland - Specialist Beef (LFA) Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	137,128	820	66
Crops	3,448	21	2
Subsidies	54,644	327	27
Diversification surplus	5,302	32	3
Other	7,430	44	4
	<u>207,951</u>	<u>1,243</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	41,834	250	20
Crop expenses	18,124	108	9
	<u>59,960</u>	<u>358</u>	<u>29</u>
GROSS MARGIN			
	<u>147,991</u>	<u>885</u>	<u>71</u>
FIXED COSTS			
Labour	10,662	64	5
Power and machinery	21,828	130	10
Overheads	18,102	108	9
Depreciation	22,296	133	11
Rent and finance	6,620	40	3
	<u>79,509</u>	<u>475</u>	<u>38</u>
FARM PROFIT			
	<u>68,481</u>	<u>409</u>	<u>33</u>
No. of farms in sample	27		
Average farm size (ha)	167		
No. of ewes	267		
No. of breeding cows	110		

Scotland - Cattle and Sheep (LFA) Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	119,089	9,004	57
Crops	3,495	264	2
Subsidies	70,907	5,361	34
Diversification surplus	4,149	314	2
Other	14,865	1,124	7
	<u>212,507</u>	<u>16,067</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	52,045	3,934	24
Crop expenses	15,554	1,176	8
	<u>67,599</u>	<u>5,111</u>	<u>32</u>
GROSS MARGIN			
	<u>144,907</u>	<u>10,956</u>	<u>68</u>
FIXED COSTS			
Labour	7,182	543	3
Power and machinery	20,284	1,534	10
Overheads	18,835	1,424	9
Depreciation	23,823	1,801	11
Rent and finance	9,675	732	5
	<u>79,789</u>	<u>6,033</u>	<u>38</u>
FARM PROFIT			
	<u>65,109</u>	<u>4,923</u>	<u>31</u>
No. of farms in sample	16		
Average farm size (ha)	259		
No. of ewes	809		
No. of breeding cows	68		
No. of other cattle	92		

Scotland - Lowland Cattle and Sheep Farms

	£/farm	All sizes £/adj. ha	% output
OUTPUT			
Livestock	109,789	774	66
Crops	6,759	64	5
Subsidies	37,845	270	23
Diversification surplus	1,258	14	1
Other	6,679	66	5
	<u>162,328</u>	<u>1,187</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	50,388	372	32
Crop expenses	20,292	153	13
	<u>70,680</u>	<u>525</u>	<u>45</u>
GROSS MARGIN	<u>91,648</u>	<u>663</u>	<u>55</u>
FIXED COSTS			
Labour	9,606	56	5
Power and machinery	23,153	180	15
Overheads	19,785	165	14
Depreciation	24,596	167	14
Rent and finance	3,881	32	3
	<u>81,020</u>	<u>599</u>	<u>50</u>
FARM PROFIT	<u>10,628</u>	<u>64</u>	<u>6</u>
No. farms in sample	12		
Average farm size (ha)	141		
No. of ewes	198		
No. of breeding cows	97		

Scotland - Dairy Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	494,678	2,319	87
Crops	6,832	32	2
Subsidies	43,637	204	8
Diversification surplus	1,351	6	-
Other	24,608	115	4
	<u>571,106</u>	<u>2,677</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	198,728	932	36
Crop expenses	34,240	160	6
	<u>232,967</u>	<u>1,092</u>	<u>41</u>
GROSS MARGIN			
	<u>338,138</u>	<u>1,585</u>	<u>59</u>
FIXED COSTS			
Labour	48,502	227	8
Power and machinery	57,570	270	10
Overheads	31,125	146	5
Depreciation	65,152	305	11
Rent and finance	18,418	86	3
	<u>220,768</u>	<u>1,035</u>	<u>39</u>
FARM PROFIT			
	<u>117,371</u>	<u>550</u>	<u>21</u>
No. of farms in sample	12		
Average farm size (ha)	213		
No. of dairy cows	204		
Output yield per dairy cow (lt)	7,388		
Revenue value (ppl)	24.79		

Scotland - Cereal Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	20,703	106	7
Crops	159,928	826	59
Subsidies	31,785	164	12
Diversification surplus	15,336	79	6
Other	43,239	223	16
	<u>270,990</u>	<u>1,399</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	9,003	46	3
Crop expenses	64,803	335	24
	<u>73,805</u>	<u>381</u>	<u>27</u>
GROSS MARGIN	<u>197,185</u>	<u>1,018</u>	<u>73</u>
FIXED COSTS			
Labour	13,569	70	5
Power and machinery	41,502	214	15
Overheads	24,345	126	9
Depreciation	41,244	213	15
Rent and finance	12,600	65	5
	<u>133,260</u>	<u>688</u>	<u>49</u>
FARM PROFIT	<u>63,926</u>	<u>330</u>	<u>24</u>
No. of farms in sample	26		
Average farm size (ha)	194		
Cereals (ha)	121		

Scotland - General Cropping Farms

		All sizes	
	£/farm	£/adj. ha	% output
OUTPUT			
Livestock	32,456	206	14
Crops	198,465	981	63
Subsidies	30,419	174	12
Diversification surplus	3,544	24	2
Other	25,124	123	8
	<u>290,008</u>	<u>1,509</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	17,765	111	8
Crop expenses	80,231	409	27
	<u>97,996</u>	<u>520</u>	<u>34</u>
GROSS MARGIN	<u>192,012</u>	<u>989</u>	<u>66</u>
FIXED COSTS			
Labour	18,406	72	4
Power and machinery	58,428	321	21
Overheads	27,968	157	11
Depreciation	43,729	232	16
Rent and finance	28,568	119	7
	<u>177,099</u>	<u>900</u>	<u>59</u>
FARM PROFIT	<u>14,913</u>	<u>88</u>	<u>7</u>
No. of farms in sample	31		
Average farm size (ha)	177		
Cereals (ha)	98		
Potatoes (ha)	13		
Other crops (ha)	10		

Scotland - Mixed Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	133,205	758	55
Crops	60,289	343	24
Subsidies	38,813	221	16
Diversification surplus	4,069	23	2
Other	9,115	52	4
	<u>245,490</u>	<u>1,397</u>	<u>100</u>
VARIABLE COSTS			
Livestock expenses	46,372	264	20
Crop expenses	42,160	240	18
	<u>88,533</u>	<u>504</u>	<u>36</u>
GROSS MARGIN	<u>156,958</u>	<u>893</u>	<u>64</u>
FIXED COSTS			
Labour	7,341	42	3
Power and machinery	29,420	167	12
Overheads	17,557	100	7
Depreciation	35,836	204	15
Rent and finance	14,473	82	6
	<u>104,628</u>	<u>596</u>	<u>43</u>
FARM PROFIT	<u>52,330</u>	<u>298</u>	<u>21</u>
No. of farms in sample	21		
Average farm size (ha)	176		
No. of ewes	109		
No. of breeding cows	55		
No. of other cattle	164		
Cereals (ha)	72		

Rural Aid Schemes

Introduction

The majority of support schemes available to UK farmers have their origins in the EU's Common Agricultural Policy (CAP). Structured in two parts, Pillar 1 and Pillar II, CAP 2014-2020 provides funding to support environmental, economic and rural development.

The amount of CAP funds available from the EU was agreed within the Multi-annual Financial Framework (MFF) and for 2014-2020 is €387 billion. The funds are allocated to Member States, including the four UK devolved administrations, who have their own implementation models for delivering funding from both Pillar I and II.

In some years, if the expected Pillar I budget is likely to exceed the available funds, the European Commission implements a mechanism called Financial Discipline. This effectively reduces the total value of Pillar I payments across all Member States. In 2016 this reduction was 1.35391%.

The following sections provide an overview of the individual CAP schemes adopted in each UK administration. Relevant government websites should be viewed for more detailed information and up-to-date guidance.

Note: Although the UK's referendum decision to leave the EU has created uncertainty over future CAP payments the UK Government has pledged to keep overall payments at the same level until 2022.

Overview of CAP Schemes

CAP Pillar I (Direct Payments)

A Basic Payment is made to eligible, active farmers and upon compliance with the EU's three Greening requirements (detailed below) farmers also receive a Greening payment. Payments are also available to eligible farmers from the Young Farmer Scheme, National Reserve, Redistributive Payment Scheme and the Voluntary Coupled Support Schemes, subject to what was adopted by each UK administration.

Greening requirements

Permanent Pasture - each UK administration's area of permanent grassland must be maintained, i.e. the ratio of permanent grassland compared to the total agricultural area declared must not decrease by more than 5%; this is managed at a national level. At the individual farm level Environmentally Sensitive Grassland Areas must not be converted to arable production.

Crop Diversification - referred to as the "two" or "three" crop rules. If the business has 10ha or more of arable land and does not qualify for an exemption, crop diversification rules on the minimum number of crops

grown and areas covered need to be followed. Exemptions are as follows:

- land certified as organic or in organic conversion
- businesses where more than 75% of the arable land is temporary grassland, fallow or herbaceous forage provided that the arable area not covered by these uses does not exceed 30ha
- businesses where more than 75% of the eligible agricultural area is permanent or temporary grassland or herbaceous forage, or is used for the production of crops under water for a significant part of the year or crop cycle provided that the arable area not covered by these uses does not exceed 30ha

If the business has between 10-30ha of arable land at least two different arable crops must be grown and the main crop must not cover more than 75% of the arable area.

If the business has more than 30ha of arable land at least three arable crops must be grown; the main crop must not cover more than 75% of the arable area and the two main crops together must not cover more than 95% of the arable area.

Ecological Focus Area (EFA) - businesses with arable land in excess of 15ha who do not qualify for an exemption need to ensure that 5% of this land is managed as EFA. Exemptions are as follows:

- land certified as organic or in organic conversion
- businesses where more than 75% of the arable land is permanent or temporary grassland or herbaceous forage, or is used for the production of crops under water for a significant part of the year or crop cycle, provided that the remaining arable land does not exceed 30ha
- businesses where more than 75% of the arable land is used to grow temporary grass, herbaceous forage, leguminous crops or fallow provided that the remaining arable land does not exceed 30ha

A range of land uses and features can be used to meet the 5% EFA requirement, see the following sections for details of each UK administered region.

In 2018 there will be changes to the EFA greening rules that apply to Scotland. As details are announced the Scottish Government's Rural Payments and Services website should be referred to for more information.

CAP Pillar II (Rural Development Programme) Overview

The EU Rural Development policy is implemented through regional rural development programmes (RDPs) that deliver upon at least four of the six common EU priorities:

- Fostering knowledge transfer and innovation in agriculture, forestry and rural areas

- Enhancing farm viability and competitiveness and sustainable management of forests
- Promoting food chain organisations
- Restoring preserving and enhancing ecosystems
- Promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy
- Promoting social inclusion, poverty reduction and economic development in rural areas

Scotland

As part of the eligibility for some rural aid schemes livestock units are used by the Scottish Government to calculate stocking densities, these are as follows:

Type of stock	Livestock units (per head)
Beef cows (including suckling calves)	1.0
Other cattle (6-24 months)	0.6
Other cattle (24 months and over)	1.0
Ewes (at least one year old and including suckling lambs)	0.15
Other sheep	0.15
Goats	0.15
Alpacas	0.30
Farmed deer - stags (over 27 mth)	0.40
Farmed deer - hinds, including suckling calves (over 27 mth)	0.30
Farmed deer - juveniles (6-27 mth)	0.20

The calculations of stocking densities using these figures should be carried out with the same methodology as is detailed on page 108.

Single Application Form

The Single Application Form (SAF) is the form that must be completed in order to claim payments under the following schemes:

- Basic Payment Scheme, including Greening and Young Farmer payments
- Scottish Suckler Beef Support Scheme (Mainland and Islands)
- Scottish Upland Sheep Support Scheme
- Less Favoured Area Support Scheme (LFASS)
- Agri-Environment Climate Scheme – annual recurrent options
- Forestry Grant Scheme – annual maintenance and management grants
- Beef Efficiency Scheme
- Rural Development Contracts – Rural Priorities annual recurrent options

The SAF can be submitted online via Rural Payments and Services or by submitting a signed paper application to the local RPID area office. The deadline for submitting applications is 15 May each year.

The SAF is a declaration of all the permanent and seasonal agricultural and non-agricultural land parcels farmed. Information declared includes:

- Areas of crops grown, on an individual land parcel basis, used to claim the Basic Payment Scheme and LFASS
- EFA options and areas used to meeting greening requirements
- Agri-Environment Climate Scheme, Forestry Grant Scheme and Rural Development Contracts options and areas
- Livestock numbers on the holding on 1 March

Within the SAF, there is also the option to claim for Young Farmer Payment, LFASS, National Reserve and the Beef Efficiency Scheme, and indicate Sterling or Euros as the chosen method of receiving funding for direct payment support.

Pillar I

CAP Pillar 1 Direct Payment schemes implemented in Scotland include the Basic Payment Scheme (BPS), Young Farmer Scheme, National Reserve and Voluntary Coupled Support (i.e. Scottish Suckler Beef Support Scheme (Mainland and Islands) and Scottish Upland Sheep Support Scheme).

Basic Payment Scheme

To take part in the BPS and receive funding farmers and crofters need to:

- Hold BPS entitlements
- Submit a claim via a Single Application Form (SAF)
- Farm a minimum of 3ha of eligible land and have this land at their disposal on 15 May of the claim year
- Have one eligible hectare of land for each BPS entitlement
- Carry out agricultural 'activity'
- Comply with Greening and a range of Statutory Management Requirements (SMRs) and standards on Good Agricultural and Environmental Condition (GAEC) i.e. Cross Compliance
- Keep comprehensive, accurate, and up-to-date records

Entitlements

Based on the areas of eligible land claimed on the 2015 SAF, BPS Regions 1, 2 and 3 entitlements were allocated to eligible farmers and crofters. For Payment Regions 2 and 3 farmers were allocated 10% fewer entitlements than the area of land declared, this is due to a reduction co-efficient having been applied. Further information about the Payment Regions can be found in the following section.

All BPS entitlements must be used in at least one year out of two.

Eligible New Entrants to farming can apply to the National Reserve for entitlements; other farmers and crofters can obtain entitlements by purchasing, leasing, inheriting them or due to whole holding transfers, business splits or mergers. Entitlements can be transferred by sale or lease, with or without land to another active farmer. If entitlements are

transferred without land the value of the entitlements that are being transferred will be reduced by 50% at the point of transfer; the siphoned funds will go to the National Reserve.

Payment regions and rates

Land parcels in Scotland are allocated to one of three payment regions:

Payment Region	Land use category
1	Arable, temporary and permanent grass
2	Rough Grazing designated as LFA grazing category B, C or D and non-LFA rough grazing land
3	Rough Grazing designated as LFA grazing category A

To ensure all farmers and crofters receive the same Basic Payment (BP) entitlement value per payment region by 2019, Scotland opted for a five year transition period. This means that the BP entitlement value will be made up of a historic Single Farm Payment element and a new Basic Payment element. The historic element will be adjusted downwards in equal 20% steps. As a result, until 2019, the value of Basic Payment entitlements will be different for each farming and crofting business.

However, within each payment region the Greening payment rates are the same for all farmers and crofters depending on the region.

The actual entitlement value for each year will be worked out once the total number of hectares of eligible land claimed for in each payment region is known and the overall budget for that period will be divided up according to the hectares claimed.

Indicative Basic Payment (BP) and Greening payment rates for 2019 are as follows:

Payment Region	BP (€/ha)	Greening (€/ha)	Total Entitlement Payment (€/ha)	
			(€/ha)	(£/ha)*
1	161.14	82.93	244.07	207.46
2	26.90	13.86	40.76	34.65
3	8.69	4.49	13.18	11.20

* based on euro/sterling exchange rate of €1 = £0.85

Activity

The minimum agricultural activities farmers or crofters must undertake to make the land eligible for the BPS is related to the Payment Region(s) applicable to the land and include:

Payment Region 1:

- produce, rear or grow agricultural products including harvesting, milking, breeding animals and keeping animals for farming purposes, or;

- maintain the land in a state suitable for grazing or cultivation, i.e. take action to control injurious weeds and maintain access for livestock or machinery. On permanent grassland, demonstrate the maintenance of existing stock-proof boundaries and water sources for livestock; whilst on arable land, take action to prevent encroachment of scrub.

Payment Regions 2 and 3:

- for 183 days in each scheme year a minimum stocking density of 0.05LU/ha must be met, or where justified, a lower minimum stocking density, in terms of numbers or period, that is in line with the carrying capacity of the land or as a result of an environmental management agreement, or
- carry out an annual Farm Environmental Assessment of the land

Businesses that operate railway services, airports, waterworks, real estate services or permanent sport and recreational grounds will be excluded from the BPS, unless they can prove they have genuine agricultural activity.

Capping

Capping is the reduction of payments above a certain level. All Basic Payment Scheme and Voluntary Coupled Support Scheme payments over €150,000 will be reduced by 5%.

Greening

The three standard EU greening measures apply in Scotland as well as an additional requirement to prepare a Permanent Grassland Nitrogen Fertiliser and Lime Plan.

Permanent grassland - will be monitored across Scotland. The Nitrogen Fertiliser and Lime Plan must detail how much inorganic nitrogen fertiliser and lime that is intended to be applied to land parcels that contain permanent grassland (PGRS) or open grazed woodland (WDG). Parcels that also contain areas of arable and/or rough grazing do not need to be included. The plan must be prepared by 9 June each year, retained on the farm and made available on request to any inspector as part of the land inspection or validation of the SAF.

Crop diversification - farmers in Scotland are required, unless they are exempt, to follow the requirements as set out in the introduction on page 426.

Ecological Focus Areas (EFAs) - farmers in Scotland are required, unless they are exempt, to follow the requirements as set out in the introduction on page 427.

There are seven EFA options that can be used in Scotland to contribute to farmers or crofters EFA commitments. Each option must be located on, adjacent to, or within 5m of arable land and are weighted according to the level of environmental benefit they deliver, see the following table.

EFA option	Location	Weighting factor	EFA area (m ²)
Fallow land	(/1m ²) On arable land	1.00	1.00
	On, adjacent to, or within 5m of arable land	1.50	1.50
Margins	(/1m ²) or contiguous to a claimed EFA option		
Nitrogen-fixing crops	(/1m ²) On arable land	0.70	0.70
Catch crop	(/1m ²) On arable land	0.30	0.30
Green cover	(/1m ²) On arable land	0.30	0.30
Hedges – right to claim whole hedge (per linear metre)	(/1m) On, adjacent to or within 5m of arable land or contiguous to a claimed EFA option	10	10
Hedges – right to claim half hedge (per linear metre)	(/1m) On, adjacent to or within 5m of arable land or contiguous to a claimed EFA option	5	5
Agro-forestry land	(/1m ²) Eligible land	1.00	1.00

Full details on Scottish greening measures and requirements can be found at the following webpage:

<https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/basic-payment-scheme/greening-guidance/>

Young Farmer Scheme

Young farmers are entitled to a top-up payment of 25% of the regional average value of BP entitlements. The actual payment received will therefore vary and be specific to each business. To qualify the applicant must be:

- Not older than 40 years of age on 31 December of the first year they apply to the BPS, and be;
- Setting up as head of an agricultural holding for the first time, or who have become head of an agricultural business for the first time during the five years preceding their first BPS application.

To qualify as head of the farm business, the young farmers must be the main shareholder/partner in the business, taking the majority share of any profits and making the key business decisions.

This payment is limited to 90ha and is only payable for a maximum of five years from the date the business was established, subject to the claimant being no more than 40 years of age by the end of the year in which the application was submitted.

The Young Farmer payment is applied for on the SAF and evidence of eligibility will also need to be submitted i.e. date of birth, % share of business profits.

National Reserve

The National Reserve will be used to allocate BPS entitlements to eligible:

- Young farmers - farmers or crofters who are less than 41 years of age on 31 December of the year of application and are setting up for the first time an agricultural holding as head of the holding
- New entrants - farmers or crofters who started their farming activity in 2013 or later, who have not had any agricultural activity in their own name or at their own risk in the five years before the start of their current farming action

There is no paper application for the National Reserve; applications must be completed online at the same time as the SAF. Successful applicants to the National Reserve in 2015, 2016 or 2017 will not be able to apply for any more BPS entitlements from any future National Reserve.

BPS entitlements awarded from the National Reserve must, over a two year period be used in at least one year.

Voluntary Coupled Support

The Scottish Government use coupled payments to support the beef and sheep sectors. To claim for coupled payments applicants must complete a SAF each year; the Main Location Code used in the coupled payments claim forms must be the same as the one on the SAF.

Scottish Suckler Beef Support Scheme - Mainland and Islands (SSBSS)

Payments are made on owned or leased homebred calves that are at least 75% beef bred. The calves must be born on or after 2 December in the year before the claim is made and remain on the holding of birth for at least 30 days. Payment rates for the 2015 and 2016 scheme years were as follows:

	£/calf	
	Mainland	Islands
2015 ¹	74.63	90.80
2016 ²	90.80	138.80

¹ based on financial discipline rate of 1.393041 and euro/sterling exchange rate of 0.73129

² based on financial discipline rate of 1.35391 and euro/sterling exchange rate of 0.85228

Actual payment rates for 2017 will depend on the total number of eligible calves claimed.

Claims can be made online or by post from 1 September until 31 December each year.

Scottish Upland Sheep Support Scheme (SUSSS)

To qualify for the scheme, 80% or more of the agricultural land must be in Payment Region 3 and less than 200ha of the agricultural land must be in Payment Region 1. Payments are made on homebred ewe hoggs that are retained on the holding from 17 October in the year claimed to 31 March the following year. Payment rates for the 2015 and 2016 scheme years were as follows:

	£/hogg
2015 ¹	56.33
2016 ²	64.80

¹ based on financial discipline rate of 1.393041 and euro/sterling exchange rate of 0.73129

² based on financial discipline rate of 1.35391 and euro/sterling exchange rate of 0.85228

Actual payment rates for 2017 will depend on the total number of eligible hoggs claimed.

Claims can be made online or by post between 1 September and 16 October each year.

Pillar II

The Scottish Rural Development Programme (SRDP) 2014-2020 will be used to deliver on the following priorities:

- Enhancing the rural economy
- Supporting agricultural businesses
- Protecting and improving the natural environment
- Addressing the impact of climate change
- Supporting rural communities

Support that is available under the SRDP is detailed in the following pages. Full details of the schemes, including further information on payments rates and application deadlines can be found at: <https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/>

Less Favoured Area Support Scheme (LFASS)

This scheme provides essential support to fragile farming businesses in remote and constrained rural areas. For 2018 the current scheme will continue but hill farmers and crofters in the most fragile and remote areas will receive a parachute payment of 80% of their LFASS payment rate. These changes have been put in place as the EU Rural Development Regulations do not permit the continuation of the LFASSS scheme unchanged after 2017.

LFASS is an area based scheme claimed for on the SAF at the same time as claiming for the BPS and is paid to applicants who actively farm forage land in the LFA area which has been given a grazing category. The main eligibility criteria include:

- Declaring at least 3ha of eligible land on the SAF.
- Actively farming land declared on the SAF for at least 183 days or periods totalling 183 days in the year of claim. To count as forage this land must be available and accessible for use for maintaining livestock or producing a forage crop for at least 7 months including 15 May.

The LFASS payment is calculated by adjusting the eligible (claimed) land from the SAF to work out a payable area. This payable area is then multiplied by the payment rate(s) for farmers and crofters fragility area.

Grazing categories are set based on stocking densities for the land being claimed. The categories are:

Category	Stocking density (LU/ha)	Hectare value	Minimum stocking density (LU/ha)	Maximum stocking density (LU/ha)
A	up to 0.19	0.167	0.09	1.4
B	0.20 - 0.39	0.333	0.15	1.4
C	0.40 - 0.59	0.667	0.30	1.4
D	0.60 or more	0.800	0.45	1.4

An enterprise mix multiplier is used as part of recognising the environmental benefits of a mixed stocking regime. Hectares claimed are multiplied by 1.35 if at least 10% but less than 50% of livestock units are cattle or 1.7 if 50% or more of livestock units are cattle.

LFASS payment rates are designated based on land category as well as grazing categories. The rates are shown in the following table:

Land category	Standard ¹	Fragile ²	Very fragile ³
	payment per adjusted hectare (£)		
More disadvantaged land (grazing categories A and B)	52.16	62.10	71.35
Less disadvantaged land (grazing categories C and D)	34.12	54.51	63.00

¹ Standard areas on the mainland with lower transport costs

² Fragile areas on the mainland where there is disadvantage resulting from higher transport costs

³ Very fragile areas on islands

An example calculation is shown below for illustrative purposes.

Assumptions:

- Farm in Standard area
- Less disadvantaged land, grazing category D
- 600ha eligible land declared on SAF
- Historic stocking density 0.5 LU/ha, 100% cattle

eligible hectares from SAF		600 ha
x hectare value for Cat D	x	0.80
= adjusted hectares	=	480 ha
x the enterprise uplift	x	1.7
= payable hectares	=	816 ha
x standard less disadvantaged rate	x	34.12
= final payment pre deductions	=	£26,242.56

For further detail see full scheme guidance at:

<https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/lfass>

Agri-Environment Climate Scheme

Targeted support is available for land managers to undertake management and capital work that will deliver biodiversity benefits, manage water quality and flood risk, conversion and maintenance of organic farming and improve public access.

Some of the Management and Capital options and payment rates available under this scheme are as follows:

Management Option	Payment Rate
Arable options	
Wild bird seed for farmland birds	£322.63/ha
Forage brassica crops for farmland birds	£463.36/ha
Retention of winter stubbles for wildlife and water quality	£96.18/ha
Grass strips in arable fields	£495.62/ha
Water margins in arable fields	£495.62/ha
Grassland options	
Species-rich grassland management	£109.56/ha
Water margins in grassland fields	£123.42/ha
Wader and wildlife mown grassland	£149.75/ha
Wader grazed grassland	£80.00/ha
Upland, peatland, moorland and heath options	
Moorland management - Livestock	£3.60/ha
- Deer	£1.24/ha
- Livestock and deer	£4.84/ha
Stock disposal	£24.83/ha
Stock disposal incl. SUSSS supplement	£32.91/ha
Away wintering sheep	£25.83
Summer hill grazing of cattle	£3.19
Farmland habitat and feature options	
Management or restoration of hedgerows	£0.11/m
Creation of hedgerows	£1.20/m
Habitat mosaic management	£93.20/ha
Managing water quality and flood risk options	
Converting arable land at risk of erosion or flooding to low-input grassland	£284.80/ha

Capital Option	Payment Rate
Stock fence	£5.50/m
Gate for stock fence	£170/gate
Deer fence	£8.50/m
Gate for deer fence	£215/gate
Planting or replanting of hedges	£5.40/m
Rabbit proofing an existing or new stock or deer fence	£2.00/m
Creation of species-rich grassland	£754.52/ha
Creation of low input grassland	£333.51/ha
Creation of grass strips & water margins in arable fields	£333.51/ha
Creation of wild bird seed for farmland birds	£232.24/ha
Cutting of rush pasture	£8.45/ha
Creation of wader scrapes	£56/scrape (20-40m ²) £93.33/scrape (>40m ²)
Livestock crossings	£222/bridge (<2.6m) £880/bridge (>2.6m)
Livestock tracks	£11/m ²

The above list is not exhaustive. For farm holding specific and/or a full list of management options and capital items see <https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/agri-environment-climate-scheme/>

Forestry Grant Scheme

Funding is available for woodland creation, agroforestry, tree health, woodland improvement, sustainable management of forests, harvesting, and processing of forest products, forest infrastructure and co-operation (see Forestry and Farm Woodlands section on pages 288-304 for more details).

New Entrants Support Schemes

Three schemes are available to help new entrants, the Young Farmers Start-up Grant Scheme, the New Entrant Start-up Grant Scheme and the New Entrants Capital Grant Scheme.

The Young Farmers Start-up Grant Scheme is aimed at those who are starting an agricultural business for the first time or who are taking over an existing agricultural business. The grant available is €70,000 paid in two instalments; an initial payment of €63,000 and a second payment of €7,000 when the milestones in the business plan are reached.

The New Entrant Start-up Grant Scheme is aimed at those who started their agricultural business in the last 12 months. The grant available is €15,000, paid in two instalments; an initial payment of €12,000 and a second payment of €3,000 when the milestones in the business plan are reached.

Funding from the above two schemes will be paid in sterling at the appropriate exchange rate and can be used to help with the costs associated with starting up an agricultural business, for example purchasing land, equipment, machinery or livestock, or constructing buildings or infrastructure.

The New Entrants Capital Grant Scheme provides grant for those that are new to farming to make improvements to their agricultural business and to help promote sustainable development. Funding of up to £25,000 for individuals and £125,000 for groups can be used for construction or improvements of agricultural buildings, investment in land management and drainage, slurry stores, equipment, infrastructure, amenities and electrical equipment.

Beef Efficiency Scheme

The Beef Efficiency Scheme is a five-year climate change scheme that aims to help beef breeders improve the efficiency, sustainability and quality of their beef herd. The scheme will deliver a range of improvements by focusing on cattle genetics and management practice. In return for keeping calving records, taking tissue samples of 20% of the calves born and preparing a farm carbon audit payments equivalent to £32/calf will be paid for the first three years. Payments will be made on an area basis. Farmers and crofters are also required to engage with a free advisory service to help identify farm improvements.

Crofting Agricultural Grant Scheme

This scheme provides grants for crofters to make improvements to their crofts and help to sustain their businesses. Funds of up to £25,000 for individual crofters and £125,000 for groups of crofters can be used for capital projects, such as the construction or improvement of agricultural buildings and for the establishment of Common Grazings Committees. Funding for eligible capital projects can cover all aspects of the project, including the cost of materials, transportation of materials, costs of contractors and own labour. See pages 256-258 for more detail.

Croft House Grant Scheme

This scheme provides grants for crofters to improve and maintain the standards of crofter housing, with the aim of attracting and retaining people within the crofting areas of Scotland. Funding of 40% of the costs up to a maximum of £38,000 in high priority areas and up to £28,000 in standard priority areas can be used for major repairs, internal improvements and rebuilding work. See pages 256-258 for more detail.

Small Farms Support Scheme

This scheme provides support to eligible farmers or crofters for investments related to development, modernisation or adaptation of small farms, i.e. holdings that have between 3 and 30ha of eligible agricultural area. To be eligible total gross income for sole traders should be no more than £30,700 and £41,000 for partnerships or groups. Funds of up to £25,000 for individuals and £125,000 for groups can be used to erect or improve

agricultural buildings, provision of slurry stores, field drainage, handling facilities, shelter belts, electrical equipment and for access. See pages 256-258 for more detail.

Food Processing, Marketing and Co-operation Scheme

Start-up grants for new enterprises and business development grants for existing businesses are available for Small and Medium-Sized Enterprises (SMEs). Funding can be used to help development or creation of food processing facilities, including buildings and equipment, marketing of products, running co-operative ventures and improving supply-chain efficiency. Capital and non-capital grant rates of up to 70% are available depending on the size of the business and the activity or products the business produces.

Knowledge Transfer and Innovation Fund

This scheme aims to promote skills development and knowledge transfer in the primary agricultural sector and deliver on-the-ground improvements in agricultural competitiveness, resource efficiency, environmental performance and sustainability. Funding is available to organisations to deliver vocational training, coaching, workshops, courses and farm visits designed to develop skills and transfer knowledge, and for the running of operational groups who are working collaboratively. There is also continued support for monitor farms.

Environmental Co-operation Action Fund

This scheme is currently being re-designed, further information will become available in due course.

SRDP Farm Advisory Service

The Farm Advisory Service (FAS) provides one-to-one and one-to-many advice and support, aimed at increasing the profitability and sustainability of farms and crofts.

The one-to-one component comprises of:

- Integrated land Management Plans (ILMPs) and specialist advice
- Mentoring of new entrants
- Carbon audits

Funding of 80% (up to a maximum of £1,200) is available to help cover the costs of the preparation of an ILMP. Additional funds of up to £1,500 are also available for two specialist advice plans and up to £500 for the preparation of a carbon audit.

The one-to-many component of the FAS delivers innovative and integrated advice to crofters and farmers via:

- Scotland wide events i.e. workshops, network farm meetings, conferences and training courses
- Publications i.e. technical notes, newsletters,
- Crofts and small farms subscription service

- An advice line which operates between 9am and 5pm Monday to Friday.

LEADER

LEADER supports multi-sectoral community-based development. It helps individuals, communities and businesses to come together to design and implement Local Development Strategies. These strategies include actions focussed on climate change, enhancement of rural services and facilities (including transport initiatives), enhancement of natural/cultural heritage, tourism and leisure, and food and drink initiatives (for example short supply chains, community food). The funding is focussed on objectives specific to local areas as set out in a Local Action Group strategy.

Broadband

This scheme is aimed at helping communities across rural Scotland to co-ordinate demand for broadband access by joining together with other community groups to deliver a broadband solution for their area. This scheme is administered by Community Broadband Scotland.

England

Pillar I

CAP Pillar I Direct Payment Schemes implemented in England include the Basic Payment Scheme (BPS), Young Farmer Scheme and the National Reserve.

Basic Payment Scheme

To apply to the BPS and receive funding eligible farmers need to:

- Submit a BPS application either online using the Rural Payments service or on paper using a BP5 application form
- Have at least 5ha of eligible land at their disposal on 15 May of the claim year
- Declare one eligible hectare of land for each BPS entitlement
- Qualify as 'active farmers'
- Follow Greening and Cross Compliance rules

Entitlements

BPS entitlements were allocated to eligible farmers in 2015 and must be used at least once in every 2 years.

Entitlements can be transferred by sale or gift, by lease, through inheritance or as part of a business merger or split.

New and young farmers who do not have BPS entitlements will be able to apply to the National Reserve or lease or purchase entitlements.

Payment regions and rates

England has three payment regions:

Payment Region	Land use category
1	Non-severely Disadvantaged Area (NSDA)
2	Severely Disadvantaged Area (SDA)
3	SDA Moorland

English BP (BP) entitlement values for 2016 are illustrated below; actual payment rates for 2017 will be worked out once the total number of hectares of eligible land claimed for in each region is known.

Payment Region	BPS (€/ha)	Greening (€/ha)	Total Entitlement (€/ha)	Payment (£/ha)*
1	175.27	77.71	252.98	215.61
2	174.01	77.15	251.16	214.06
3	45.97	20.39	66.36	56.56

* based on euro/sterling exchange rate of €1 = £0.85228

Activity

To be eligible for the BPS farmers must undertake at least one of the following on their holding:

- Produce, rear, or grow agricultural products – including harvesting, milking, breeding animals and keeping animals for farming purposes.
- Keep some land in a state suitable for grazing or cultivation by keeping it clear of any scrub that can't be grazed.

Businesses that operate airports, railway services, waterworks, real estate services or permanent sport and recreational grounds will not be able to make a BPS application unless they meet one of three readmission criteria:

- Have 36ha or more of eligible land
- Total agricultural receipts were at least 40% of the total receipts in the most recent financial year
- Value of the BPS claim is equivalent to at least 5% of the total non-agricultural receipts in the most recent financial year.

Capping

BPS payments over €150,000 (excluding Greening and any Young Farmer payment) will be scaled back by 5%.

Greening

A greening payment will be made to farmers who comply with the three standard EU greening measures.

Permanent grassland - the area of permanent grassland is monitored across England.

Crop diversification - farmers in England are required, unless they are exempt, to follow the requirements as set out in the introduction on pages 426.

Ecological Focus Areas (EFAs) - farmers are required, unless they are exempt, to follow the requirements as set out in the introduction on pages 427.

The following features and/or areas count towards EFA in England. Each option must be located either on, adjacent to, or within 5m of arable land; conversion factors and weighting factors also apply see below:

EFA option	Location	Conversion factor (m to m²)	Weighting factor	EFA area (m²)
Fallow land	(/1m ²) On arable land	n/a	1.00	1.00
Hedges	(/1m) On or adjacent to arable land	5	2.00	10.00
Buffer strips	(/1m) On or adjacent to arable land	6	1.50	9.00
Catch crops	(/1m ²) On arable land	n/a	0.30	0.30
Cover crops	(/1m ²) On arable land	n/a	0.30	0.30
Nitrogen-fixing crops	(/1m ²) On arable land	n/a	0.70	0.70

Details of the greening rules for England can be found at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607708/BPS_2017_scheme_rules.pdf

Young Farmer Scheme

Young farmers can apply for a top-up payment, equivalent to 25% of their BPS entitlement values, limited to 90ha. To qualify for the payment, young farmers need to show that they:

- Are at least 18 years of age when they make their BPS application but not older than 40 years of age when the first successful BPS application was made
- Are in 'control' of the farm business that is applying for the BPS, and
- Set up or took 'control' of their business for the first time during the five years preceding their first BPS application

Young farmers can apply for the payment each year via their BPS application, for a maximum of five years after the year they started, or took control of their business.

To qualify as in 'control' of the farm business, the young farmers must have more than 50% of the shares and votes in the business.

National Reserve

The National Reserve will be used to allocate BPS entitlements to eligible:

- Young farmers - defined under the Young Farmer Scheme

- New farmers - farmers who started an agricultural activity in 2013 or later and have not carried out or be in control of carrying out 'agricultural activity' in the five years before the start of their current activity. In addition new farmers need to show that they are at least 18 years old when they make their BPS application and are in 'control' of the business

Further details of the Young Farmer Scheme and the National Reserve can be found at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607708/BPS_2017_scheme_rules.pdf

Pillar II

The Rural Development Programme for England 2014-2020 provides funds to:

- Improve the environment
- Increase the productivity of farming and forestry
- Grow the rural economy

Support available under England's Rural Development Programme includes the following:

Countryside Stewardship

Funding and capital grants are available for farmers and land managers to undertake targeted management actions to support biodiversity, forestry and water quality. The Country Stewardship has 3 main elements, mid tier, higher tier and capital grants.

Mid Tier

The Mid Tier offers options and capital items to achieve simple environmental benefits, for example reducing diffuse water pollution and improving the farmed environment for farmland birds and pollinators. There are no options or capital items for woodland or educational access in the Mid Tier.

Higher Tier

The Higher Tier provides funding for a full range of options and capital grants for the most environmentally important site, commons and woodlands. One-to-one advice and support from Natural England and/or Forestry Commission advisers is available to help farmers with their agreements.

Capital Grants

This provides capital grants that benefit the environment and includes funding for hedges and boundaries, tree health issues, woodland management plans, woodland creation and improvement, feasibility studies and implementation plans.

Water quality capital grants for infrastructure work are also available in Catchment Sensitive Farming (CSF) target areas either as part of the Mid Tier and Higher Tier agreements, or as standalone capital agreements.

Countryside Productivity Scheme

Support is available to encourage farmers, foresters and land managers to improve productivity and health of their livestock, forests, arable and horticultural crops through investment in equipment and innovative technologies.

Growth Programme

Funding is available for business development, food processing, small-scale tourism infrastructure and tourism cooperation.

LEADER

Funding is allocated to Local Action Groups (LAGs) in order to create jobs and growth in rural areas and covers farm and forestry productivity, support for micro and small businesses and farm diversification, boosting of rural tourism and for provision of cultural and heritage activities and rural services.

Full details of the scheme rules, grant funding rates and application windows can be found at: <https://www.gov.uk/topic/farming-food-grants-payments/rural-grants-payments>

Wales

Pillar 1

CAP Pillar 1 Direct Payment schemes implemented in Wales are the Basic Payment Scheme (BPS), Redistributive Payment Scheme, Young Farmer Scheme and the National Reserve.

Basic Payment Scheme

To apply to the BPS and receive funding farmers need to:

- Submit an on-line Single Application Form before the 15 May deadline
- Have at least 5ha of eligible land at their disposal on 15 May of the claim year
- Have one eligible hectare of land for each BPS entitlement
- Be an 'active farmer'
- Follow Greening and Cross Compliance rules

Entitlements

BPS entitlements were allocated in 2015 to eligible farmers and can be transferred by sale or lease but only to another 'active' farmer.

All BPS entitlements must be used in at least one year out of two.

New entrants and young farmers who do not have BPS entitlements will be able to apply to the National Reserve, or lease, or purchase entitlements.

Payment regions and rates

Wales has a single payment region. Indicative BPS payments for 2019 are as follows:

Payment Region	Land use category	Estimated Payment (€/ha)	Estimated Payment (£/ha)*
1	n/a - single region	176	149.60

* based on euro/sterling exchange rate of €1 = £0.85

Payment rates farmers receive in 2016 to 2018 will, due to implementation of a five year transition period, include a declining percentage of the historical Single Payment Scheme payment.

Activity

To be eligible for the BPS farmers must exercise agricultural activity by one or more of the following:

- Producing, rearing or growing agricultural products
- Maintaining an agricultural area in a state which makes it suitable for grazing or cultivation i.e. control non-native invasive weeds and scrub, ensure land has stock proof boundaries and a water source for livestock
- Carry out 'minimum activity' in areas that are 'naturally' kept in a suitable state for grazing or cultivation i.e. on saltmarsh and coastal sand dunes either adhere to an average annual stocking density of 0.01-0.05 Livestock Units or control non-native invasive weeds and scrub

Businesses that operate airports, railway services, waterworks, real estate services or permanent sport and recreational grounds will not be able to make a BPS application unless they are able to show that:

- BPS payments are 5% of more of the receipts obtained from the non-agricultural activities, or
- Receipts from agricultural activities are at least 40% of the total receipts

Capping

BPS payments are capped as illustrated in the table below:

Annual BPS payment (€)	Capping (%)
150,000 - 200,000	15
200,000 - 250,000	30
250,000 - 300,000	55
300,000 +	100

Greening payments and payments under the Young Farmers Scheme will not be subject to capping. Wage related costs will not be deducted prior to calculating the deduction.

Greening

A greening payment will be made to farmers who comply with the three standard EU greening measures.

Permanent grassland - the area of permanent grassland will be monitored across Wales.

Crop diversification - farmers in Wales will be required, unless they are exempt, to follow the requirements as set out in the introduction on pages 426.

Ecological Focus Area (EFA) - farmers will be required, unless they are exempt, to follow the requirements as set out in the introduction on pages 427.

The following land uses and features count towards EFA in Wales. Each option, with the exception of short rotation coppice and afforested areas must be located either on or adjacent to arable land. Conversion and weighting factors also apply as illustrated in the following table:

EFA option	Location	Conversion factor (m to m²)	Weighting factor	EFA area (m²)
Fallow land	(/1m ²) On arable land	n/a	1.00	1.00
Hedges or wooded strips	(/1m) On or adjacent to arable land	5	2.00	10.00
Traditional stone walls	(/1m) On or adjacent to arable land	1	1.00	1.00
Short rotation coppice	(/1m ²) Eligible land	n/a	0.30	0.30
Afforested land	(/1m ²) Eligible land	n/a	1.00	1.00
Nitrogen-fixing crops	(/1m ²) On arable land	n/a	0.70	0.70

Redistributive Payment

A 'top-up' payment covering the first 54ha is made to eligible farmers.

Young Farmer Scheme

Qualifying young farmers receive a Young Farmer payment on up to 25ha. The payment is available to sole traders and members of partnerships or limited companies who are no more than 40 years of age in the year they apply and:

- are setting up for the first time as head of the holding, or
- have taken control (i.e. set up a new business or taken over an existing business) of a Partnership or Limited Company during the 5 years before submitting their first BPS application.

National Reserve

The National Reserve is available to ensure new entrants to agriculture and young farmers receive entitlements.

To qualify as a New Entrant, farmers:

- cannot have had any agricultural activity in their own name or at their own risk in the 5 years before the start of their current agricultural activity
- must have started their current agricultural activity in 2013 or a later year

To qualify as a Young Farmer, farmers must be:

- 40 years of age or less in 2016 (and at least 18 years old for partnerships or sole traders or 16 years old for a Limited Company)
- setting up for the first time as head of holding or have control of a Partnership or Limited Company or have done so in the preceding 5 years.

Full details can be found at:

<http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/schemes/?lang=en>

Pillar II

The Welsh Government Rural Communities - Rural Development Programme 2014-2020 focuses on:

- Competitiveness (on farm and through the supply-chain)
- The Environment (agri-environmental work, woodland, renewable energy)
- Community (access to service and the LEADER approach)

Schemes available under the Welsh RDP include:

Glastir

Glastir is the Welsh Government's key sustainable land management scheme and includes provisions for capital works supporting sustainable uplands, woodland management, creation and restoration, targeted environmental intervention, organic conversion and maintenance, and effective engagement with land managers.

Sustainable Production Grant

The SPG provides farmers funding for capital investments to help improve the economic and environmental performance of their agricultural holdings. Grants can be used to invest in facilities and equipment that relate to animal health and welfare, crop storage, production housing and handling, renewable energy production and soil and crop management. The maximum grant rate for any individual investment project is 40% of the total investment cost, regardless of the size of the enterprise and location.

Timber Business Investment Scheme

This scheme provides financial assistance to private forest owners, local authorities and small/medium sized enterprises (SMEs), community organisations or forestry contractors for capital investments that add value to forests. The grant can be used to improve harvesting, processing and marketing of wood products.

Co-operation and Supply Chain Development Scheme

This scheme provides support for groups of co-operating entities to undertake new joint projects. It provides support for the full scope of a project. The grant can be used to support the development of new products, practices, processes and technologies in the agriculture, forestry and food sectors.

Rural Community Development Fund

Support is available primarily for Local Action Groups (LAGs) and other community-based organisations to support projects in key rural priority sectors. Supported projects include drawing up of community and village development plans, investments in small scale infrastructure including renewable energy, investments in ICT including broadband and digital inclusion, improving access to services such as childcare, rural transport and financial advice, investments in recreational, tourist infrastructure and activities to improve health and quality of life.

Knowledge Transfer and Innovation Scheme

This scheme is an integrated programme of knowledge transfer, innovation and advisory services delivered by Farming Connect. It aims to supply farming and forestry businesses with focussed support and advice to help them develop their business. The scheme funds demonstration activities, information actions, workshops, training, coaching and mentoring. Advice through the farm advisory service is also available on a one-to-one or group basis.

Sustainable Management Scheme

This scheme provides financial support for activities that improve the management of natural resources and contributes to the well-being of rural communities. It offers grants of £10,000 to £5,000,000 to help start up and facilitate new collaborations through to landscape-scale ambition co-ordinating actions that will improve natural resources, reduce greenhouse gas emissions and improve business and community resilience to the impacts of climate change.

LEADER

LEADER supports community based organisations and businesses to become involved in improving and developing their rural communities by facilitating innovative ways to help sustain long term development.

Further details can be found at:

Northern Ireland

Pillar I

CAP Pillar 1 Direct Payments implemented in Northern Ireland are the Basic Payment Scheme (BPS), Young Farmer Scheme and the National Reserve.

Basic Payment Scheme

To take part in the BPS and receive funding farmers need to:

- Submit a BPS application via the online Single Application and Maps Service or submit a paper SAF before 15 May deadline
- Have at least 3ha of eligible land at their disposal on 15 May of the claim year
- Have one eligible hectare of land for each BPS entitlement
- Be an 'active farmer'
- Follow Greening and Cross Compliance rules

Entitlements

BPS entitlements were allocated in 2015 to active, eligible farmers and must be activated in at least one year out of two.

BPS entitlements can be transferred between farmers by sale, gift, lease, inheritance or from the result of a business merger or split.

Payment regions and rates

A single region Pillar I support model is implemented in Northern Ireland. All BPS entitlements will converge towards a regional average entitlement value in equal steps, achieving a flat rate payment by 2021. Indicative BPS payment for 2019 (the end of this CAP) is estimated as follows:

Payment Region	Land use category	Estimated Payment (€/ha)	Estimated Payment (£/ha)*
1	n/a -single region	330.42	280.86

* based on euro/sterling exchange rate of €1 = £0.85

Actual payment rates for 2017 will be worked out once the total number of hectares of eligible land claimed for in 2017 is known.

Activity

To be eligible for the BPS farmers must exercise agricultural activity by:

- Producing, rearing or growing agricultural products, including harvesting, milking, breeding animals, and keeping animals for farming purposes

- Maintaining an agricultural area in a state which makes it suitable for grazing or cultivation

Businesses that operate airports, railway services, waterworks, real estate services, permanent sport or recreational grounds will not be able to make a BPS application unless they meet one of the following re-admission criteria:

- Farm at least 26 hectares of eligible land
- The annual amount of direct payments is at least 5% of the total receipts obtained from non-agricultural activities in the most recent tax year for which information is available
- Receipts obtained from agricultural activities represent at least 40% of total receipts obtained in the most recent fiscal year for which information is available.

Capping

BPS payments over €150,000 will be reduced by 100%. Greening payments and payments under the Young Farmer’s scheme will not be capped.

Greening Payment

A greening payment is made to farmers who comply with the three standard EU greening measures.

Permanent grassland - is monitored across Northern Ireland.

Crop diversification - farmers in Northern Ireland are required, unless they are exempt, to follow the requirements as set out in the introduction on pages 426.

Ecological Focus Areas (EFAs) - farmers in Northern Ireland are required, unless they are exempt, to follow the requirements as set out in the introduction on pages 427.

The following land uses and features, as illustrated in the table, count towards EFA in Northern Ireland. Each option, with the exception of short rotation coppice and afforested areas must be located either on or adjacent to arable land. Conversion and weighting factors also apply.

EFA option	Location	Conversion factor (m to m²)	Weighting factor	EFA area (m²)
Fallow land	(/1m ²) On arable land	n/a	1.00	1.00
Hedges	(/1m) On or adjacent to arable land	5	2.00	10.00
Sheughs	(/1m) On or adjacent to arable land	3	2.00	6.00
Dry stone walls	(/1m) On or adjacent to arable land	1	1.00	1.00

EFA option	Location	Conversion factor (m to m ²)	Weighting factor	EFA area (m ²)
Archaeological features	(/1m ²) On or adjacent to arable land	n/a	1.00	1.00
Earth banks	(/1m ²) On or adjacent to arable land	n/a	1.00	1.00
Short rotation coppice	(/1m ²) Eligible land	n/a	0.30	0.30
Afforested land	(/1m ²) Eligible land	n/a	1.00	1.00
Agro-forestry	(/1m ²) On arable land	n/a	1.00	1.00
Nitrogen-fixing crops	(/1m ²) On arable land	n/a	0.70	0.70

Young Farmer Scheme

Young farmers receive a top-up payment based on 25% of the total direct payments regional average per hectare limited to 90ha. To qualify the farmers must:

- be no more than 40 years of age in the year of submission of their first BPS application
- be setting up for the first time an agricultural holding as head of the holding, or who have already set up such a holding during the five years preceding the first submission of an application under the BPS
- hold a Level II qualification in agriculture (or related subject containing at least a farm business management module)

In 2016 the Young Farmers payment rate was €60.53/ha.

Regional Reserve

A Regional Reserve is used to allocate entitlements to new entrants and young farmers and to those who were prevented from being allocated payment entitlements as a result of force majeure or exceptional circumstances.

Full details can be found at:

<https://www.daera-ni.gov.uk/publications/2017-guide-basic-payment-scheme>

Pillar II

The Rural Development Programme 2014-2020 for Northern Ireland aims to:

- Improve the competitiveness of the agriculture, forest and food industries
- Improve the sustainable management of the region's natural resources
- Develop and improve rural areas

Schemes available under Northern Ireland's RDP include:

Environmental Farming Scheme

The Environment Farming Scheme offers farmers a five year agreement to deliver a range of environmental measures via three level:

- A higher level, primarily for environmentally designated sites and other priority habitats
- A wider level to deliver benefits across the countryside, outside of environmentally designated areas
- A group level to support co-operative action by farmers in specific areas such as a river catchment

Business Development Groups

The scheme uses a group approach to improve efficiency of farm businesses and offers participants the opportunity to gain a level 3 qualification. Farmers participating in the scheme benchmark their business to identify areas that have the potential to be improved. A business development plan is then created to identify the actions to be taken to improve the technical efficiency of the business and improve the sustainability of the farm.

Forestry Grant Schemes

Three schemes are available, Forest Expansion Scheme, Forest Protection Scheme and Woodland Investment Grant that provide support for the expansion or creation of woodland or forestry, preventing and restoring pest and disease damage to forests and to improve resilience and environmental value of woodlands.

Farm Business Improvement Scheme

This scheme also includes the Business Investment Scheme (BIS). Support is available to assist farmers to invest in their farm business and to improve their profitability. Funds can be used to construct new farm buildings and refurbishment of existing buildings, purchase machinery, equipment to improve nutrient management, investments to improve resource efficiency and renewable energy feasibility studies.

Agri-food Processing Investment Scheme

This scheme helps to add more value to agriculture produce by encouraging better production methods to achieve premium prices on quality products and to improve promotion and labelling. Support is available for new technology, creation and modernisation of the supply chain, food safety management systems and feasibility studies for renewable energy.

Areas of Natural Constraint (ANC) Scheme

The ANC Scheme provides a payment to farmers with land in the severely disadvantaged area (SDA) to compensate for all or part of the additional costs and income forgone related to the constraints of agricultural production in the area.

Rural Economic Development Schemes (including LEADER)

A range of schemes are available to help the economic development of rural areas. Funds can be used to invest in the creation and development of micro and small businesses in rural areas for non-agricultural activities (including farm diversification), small broadband projects, basic services, small rural tourism projects that are in line with tourist board priorities and for cross border LEADER co-operation projects.

Rural Tourism

This scheme invests in natural and built heritage projects that can act as a key driver for encouraging rural tourism and particularly out of state visitors whilst preserving the natural assets of the rural community. The scheme will be open to Local Authorities and should align with the objectives of Tourism NI.

Further details of the Rural Development Programme can be found at: <https://www.daera-ni.gov.uk/articles/2014-2020-rural-development-programme>

Cross Compliance

In order to receive CAP support payments based on European and Scottish legislation, Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Condition (GAEC) standards must be met; together they are known as “Cross Compliance”.

Under the current CAP the following SMRs apply in **Scotland**:

Environment and climate change

- SMR 1** Nitrate Vulnerable Zones
- SMR 2** Conservation of wild birds
- SMR 3** Conservation of flora and fauna

Public health, animal health and plant health

- SMR 4** Food and feed law
- SMR 5** Restrictions on the use of substances having hormonal or thyrostatic action and beta-agonists in farm animals
- SMR 6** Pig identification and registration
- SMR 7** Cattle identification and registration
- SMR 8** Sheep and goat identification
- SMR 9** Prevention and control of transmissible spongiform encephalopathies (TSEs)
- SMR 10** Restriction on the use of plant protection products

Animal welfare

- SMR 11** Welfare of calves
- SMR 12** Welfare of pigs
- SMR 13** Welfare of farmed animals

The GAEC requirements are as follows:

- GAEC 1** Buffer strips along watercourses
- GAEC 2** Abstraction of water for irrigation
- GAEC 3** Protection of groundwater against pollution
- GAEC 4** Minimum soil cover
- GAEC 5** Minimum land management reflecting site specific condition to limit erosion
- GAEC 6** Maintenance of soil organic matter
- GAEC 7** Retention of landscape features

See page 488 for specific details on some of these GAEC requirements.

Rules in England, Wales and Northern Ireland may differ. To ensure compliance with current SMRs and GAEC in each region, more information can be found at:

Scotland:

<https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance>

<https://www.fas.scot/publications/>

England:

<https://www.gov.uk/guidance/cross-compliance-2017>

Wales:

<http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/crosscompliance/?lang=en>

Northern Ireland:

<https://www.daera-ni.gov.uk/publications/cross-compliance-2017>

Credit

Amortisation Table

The table below can be used to estimate the annual charge to service the repayment of loan capital and interest per £1,000 borrowed.

Years	Percentage rate of interest								
	2	3	4	5	6	7	8	9	10
1	1,020	1,030	1,040	1,050	1,060	1,070	1,080	1,090	1,100
2	515	523	530	538	545	553	561	568	576
3	347	354	360	367	374	381	388	395	402
4	263	269	275	282	289	295	302	309	315
5	212	218	225	231	237	244	250	257	264
6	179	185	191	197	203	210	216	223	230
7	155	161	167	173	179	186	192	199	205
8	137	142	149	155	161	167	174	181	187
9	123	128	134	141	147	153	160	167	174
10	111	117	123	130	136	142	149	156	163
11	102	108	114	120	127	133	140	147	154
12	95	100	107	113	119	126	133	140	147
13	88	94	100	106	113	120	127	134	141
14	83	89	95	101	108	114	121	128	136
15	78	84	90	96	103	110	117	124	131
20	61	67	74	80	87	94	102	110	117
25	51	57	64	71	78	86	94	102	110
30	45	51	58	65	73	81	89	97	106
40	37	43	51	58	66	75	84	93	102

Example:

The annual charge to service the interest and capital repayments on £8,000 repayable over 10 years at 5% would be £130 x 8 = £1,040. The payment at 6% would be £136 x 8 = £1,088.

The annual charge is given by:

$$C \times \left(\frac{r(1+r)^n}{(1+r)^n - 1} \right)$$

where: C = capital investment
 r = rate of interest (to 2 decimal places)
 n = years of repayment

Sinking Fund Table

The following table can be used to estimate the capital accruing to a regular annual investment of £100.

Years	Percentage rate of interest								
	2	3	4	5	6	7	8	10	12
1	100	100	100	100	100	100	100	100	100
2	202	203	204	205	206	207	208	210	212
3	306	309	312	315	318	321	325	331	337
4	412	418	425	431	437	444	451	464	478
5	520	531	542	553	564	575	587	611	635
6	631	647	663	680	698	715	734	772	812
7	743	766	790	814	839	865	892	949	1,009
8	858	889	921	955	990	1,026	1,064	1,144	1,230
9	975	1,016	1,058	1,103	1,149	1,198	1,249	1,358	1,478
10	1,095	1,146	1,201	1,258	1,318	1,382	1,449	1,594	1,755
11	1,217	1,281	1,349	1,421	1,497	1,578	1,665	1,853	2,065
12	1,341	1,419	1,503	1,592	1,687	1,789	1,898	2,138	2,413
13	1,468	1,562	1,663	1,771	1,888	2,014	2,150	2,452	2,803
14	1,597	1,709	1,829	1,960	2,102	2,255	2,421	2,797	3,239
15	1,729	1,860	2,002	2,158	2,328	2,513	2,715	3,177	3,728
20	2,430	2,687	2,978	3,307	3,679	4,100	4,576	5,727	7,205
25	3,203	3,646	4,165	4,773	5,486	6,325	7,311	9,835	13,333
30	4,057	4,758	5,608	6,644	7,906	9,446	11,328	16,449	24,133

Example:

The capital accruing after 10 years to the regular annual investment of £600 at 5% would be £1,258 x 6 = £7,548. At 6%, the capital accrued would be £1,318 x 6 = £7,908.

The terminal sum is given by:

$$d \times \left(\frac{(1 + r)^n - 1}{r} \right)$$

where: d = regular annual investment
 r = rate of interest (to 2 decimal places)
 n = years of repayment

Approximate Annual Percentage Rates of Annual Nominal Rates

As an aid to assessing finance deals, the following table estimates the equivalent annual percentage interest rates (APR's) for a range of nominal annual rates (e.g. 2% above base rate of 1% = 3%) and various charging regimes.

Annual nominal rate (%)	Approximate annual percentage rate equivalent (%)		
	Monthly charging	Quarterly charging	Half-yearly charging
2	2.0	2.0	2.0
3	3.0	3.0	3.0
4	4.1	4.1	4.0
5	5.1	5.1	5.1
6	6.2	6.1	6.1
7	7.2	7.2	7.1
8	8.3	8.2	8.2
9	9.4	9.3	9.2
10	10.5	10.4	10.3
11	11.6	11.5	11.3
12	12.7	12.6	12.4
13	13.8	13.6	13.4
14	14.9	14.8	14.5
15	16.1	15.9	15.6

Example:

A nominal interest rate of 5% with monthly charging gives an approximate annual percentage rate of 5.1%. A nominal rate of 6%, gives an annual percentage rate (APR) of 6.2%.

The approximate annual percentage rate is given by:

$$\left[\left(1 + \frac{n}{p} \right)^p - 1 \right] \times 100$$

where: n = nominal interest rate (expressed as a decimal)
p = number of instalments per year

Approximate Annual Percentage Rates of Annual Flat Rates

Where interest on finance is quoted as flat rate on the original amount borrowed, the following table can be used to estimate the equivalent annual percentage rate (APR) for equal monthly repayments of interest and capital.

Annual flat rate (%)	Approximate annual percentage rate equivalent (%) for loans over:			
	1 year	5 years	10 years	15 years
4	7.5	7.6	7.3	7.0
5	9.4	9.5	9.0	8.6
6	11.4	11.4	10.7	10.1
7	13.4	13.2	12.3	11.6
8	15.4	15.0	13.9	13.0
9	17.4	16.8	15.5	14.4
10	19.5	18.7	17.0	15.8
11	21.6	20.5	18.6	17.2
12	23.6	22.3	20.1	18.6

Example:

The APR for a loan at an annual flat rate of 6% repaid by monthly instalments over 5 years will be 11.4%.

Compounding Table

This table estimates the future monetary value of £100 after n years at various interest rates.

Years	Percentage rate of interest									
	3	4	5	6	7	8	10	12	14	16
1	103	104	105	106	107	108	110	112	114	116
2	106	108	110	112	114	117	121	125	130	135
3	109	112	116	119	123	126	133	140	148	156
4	113	117	122	126	131	136	146	157	169	181
5	116	122	128	134	140	147	161	176	193	210
6	119	127	134	142	150	159	177	197	219	244
7	123	132	141	150	161	171	195	221	250	283
8	127	137	148	159	172	185	214	248	285	328
9	130	142	155	169	184	200	236	277	325	380
10	134	148	163	179	197	216	259	311	371	441
11	138	154	171	190	210	233	285	348	423	512
12	143	160	180	201	225	252	314	390	482	594
13	147	167	189	213	241	272	345	436	549	689
14	151	173	198	226	258	294	380	489	626	799
15	156	180	208	240	276	317	418	547	714	927
20	181	219	265	321	387	466	673	965	1,374	1,946
25	209	267	339	429	543	685	1,083	1,700	2,646	4,087
30	243	324	432	574	761	1,006	1,745	2,996	5,095	8,585

Example:

The value of £1,200 at 5% after 8 years would be £148 x 12 = £1,776. At 6%, it would be £159 x 12 = £1,908.

The compounding factor is given by: $(1 + r)^n$

where: r = rate of interest (expressed as a decimal)
 n = number of years

Annuity Tables

Discount factors for calculating the present value of future cash flows where cash flows are **regular**.

Years	Percentage											
	1	2	3	4	5	6	7	8	9	10	11	12
1	0.99	0.98	0.97	0.96	0.95	0.94	0.94	0.93	0.92	0.91	0.90	0.89
2	1.97	1.94	1.91	1.89	1.86	1.83	1.81	1.78	1.76	1.74	1.71	1.69
3	2.94	2.88	2.83	2.78	2.72	2.67	2.62	2.58	2.53	2.49	2.44	2.40
4	3.90	3.81	3.72	3.63	3.55	3.47	3.39	3.31	3.24	3.17	3.10	3.04
5	4.85	4.71	4.58	4.45	4.33	4.21	4.10	3.99	3.89	3.79	3.70	3.61
6	5.80	5.60	5.42	5.24	5.08	4.92	4.77	4.62	4.49	4.36	4.23	4.11
7	6.73	6.47	6.23	6.00	5.79	5.58	5.39	5.21	5.03	4.87	4.71	4.56
8	7.65	7.33	7.02	6.73	6.46	6.21	5.97	5.75	5.53	5.34	5.15	4.97
9	8.57	8.16	7.79	7.44	7.11	6.80	6.52	6.25	6.00	5.76	5.54	5.33
10	9.47	8.98	8.53	8.11	7.72	7.36	7.02	6.71	6.42	6.15	5.89	5.65
11	10.37	9.79	9.25	8.76	8.31	7.89	7.50	7.14	6.81	6.50	6.21	5.94
12	11.26	10.58	9.95	9.36	8.86	8.38	7.94	7.54	7.16	6.81	6.49	6.19
13	12.13	11.35	10.64	9.99	9.39	8.85	8.36	7.90	7.49	7.10	6.75	6.42
14	13.00	12.11	11.30	10.56	9.90	9.30	8.75	8.24	7.79	7.37	6.98	6.63
15	13.87	12.85	11.94	11.12	10.38	9.71	9.11	8.56	8.06	7.61	7.19	6.81
20	18.05	16.35	14.88	13.59	12.46	11.47	10.59	9.82	9.13	8.51	7.96	7.47
25	22.02	19.52	17.41	15.62	14.09	12.78	11.65	10.67	9.82	9.08	8.42	7.84
30	25.81	22.40	19.60	17.29	15.37	13.76	12.41	11.26	10.27	9.43	8.69	8.06

Years	Percentage											
	13	14	15	16	17	18	19	20	25	30	35	40
1	0.89	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.80	0.77	0.74	0.71
2	1.67	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.44	1.36	1.29	1.22
3	2.36	2.32	2.28	2.25	2.21	2.17	2.14	2.11	1.95	1.82	1.70	1.59
4	2.97	2.91	2.86	2.80	2.74	2.69	2.64	2.59	2.36	2.17	2.00	1.85
5	3.52	3.43	3.35	3.27	3.20	3.13	3.06	2.99	2.69	2.44	2.22	2.04
6	4.00	3.89	3.78	3.68	3.59	3.50	3.41	3.33	2.95	2.64	2.39	2.17
7	4.42	4.29	4.16	4.04	3.92	3.81	3.71	3.60	3.16	2.80	2.51	2.26
8	4.80	4.64	4.49	4.34	4.21	4.08	3.95	3.84	3.33	2.92	2.60	2.33
9	5.13	4.95	4.77	4.61	4.45	4.30	4.16	4.03	3.46	3.02	2.67	2.38
10	5.43	5.22	5.02	4.83	4.66	4.49	4.34	4.19	3.57	3.09	2.72	2.41
11	5.69	5.45	5.23	5.03	4.84	4.66	4.49	4.33	3.66	3.15	2.75	2.44
12	5.92	5.66	5.42	5.20	4.99	4.79	4.61	4.44	3.73	3.19	2.78	2.46
13	6.12	5.84	5.58	5.34	5.12	4.91	4.71	4.53	3.78	3.22	2.80	2.47
14	6.30	6.00	5.72	5.47	5.23	5.01	4.80	4.61	3.82	3.25	2.81	2.48
15	6.46	6.14	5.85	5.58	5.32	5.09	4.88	4.68	3.86	3.27	2.83	2.48
20	7.02	6.62	6.26	5.93	5.63	5.35	5.10	4.87	3.95	3.32	2.85	2.50
25	7.33	6.87	6.46	6.10	5.77	5.47	5.20	4.95	3.98	3.33	2.86	2.50
30	7.50	7.00	6.57	6.18	5.83	5.52	5.23	4.98	4.00	3.33	2.86	2.50

Example:

The present value of £350 received each year for 6 years at 5% discount rate is £350 x 5.08 = £1,778. At 6%, the present value is £350 x 4.92 = £1,722.

The discount factor is given by:

$$\frac{1 - (1 + r)^{-n}}{r} \quad \text{where: } r = \text{rate of discount}$$

$$n = \text{number of years}$$

Discount Tables

Discount factors for calculating the present value of future cash flows where cash flows are **irregular**.

Years	Percentage											
	1	2	3	4	5	6	7	8	9	10	11	12
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059

Years	Percentage											
	13	14	15	16	17	18	19	20	25	30	35	40
1	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.800	0.769	0.741	0.714
2	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	0.640	0.592	0.549	0.510
3	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	0.512	0.455	0.406	0.364
4	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	0.410	0.350	0.301	0.260
5	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	0.328	0.269	0.223	0.186
6	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	0.262	0.207	0.165	0.133
7	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	0.210	0.159	0.122	0.095
8	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	0.168	0.123	0.091	0.068
9	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	0.134	0.094	0.067	0.048
10	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	0.107	0.073	0.050	0.035
11	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	0.086	0.056	0.037	0.025
12	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	0.069	0.043	0.027	0.018
13	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	0.055	0.033	0.020	0.013
14	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	0.044	0.025	0.015	0.009
15	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	0.035	0.020	0.011	0.006
20	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026	0.012	0.005	0.002	0.001
25	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010	0.004	0.001	0.001	0.000

Example: To find the present value of the following cash flows at 5% discount rate of interest.

Year	Cash flow (£)	Discount factor	Present value (£)	
1	250	0.952	238	The Present Value of this series of cash flows is £995
2	300	0.907	272	
3	180	0.864	155	
4	400	0.823	329	

The discount factor is given by

$$\frac{1}{(1 + r)^n}$$

where: r = rate of discount
n = number of years

Long-Term Loans

Long-term finance might be obtained from banks, mortgage providers, insurance companies, finance companies, solicitors, or by private arrangement. These loans are generally secured against the value of existing property and other business assets.

Long-term loans tend to be used for purchasing fixed assets and are structured as an agricultural mortgage or secured loans typically extending between 5 and 25 years at fixed and/or variable interest. Interest payments can be arranged to tie in with cashflow but would usually be charged monthly or quarterly, however, there are alternative options e.g. of paying interest in half-yearly or annual instalments although this tends to be more expensive. Interest only periods are potentially available prior to moving to capital repayments. Frequency of capital repayments will be subject to negotiation with the lender. Capital repayments are generally packaged together with accrued interest in monthly payments. It may be agreeable with the lender to defer capital repayment or repay a lump sum on a fixed date each year.

It is necessary for the business borrowing the money to be deemed financially secure and demonstrate the ability to service the loan. This will be determined based on past financial performance, an updated balance sheet, cash flow budgets and perceived risk of the proposed venture.

Long-term loans can typically pass from generation to generation. In other words a loan is not repayable on the death of a borrower and cannot be recalled for the term of the loan provided that obligations continue to be met.

Medium-Term and Short-Term Credit

Banks

Banks, the primary source of medium and short-term capital, may agree to grant farmers an overdraft to meet business financial requirements.

Overdrafts are reviewed annually; the interest rate, subject to the security available, is competitive, and interest is charged daily only on the daily balance outstanding. Generally, an arrangement fee will be charged and, in some cases, a renewal fee.

In terms of medium term loans, 10-year term loans are most common. Interest is related to commercial and market factors but have historically been lower than overdraft rates (particularly if adjusted for any overdraft rearrangement fees).

Merchants and tradesmen

A popular form of short-term financing. Finance is often in the form of credit allowed by merchants, auctioneers, tradesmen and dealers over a

wide range of commodities and farm requisites, including livestock and implements. Rates of interest vary widely and can be relatively cheap over one or two months, but can rise to as high as 4% per month on accounts outstanding for several months.

Mart credit

Farmers buying livestock can obtain up to 12 months credit. Interest rates quoted vary depending on term and amount borrowed. Other arrangements are possible whereby a farmer may borrow capital from a mart for finishing stock purchased from the mart. Interest will be charged on the stock during the finishing period which is then deducted from the sale price achieved for the stock. The stock remains the property of the mart and must be resold through the mart or to an associated abattoir/meat processing company.

Hire purchase

Hire purchase is currently the most popular form of finance used by UK farmers. This type of finance covers identifiable products such as plant and machinery, and livestock. It offers 100% ownership at the end of the repayment period.

Credit is supplied by a finance company but the arrangements are often carried out through the dealer who made the sale. Repayment periods are usually from two to four years with payment by standing order. Payments are for capital and interest and are usually offered on a fixed rate basis. However, this form of finance can be more expensive than an overdraft, because the lender is offering less security.

Contract hire and leasing

Leasing is usually used for equipment or vehicles. Breeding livestock can also be leased. However, leasing costs can vary considerably and the details of a contract should be studied carefully before entering into an agreement. The tax aspects should be discussed with an accountant. Two types of leasing exist:

Finance Lease - Offers use of an asset for an agreed period without ownership. Payments are normally fixed for a defined period of time (usually 2 to 5 years). After this period, the farmer can either continue to use the equipment at a nominal rent (which can vary from nothing to 1.5% of capital cost), or, with the finance company's permission, sell the equipment. Dependent on arrangements, the farmer may obtain 90% to 100% of the sale value to be used as a refund or a down-payment.

Operating Lease - Appropriate for the use of equipment for less than its full economic life. The farmer takes the risk of the equipment becoming obsolete and is responsible for all repairs, maintenance and insurance. The residual value of the asset is usually set at the outset, based on the estimated use throughout the term. In most cases, this is more expensive than a finance lease.

The advantages of leasing schemes (machinery and livestock) depend on the individual's circumstances. Leasing is a complex subject and it is advisable to seek professional advice to assess the best financial alternative.

Taxation

Introduction

This section is designed to provide background information on how tax may affect the farm business and contains a summary of how the system operates. Tax is an increasingly complex subject and we now have seven different rates of income tax alone. New allowances for dividend income and savings income are welcome but add complications to the tax calculations for seemingly straightforward situations. It is stressed that it is essential that professional advice should be obtained before any action is taken which may affect your liability to taxation. Although every effort has been made to provide accurate details, no responsibility can be taken for any omissions that may have occurred in the treatment of this specialised field.

The Taxation section of the Handbook has been updated by Chiene + Tait LLP. Chiene + Tait is a large independent accountancy firm based in Edinburgh. Chiene + Tait offers an extensive range of personal, business and advisory services to a wide range of clients and has a significant agricultural practice. If you would like to discuss the range of services provided by Chiene + Tait please contact Helen Mackenzie or Rory Kennedy (0131 558 5800).

Income Tax

Income tax is calculated by applying the appropriate rates to taxable income. The amount of a person's income chargeable to tax in any year is calculated according to the specific rules applicable to the various types of income. Farming profits are assessed as trading income.

The net profit in the accounts usually requires adjustment because some costs may appear in the accounts which are not allowable for tax purposes (e.g. depreciation) and some income may not be subject to income tax at all, or not taxed as trading income.

Main Income Tax reliefs

<i>Allowed at top rate of tax</i>	<i>2017/18</i>	<i>2016/17</i>
Personal Allowance ¹	£11,500	£11,000
Blind Person's Allowance	£2,320	£2,290
Marriage Allowance ²	£1,150	£1,100
Dividend Tax Allowance (DTA) ³	£5,000	£5,000
Personal Savings Allowance (PSA) ⁴		
- Basic Rate Taxpayer	£1,000	£1,000
- Higher Rate Taxpayer	£500	£500

<i>Allowed only at 10%</i>		
Married Couple's Allowance (MCA) ⁵	£8,445	£8,355
Income limit for age-related allowances	£27,700	£27,700

- 1 The personal allowance is withdrawn at £1 for every £2 by which total income exceeds £100,000 such that allowances become nil at income of £123,000.
- 2 Up to 10% of the personal allowance can be transferred to a spouse who is no more than a basic rate taxpayer. Not available if the married couple's allowance is being claimed.
- 3 The DTA taxes the first £5,000 of dividend income at 0%.
- 4 The PSA operates as a nil rate band for interest income.
- 5 Only available if born before 6th April 1935.

Income Tax bands and rates

	<i>2017/18</i>	<i>2016/17</i>
Basic rate band	£33,500	£32,000
Higher rate band	£33,501 - £150,000	£32,001 - £150,000
Additional rate band	over £150,000	over £150,000

The tax rates differ for General income (G - salary, pensions, business profits, rent), Savings income (S - interest) and Dividend income (D).

	<i>2017/18</i>			<i>2016/17</i>		
	G	S	D	G	S	D
Basic rate	20%	20%	7.5%	20%	20%	7.5%
Higher rate	40%	40%	32.5%	40%	40%	32.5%
Additional rate	45%	45%	38.1%	45%	45%	38.1%

The Dividend Tax Credit which applied up to 2015/16 has been abolished. In 2015/16, a net dividend of £90 would be deemed to be £100 of taxable income with a 10% tax credit attached. A basic rate taxpayer would pay no additional tax. For 2016/17 and later years, the taxable sum will be the £90 received. The first £5,000 of dividend income will be tax free but for dividends above that level, the true comparative tax rates on the net sum received is as follows:

	<i>2017/18</i>	<i>2016/17</i>
Basic Rate	7.5%	0%
Higher Rate	32.5%	25%
Additional Rate	38.1%	30.6%

Scottish Rate of Income Tax (SRIT)

The Scottish Parliament has the power to vary the rate of income tax applying to General Income only. The rate is set by deducting 10% from each of the rate bands and adding the SRIT. For 2017/18, the SRIT has been set at 10% so this means that the tax rates in Scotland will be the same as the rest of the UK for 2017/18.

From April 2017, the Scottish Parliament has the authority to vary the rate bands as well as the actual tax rates. The SRIT will apply to General Income belonging to a "Scottish Taxpayer" regardless of where that income arises. The rules for defining a "Scottish Taxpayer" can be

complicated but will broadly apply where the individual's main family home is in Scotland.

The Scottish Parliament decided that the basic rate band should remain unchanged for 2017/18. This means that the Scottish income tax bands and rates applicable to General Income for 2017/18 are as follows:

	2017/18
Basic Rate	£32,000
Higher Rate	£32,001 - £150,000
Additional Rate	over £150,000

For 2017/18 onwards, a Scottish Taxpayer who has General income (salary, pensions, business profits, rents) as well as Savings income and Dividend income will need to consider both the UK tax rates and tax bands and the Scottish rates and tax bands in order to work out their income tax liability.

Important investment annual limits

	2017/18	2016/17
Individual Savings Account (ISA)	£20,400	£15,240
Junior ISA ¹	£4,128	£4,080
Enterprise Investment Scheme (EIS) ²	£1,000,000	£1,000,000
Seed Enterprise Investment Scheme (SEIS) ³	£100,000	£100,000
Venture Capital Trust (VCT) ²	£200,000	£200,000

¹ Available from 20 November 2011 to all UK resident children who do not have a Child Trust Fund account. From 6 April 2015 it has been possible to transfer a Child Trust Fund to a Junior ISA.

² Income Tax relief at 30% for both EIS and VCT

³ Income Tax relief at 50% for SEIS

Full details of the rates of income tax and the main allowances can be found on the HM Revenue and Customs (HMRC) website at www.gov.uk.

Property Rental Income

From 6 April 2017 tax relief on finance costs for rental businesses will be restricted and the tax relief will ultimately be restricted to the basic rate. Until 5 April 2017, any finance costs incurred annually were offset against rental income when calculating taxable profits. This change will only apply to individuals who own let residential property.

Tax Credits

The system of tax credits is a method by which financial support is given to those in work, or with children, on low incomes. Tax credits comprise working tax credits and child tax credits. The term tax credits is a

misnomer: tax credits are a form of financial support, and they are administered by HMRC. The financial support (itself tax-free) consists of payments to claimants, and not offsets against tax liabilities. The income tax system treats members of a family independently. By contrast, tax credits are based, where appropriate, on the circumstances of couples living together, whether married or not.

Further information on tax credits can be found on the tax credit website at www.gov.uk.

Pensions

It is recognised that state pensions do not provide an adequate income in old age and it is for this reason that individuals may wish to contribute to pensions other than under the state pension scheme. Pension contributions attract tax relief up to set limits and the contributions are accumulated in a fund that is free of income tax and capital gains.

The rules for tax relief on pension contributions have undergone significant changes over the years with a view to simplification. Complications remain with rules for the carry forward of unused relief and advice should be taken on the tax implications before a pension contribution is made. Broadly, however, anyone can contribute up to £3,600 (gross) each year, regardless of earnings. Pension payments are made net of basic rate tax relief so the individual would pay £2,880 and the government would add £720 to the pension fund to bring the total up to the £3,600 figure. Higher rate tax relief if applicable is then given through the individual's self assessment tax return or PAYE code. For 2017/18, the maximum tax-efficient contribution will generally be £40,000 (gross) or 100% of current earnings unless there is unused pension relief available to carry forward from the previous tax years. With effect from 6 April 2016 the maximum contribution is tapered where 'adjusted income' (i.e. including pension contributions) is more than £150,000. The reduction is £1 for every £2 of income over £150,000 and the minimum allowance will be £10,000.

There is also a lifetime limit to the value an individual can contribute to a pension fund tax efficiently. For 2017/18, the "lifetime allowance" is £1,000,000.

Occupational schemes are available to employees who have an employer offering such a scheme and the Pensions Act 2008 included provisions requiring employers to set up pension arrangements for all employees. The rules for compulsory work pensions include a new government "auto-enrolment" scheme called the National Employment Savings Trust (NEST). There are now alternative private pension providers offering auto-enrolment scheme options in addition to the government NEST scheme. The implementation date for compulsory pensions is phased according to the number of employees. Staging

dates started in the final quarter of 2012 for the largest employers and all existing employers will have to comply by the end of 2017.

From 6 April 2015, those with a money purchase pension (i.e. not final salary schemes) will be able to have unrestricted access to the full value of their pension fund. Any withdrawals above the level of the tax free amount (currently 25%) will be taxed at the individual's marginal rate of income tax. To prevent recycling funds into another pension to increase the tax relief available, a Money Purchase Annual Allowance (MPAA) was introduced. Until 5 April 2017 the MPAA was £10,000, however, with effect from 6 April 2017 it was reduced to £4,000.

Recent changes to the punitive 55% tax charge on death have resulted in pensions becoming increasingly beneficial for inheritance tax planning matters.

Capital Allowances

<i>Main capital allowances - plant and machinery</i>	<i>Allowance %</i>
Annual Investment allowance: £200,000 (from 1 Jan 2016)	100
Certain energy and water efficient equipment, cars CO ₂ 75g/km or less	100
Writing down allowance: general pool*	18
Writing down allowance: special rate pool*	8

* The special rate pool includes long life assets, integral plant in buildings, thermal insulation, solar shading and cars with CO₂ emissions over 130g/km. The general pool contains other plant and machinery.

In the accounts it is normal practice to write-off part of the cost of plant, machinery, vehicles and buildings as depreciation each year. In calculating taxable income, this depreciation is added back to profit, and capital allowances are deducted.

Since 6 April 2008, it has been possible to claim a new 100% Annual Investment Allowance (AIA) for plant and machinery (excluding cars). The AIA has been as high as £500,000 but it was reduced to £200,000 from 1 January 2016.

For new cars bought from 6 April 2009 onwards, allowances will be related to the CO₂ rating of the car. New cars with a rating below 75g/km will enjoy a 100% first year allowance. Cars with a rating up to 130g/km will go into the general pool and receive 18% allowances (restricted to £3,000 per annum if the car cost more than £3,000). Cars with higher ratings will go into the special rate pool and only receive 8% allowances. From April 2018 the CO₂ threshold will be reduced to 110g/km.

Capital allowances can no longer be claimed for expenditure on agricultural buildings or works.

Expenditure on integral features of a building such as electrical and lighting systems, cold water and water heating systems and expenditure on solar panels qualifies for special rate allowances at 8%.

Following the abolition of agricultural buildings allowances farmers should review their expenditure on buildings to ensure that any expenditure which may qualify for plant and machinery or integral features allowances are identified. It is also important to review the timing of capital expenditure to maximise allowances.

Losses

When an individual makes a trading loss for a tax year, the loss can be relieved against any other income of the same tax year, against any other income of the previous tax year, against capital gains of either year or by carry forward against future trading profits from the same trade. There are also special loss relief rules for losses made in the early years of a business and the last twelve months before the cessation of trade.

However, from 6 April 2013, the amount of *income tax* loss relief available to an individual in a tax year in respect of a trade loss is capped at the greater of £50,000 or 25% of income.

In addition, the amount of loss relief that a sole trader or partner may claim against general income has been limited to £25,000 if the loss is from *non active trades*. An individual is deemed to be non active if they spend an average of less than 10 hours per week personally engaged in the trade's activities. The existing rules for restricting tax relief for losses incurred for more than five consecutive tax years under the "hobby farming" provisions also still apply.

For companies, trading losses can be offset against other profits in the same group or carried forward indefinitely and are available for offset against profits of the same trade.

Relief for Fluctuating Profits (Averaging)

Relief for fluctuating profits (averaging) is available to any individual or partnership carrying on a trade of farming or market gardening. Prior to April 2016, it was possible to average two consecutive years of assessment where the profits of one year are at least 30% below the profits of the other. From April 2016, it will be possible to choose to average over a five year period.

Averaging claims can result in significant savings of tax and national insurance contributions. Averaging is a valuable relief for farmers, particularly now that income tax rates can be as high as 45% but the new five year option will result in significant work being required to calculate the benefits of an averaging claim.

Herd Basis of Livestock Valuation

Under the herd basis of livestock valuation, fluctuations in the value of production animals are not taken into account in computing profits, nor is the cost of the original herd or flock deductible. The values of the original production stock numbers are held constant throughout the period that the herd is in existence.

An election to adopt the herd basis of livestock valuation can normally only be made at a time when a production herd is first kept and provided that a herd of that class has not been kept in the preceding five years. Once made, an election is irrevocable and will come to an end only on ceasing to keep a production herd of the particular class for a period of five years or on a change of business structure, e.g. when a sole trader introduces a partner to the business. The time limit for making an election to adopt the herd basis of valuation is two years after the end of the first tax year affected by the purchase of the herd.

The advantage of the herd basis is the exclusion from taxable profit of changes in value of production animals. In addition, when a whole herd or a substantial part of it (over 20%) is sold without replacement, any difference between sale value and book value is not taxable for income tax or capital gains tax purposes.

Self Assessment Procedures

Every personal tax return carries a self assessment section in which the taxpayer is normally expected to calculate his or her own income tax and capital gains tax liability. The submission deadline for paper tax returns is 31 October following the end of the tax year. The submission deadline for tax returns delivered electronically is 31 January following the end of the tax year. Penalties are imposed for the late submissions of tax returns.

Tax liabilities are settled via two interim payments on account and a final balancing payment. The two interim payments on account are payable on 31 January during the tax year and 31 July following the end of the tax year. The balance of any income tax due and the full amount of any capital gains tax due is payable on 31 January following the end of the tax year. Interest and surcharges will be due on tax paid late.

Records of personal income, such as bank interest and dividend income should be retained for a period of one year and ten months following the year of assessment to which they relate unless the taxpayer also has a business or let property in which case all records must be kept for five years and ten months.

Corporation Tax Procedures

Companies have 12 months from the end of the accounting period to file their tax return. For most companies, tax payments are due nine months and 1 day after the end of the accounting period and large companies pay tax in instalments.

Corporation Tax Rates

Year to 31 March 2018

Main rate	19%
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All companies now pay the same rate of tax on profits regardless of the level of profits generated.

If the firm trade is carried on through the medium of a company, corporation tax on the profits has to be paid by the company.

Corporation tax is charged on the trading profits, capital gains and other income of an accounting period. Directors' salaries and fees are a charge against profit. Capital allowances are deducted where expenditure is incurred on the acquisition of qualifying plant and machinery.

Annual Tax on Enveloped Dwellings

From 1 April 2013 an annual tax charge has been imposed on certain "non-natural persons" (broadly, companies, partnerships with a corporate partner and collective investment schemes) which hold UK residential dwellings. From 1 April 2016 properties valued at more than £500,000 on specific valuation dates are subject to the charge. For 2017/18 the charge is determined as follows:

Property Value	Annual Tax Charge
£500,000 - £1,000,000	£3,500
£1,000,001 - £2,000,000	£7,050
£2,000,001 - £5,000,000	£23,550
£5,000,001 - £10,000,000	£54,950
£10,000,001 - £20,000,000	£110,100
More than £20,000,000	£220,350

A capital gains tax charge may also arise on disposal of such properties and a 15% SDLT or LBTT charge may arise on the acquisition of such properties (see below for further details).

Capital Gains Tax

Annual exempt amount 2017/18: individuals £11,300, most trustees £5,650. The Capital Gains Tax (CGT) rates for 2017/18 have been reduced from 18% (for the element within the basic rate band) and 28% to 10% and 20% unless the taxable gain relates to residential property. Gains on residential property will continue to attract the higher 18%/28% rates.

CGT is a tax on the increase in value of certain property which is sold or given away in a lifetime. It applies to the sale or gift of assets such as land, shares, or other capital assets. CGT does not apply to transfers of cash or the disposal of trading stock. Lifetime gifts between spouses do not give rise to a chargeable gain.

Capital losses are set against other capital gains of the same year or carried forward to reduce gains in excess of the annual exemption in future years. Capital losses cannot be carried back unless they arise in the year of death.

From, 1 April 2013, CGT is payable at 28% in respect of any gain arising from the disposal of residential property owned by UK resident or non-UK resident “non-natural persons”.

From 6 April 2015, CGT is payable on the disposal of UK residential property by non-resident individuals. On sale, there are two options. The property value can be rebased at 5 April 2015 and the chargeable gain arising on disposal will be the difference between the 5 April 2015 valuation and the value at date of sale. Alternatively, the gain arising over the whole period of ownership can be calculated and apportioned, with only the element of the gain arising after 6 April 2015 being liable to capital gains tax.

Entrepreneurs’ Relief applies to disposals of a sole trade or interest in a partnership trade, or shares in a trading company where the shareholder owns at least 5% of the ordinary share capital **and** has at least 5% of the voting rights **and** is an officer or employee of the company. There is a requirement to meet the qualifying criteria for a minimum period of 12 months. Qualifying gains are taxed at 10% up to a lifetime maximum of £10m.

Principal Private Residence Relief (PPR) will generally exempt the gain arising on the sale of the farmhouse and up to half a hectare of grounds. The relief will be restricted if any part of the residence is used solely for business purposes. Where a property had been occupied as the owner’s only or main residence, the last 18 months of ownership will qualify for PPR even if the property was no longer occupied.

Gift Relief is available on the gift of assets used in a trade carried on by the transferor, agricultural property (including tenanted land) or shares in an unquoted company. The capital gain is calculated as normal, but

does not become chargeable if both the transferor and the transferee agree to “hold over” the gain. If an election is made, the transferee will be deemed to acquire the asset at its open market value less the gain held over. In this way the tax charge is deferred until the transferee sells the asset at arms length. Gift relief is restricted if there has been any non business use of the asset. Previously only agricultural land in the UK qualified for relief, however, from 22 April 2009 land anywhere in the European Economic Area can qualify.

Roll Over Relief can be claimed when a capital asset which has been used for trade purposes (e.g. a building) is sold at a gain and the whole of the sales proceeds are invested in other qualifying assets to be used for trade purposes. The value of the new asset is deemed to be reduced by the amount of the gain arising on the sale of the first asset. The sale proceeds must be reinvested in the period commencing twelve months before and three years after the sale of the original asset. If the entire proceeds of the sale are not reinvested, only partial roll-over relief is available.

Inheritance Tax

Nil Rate Band (NRB) ¹	£325,000
Rate above NRB	40% ²
Lifetime transfers to certain trusts	20%
Annual exemption for lifetime gifts	£3,000
Small gifts - annual amount per donee	£250

¹ Frozen until 2017/18

² There is a reduced rate of 36% for an estate leaving 10% or more to charity on or after 6 April 2012

Tapering relief applies to reduce the tax on transfers within 7 years of death. The reduction in tax is 20% for survivorship of 3-4 years, 40% for 4-5, 60% for 5-6 and 80% for 6-7 years.

It should be noted that it is now possible for a nil rate band which is unused on a person’s death to be transferred to the estate of their spouse or civil partner. Chargeable transfers at death are subject to IHT, but there is no IHT charged on lifetime gifts to individuals. Such transfers are known as potentially exempt transfers (PETs). Where the donor dies within seven years of making a PET, the transfer is taxed on its value at the date of the gift, using the death rate scale applicable at the date of death.

A new tax free band worth £175,000 per individual (£350,000 per married couple) will be phased in from 2017 in respect of the transfer of an individual’s main home on death. The £350,000 allowance applies where the property is passed between spouses on first death and then on to children or grandchildren.

Combining the new allowance with the existing IHT Nil Rate Band of £325,000 per individual means that by 2020 a married couple will effectively have a combined NRB of £1million. However, this new allowance is only available in full where the value of the deceased estate is under £2million. In deceased estates with a value of over £2million, the allowance is reduced by £1 for every £2 over £2million. So by 2020 (when the allowance is £175,000) deceased estates with a value of more than £2.35million will not benefit from the allowance.

A number of transfers are left out of account in arriving at the cumulative total on which a person is chargeable. These include transfers between spouses, lifetime transfers made in a year up to a value of £3,000 and transfers to charities.

Wide ranging changes to IHT were announced in 2006 which have had a significant impact on UK estate planning using trusts. As a result of the scope and complexity of these trust rules it is not possible to consider the detail here. Farmers would be advised to consult their tax advisers to review the terms of existing trusts and their wills.

Agricultural and business property relief can in some circumstances reduce the value of the chargeable transfer to Nil.

Agricultural Property Relief (APR)

<i>Nature of property</i>	<i>Rate of Relief</i>
Vacant possession or right to obtain vacant possession within 12 months	100%
Agricultural land let after 1 September 1995	100%
Any other circumstances *	50%

* The 100% relief can apply in certain circumstances where land has been owned and let since before 10 March 1981 and by Extra Statutory Concession F17.

Agricultural Property Relief (APR) only applies to the agricultural value of farmland. Where the farm has additional development value this may qualify for Business Property Relief (BPR).

Agricultural property includes “such cottages, farm buildings and farmhouses, together with the land occupied with them, as are of a character appropriate to the property”. To qualify for APR, the transferor must either have farmed the agricultural property for two years before the transfer or have owned it for seven years before the transfer, during the whole of which time it has been occupied for the purposes of agriculture. As with gift relief, land anywhere within the EEA will qualify.

In order to obtain APR for a farmhouse it is necessary to show that the farmhouse is of a character and size appropriate to the property and the requirements of the farming activities conducted on the agricultural land.

Relief may therefore be denied where the farmhouse is excessively large in relation to the farm. The definition of farmhouses and other agricultural property has been considered in a number of cases. HMRC will review APR claims more or less as a matter of course and specialist advice may be needed now, i.e. on a proactive basis, or in the event of an HMRC challenge.

Business Property Relief (BPR)

<i>Nature of property</i>	<i>Rate of Relief</i>
Business or interest in a business	100%
Controlling shareholding in quoted company	50%
Shareholding in unquoted company	100%
Controlling holding in unquoted securities	100%
Settled property used in the business of a life tenant	100%/50%*
Land, buildings, plant used in company or partnership	50%

* 100% relief is available where the property is transferred with the business on death otherwise the 50% rate applies.

BPR is a relief against IHT on business assets, including a tenant's capital items such as machinery and livestock. To qualify for BPR, the property should have been owned by the claimant for two years before the transfer (or it must have replaced other qualifying assets owned for at least two out of the five years before the transfer). BPR is not available if the business or company is one of "wholly or mainly" dealing in securities, stocks or shares, land or buildings or in the making or holding of investments. Some business activities are borderline and particular care will be needed for mixed estates comprising farming and letting activities.

Value Added Tax

Standard rate (1/6 of VAT-inclusive price)	20.0%
Registration level from 1 April 2017	£85,000 per annum
Deregistration level from 1 April 2017	£83,000 per annum

Value added tax (VAT) is an indirect tax on sales of goods and services. In general, a taxable business pays VAT on its purchases (input tax) and charges VAT on its sales (output tax). Taxable businesses are required to pass on the output tax to HMRC and may reclaim input tax. From 1 April 2017 businesses with an annual turnover of taxable goods and services of more than £85,000 are required to register for VAT. Businesses with a turnover of less than £83,000 may elect to deregister. It is also possible to voluntarily register for VAT where turnover is below £85,000 if this is seen to be beneficial. Once registered VAT returns are normally submitted to HMRC quarterly (although it is possible to apply for monthly VAT returns subject to certain conditions - see below).

There are three rates of VAT applicable to taxable income: a standard rate, a reduced rate of 5% and a 0% rate. The standard rate is currently 20% and has been at this level since 4 January 2011.

Some income streams are not taxable, and are exempt from VAT. This can include supplies made in connection with land, i.e. renting or selling land or property. It is possible to 'opt to tax' land or property so that you can make the lease, licence or sale taxable. This is beneficial if there is input VAT to claim on expenditure connected with the property. The option to tax does not apply to residential accommodation.

Since farm businesses often have zero rated taxable income they can often be in a position where VAT being reclaimed from HMRC exceeds output VAT paid. In such situations, it is advisable to apply to HMRC to submit monthly rather than quarterly returns to aid cashflow. This can be done online.

Farmers may deregister for VAT and elect to use the "flat rate" farmers' scheme. A "flat rate" farmer cannot reclaim VAT on inputs, but charges and retains a flat rate addition of 4% on designated farming activities. This applies even if some of the goods would otherwise be zero rated. If the farmer is involved in other non-farming activities (e.g. bed and breakfast) which have a turnover above the VAT threshold, the flat rate scheme may not be available.

The following is a brief summary of the VAT rates as they apply to typical farming activities and expenditure.

VAT - exempt Items

Banking

Certain subscriptions

Cottage rents other than for holiday purposes

Granting of credit and loans

Instalment credit finance charges on a hire-purchase

Insurances

Land let for growing grain, etc*

Postal services

Purchase or sale of land and existing buildings*

Rent*

Easements, Wayleaves, Servitudes, Rights of Way*

* The grant of a lease, licence or sale of land and property is exempt from VAT. Therefore the above activities marked with a * are exempt from VAT unless an option to tax is in place. If an option to tax is in place these supplies are standard rated.

VAT - standard rated goods and services

Accountants' fees

Artificial insemination

Binder twine

Business activities of a Government Department
Camping facilities and car parks
Charges for storage of goods in enclosed spaces
Commission
Consultants' fees
Contract work for which a payment is in cash or kind
Cottage rents if let as holiday accommodation
Domestic fuel (special rate of 5% - provided supplied for "qualifying use")
Farmyard manure
Fencing and drainage
Fertilisers
Fishing and shooting rights
Fuel - petrol, diesel, and other heavy oil (for road use)
Grazing wintering and land let (with care of animals)
Haulage
Hire of machine or implement
Horses and ponies
Leasing charges
Machinery and vehicle repairs
MLC recording fees
New or second-hand machinery
Non-edible horticultural products
Non-residential construction
Property repairs
Quota sales and leases
Room lettings where catering is included
Sheep dogs
Soil and silage sampling charges
Sprays
Subscriptions, if association VAT registered
Telephone accounts
Tourist accommodation and meals
Trees and hedgerow timber
Paint
Pet foods
Veterinary services and medicines
Wood
Wool

VAT - zero rated goods and services

Animal feeding stuffs
Bees
Crops
Eggs
Sale of new residential buildings
Construction services in relation to a new dwelling
Grazing and wintering (no service included)
Livestock but excluding working animals

Milk
 Newspapers and periodicals
 Seeds of food and seed plants
 Trees and bushes if used for production of edible fruit

Car fuel scale charges

Other than farm vehicles, where fuel is purchased for vehicles which are used for private and business purposes, VAT is only partially recoverable. To make things simpler businesses can use the VAT Fuel Scale Charge. When using this system the business reclaims all VAT incurred on fuel and then accounts for the private use using the fuel scale charge. Alternatively, the business can elect to not recover any VAT incurred on fuel.

The VAT road fuel scale charges are based on the emissions rating of the vehicle and were updated with effect from 1 May 2017. These figures should be used only from the start of the next VAT accounting period beginning on or after that date. These figures along with previous years can be found on the HMRC website at <https://www.gov.uk/government/publications/vat-road-fuel-scale-charges-table>

Basic Payment Scheme Entitlements

The sale or lease of BPS entitlements by a VAT registered business is treated as a supply. This means that the purchase price would be subject to VAT at the standard rate and farmers would be looking to recover this input VAT.

National Insurance Contributions (NICs)

Class 1 (employees)	Main rate
<i>Employee contributions</i>	
- on earnings £157.00 - £866.00 pw	12.0%
- on earnings above £866.00 pw	2.0%
<i>Employer contributions</i>	
- on all earnings above £157.00 pw	13.8%

Employer contributions (at 13.8%) are also due on most benefits in kind and on tax paid on an employee's behalf under a PAYE settlement agreement.

Class 2 (self-employed)	
Flat rate per week	£2.85
Small earnings exception: profits per annum	£6,025

Class 3 (voluntary)	
Flat rate per week	£14.25

Class 4 (self-employed)	
On profits £8,164 - £45,000	9.0%
On profits over £45,000	2.0%

From 6 April 2014, every business or charity in the UK is entitled to benefit from an “allowance” in respect of their employer Class 1 NIC liability. This “allowance” was £2,000 from 6 April 2014 to 5 April 2016 and £3,000 from 6 April 2016.

Self-employed individuals will pay both Class 2 and Class 4 NICs and these will be collected through the Self Assessment tax return. No NIC is levied if the individual is over state pension age. This “allowance” was £2,000 from 6 April 2014 to 5 April 2016 and £3,000 from 6 April 2016.

Stamp Duty (SD)

% of Total Consideration	
Shares and marketable securities (nil if value up to £1,000)	0.5%

Stamp Duty Land Tax (SDLT)/Land Building Transaction Tax (LBTT) in Scotland

Commercial Property			
LBTT		SDLT	
Up to £150,000	0%	Up to £150,000	0%
Over £150,000 to £350,000	3%	Over £150,000 to £250,000	2%
Over £350,000	4.5%	Over £250,000	5%

Residential Property (First Property)			
LBTT		SDLT	
Up to £145,000	0%	Up to £125,000	0%
Over £145,000 to £250,000	2%	Over £125,000 to £250,000	2%
Over £250,000 to £325,000	5%	Over £250,000 to £925,000	5%
Over £325,000 to £750,000	10%	Over £925,000 to £1.5m	10%
Above £750,000	12%	Above £1.5m	12%

SDLT/LBTT imposes a charge on land transactions. LBTT applies in Scotland only. The tax is calculated as a percentage of chargeable consideration with different amounts applicable to residential and non-residential transactions. The person liable to pay the tax is the purchaser. In general, the tax must be paid at the same time the return is made. Interest is charged on late paid tax, and also on late paid penalties.

From 1 April 2016, a new 3% supplement applies for both SDLT and LBTT purposes where a second residential property is purchased by an

individual for more than £40,000. This 3% supplement also applies for LBTT purposes when certain “non-natural persons” (broadly, companies, partnerships, collective investment schemes) purchase a residential property, even if it is their first and only residential property.

From 21 March 2012 a 15% rate of SDLT applies to certain “non-natural persons” acquiring residential property where the purchase price exceeds a set level. From 20 March 2016 the 15% rate applies to properties where the cost exceeds £500,000 subject to relief in certain specific circumstances.

Single Farm Payment Scheme/Basic Payment Scheme

The European Union Common Agricultural Policy has introduced new reforms across all EU member states. From 1 January 2015, the Single Farm Payment Scheme (SFPS) which has been in existence since January 2005 has been replaced with the Basic Payment Scheme (BPS). The Milk Quota system has also been abolished with effect from 31 March 2015.

The BPS is a regional area based scheme being phased in transitionally over five years up to 2019 and interacting with a phasing out of the SFPS. BPS receipts will be liable to income tax or corporation tax (if paid to a company) and should be included in the taxable trading income in the relevant accounting period.

For more information on CAP Reform and the BPS, see pages 426-454.

Single Farm Payment Scheme Payment Entitlement

The SFPS entitlement has been agreed by HMRC as an asset for CGT purposes. In most cases, the base cost for the asset will be nil where the entitlement was received in 2005 at the outset of the scheme and no CGT issue will arise. However, in some cases the entitlement will have been acquired at a later date. In these cases the acquisition cost is the base cost for CGT purposes.

In Scotland, Wales and Northern Ireland, HMRC have agreed that a capital loss arises on the date at which the SFPS entitlement ceased. This will be between 16 May 2014 and 31 December 2014 and therefore the capital loss claim should have been made on the 2014/15 self assessment tax return. Capital losses for 2014/15 can be claimed at any time up to 5 April 2019 so it is not too late to claim now.

HMRC have confirmed that no correlative position exists in England and any loss claims in respect of Single Farm Scheme Payment Entitlements made in respect of English farming operations will be rejected.

Commercial Woodlands

Commercial woodlands enjoy a tax favoured status.

For income tax purposes, sales of timber from commercial woodland can be outside the scope of income tax. However, in circumstances where land is predominantly occupied for another purpose, receipts from the sale of timber may fall outside the exemption. For example, receipts from the sale of trees planted on a farm should be included as part of farming profits. An owner of commercial woodlands who simply lets the land will receive income in the form of rent and this would be classed as profits from a rental business.

In relation to capital gains tax, profits from the sale of trees are exempt, but there may be a charge to capital gains tax on a profit on the sale of land (i.e. the solum). Furthermore, the occupation of commercial woodlands is a qualifying activity for roll-over and hold-over reliefs.

Inheritance tax exemption is potentially available through 100% Business Property Relief once a two year period of ownership of commercial woodlands has been established. Agricultural Property Relief would potentially be available on woodlands whose occupation is ancillary to the agricultural land. An example of this would be a woodland shelter belt.

For more information on forestry and farm woodlands see pages 288-304.

Anti-Avoidance

The “General Anti-Abuse Rule” (“GAAR”) came into force with the enactment of the Finance Act 2013 on 17 July 2013. The rule counteracts abusive tax avoidance schemes and applies to income tax, national insurance contributions, corporation tax, capital gains tax, inheritance tax, petroleum revenue tax and stamp duty land tax.

The measure supports the Government's objective of promoting fairness in the tax system by deterring taxpayers from entering into abusive schemes that might succeed under current law. The GAAR provides that tax advantages arising from such arrangements are counteracted on a just and reasonable basis.

The UK GAAR legislation has a 'safety net' arrangement in that there is a requirement for HM Revenue & Customs to seek opinion from an independent panel before invoking the GAAR legislation. There is now a separate Scottish GAAR which initially will only apply to the two devolved taxes (Land and Buildings transaction tax (LBTT) and Scottish landfill tax). The Scottish GAAR has no requirement to bring in an independent perspective and, therefore, gives much more power to Revenue

Scotland. It is intended that the Scottish GAAR will extend to all devolved taxes in the future.

Making Tax Digital

In the March 2015 Budget, the Government announced its vision for a new digital tax administration and there was much publicity about this being the death of the annual self-assessment tax return. The transformation of the tax system, to be fully in place by April 2020, was hailed by HMRC as being simpler, more effective and more efficient.

The intended timetable is that self employed businesses and landlords with a turnover greater than the VAT registration threshold (£85,000 for 2017/18) will be the first to be brought within the scope of the new rules in April 2018. All those with a turnover above £10,000, as well as all VAT registered traders, will be brought within the new rules from April 2019. Corporation tax is to be brought within the system from April 2020. Self employed businesses and landlords with a turnover below £10,000 will initially be exempt from the new regime.

HMRC will require self-employed individuals and landlords to lodge “mini-tax returns” on at least a quarterly basis and this will include accounting records. HMRC will be able to pre-populate some of the return figures, such as employment income and bank account interest. Tax may also have to be paid more frequently than the current January/July dates. A year end declaration will need to be filed instead of a self assessment tax return.

The new system will have a fundamental impact on record-keeping and businesses/landlords will be required to use digital tools such as cloud software or apps, which will have the ability to upload information to HMRC. Each taxpayer will have an online ‘digital account’ where they will be able to view their payments.

It is clear to see the potential benefits of the digital system for HMRC with frequent reporting and accelerated tax payments, but there are many questions still to be answered and it is hard to see that this will result in any real form of simplification. Furthermore, the requirement to complete quarterly returns rather than one annual return is likely to result in additional costs, particularly for smaller businesses.

Miscellaneous

Summary of Farm Management Practices (including useful dates and timings)

Good Agricultural and Environmental Conditions (GAEC) - Scotland

Buffer strips (GAEC 1)

- no cultivations and application of pesticides within 2m of the top of the bank of watercourses 1 Jan - 31 Dec

Water abstraction (GAEC 2)

- submit annual data return by 31 Dec

Muirburn (GAEC 6)

- permitted between and inclusive 1 Oct - 15 Apr
(or 30 Apr with the landowner's permission)

Hedges (GAEC 7)

- no trimming between and inclusive 1 Mar - 31 Aug
- no cultivations and application of fertilisers and pesticides within 2m from the centre line of hedges 1 Jan - 31 Dec

Greening

Permanent grassland

Nitrogen fertiliser and lime plan prepared by 9 Jun

Ecological Focus Areas (EFAs)

EFA fallow period 15 Jan - 15 Jul
Establish EFA green cover by 1 Nov
Establish EFA catch crop in 'spring'
Harvest of EFA nitrogen fixing crops after 1 Aug
Cut or graze EFA margins (buffers; cut only, not graze) after 15 Jul
EFA map submit by 15 May

Diffuse Pollution General Binding Rules (DP GBRs) - Scotland

Minimum legal working distances from watercourses:

Within 2m of a watercourse

- no application of inorganic fertiliser
- no cultivation (from top of bank)

Within 5m of a watercourse

- prevent significant poaching

Within 5m of spring, well or borehole

- no fertiliser application
- no cultivation
- no livestock

Within 10m of a watercourse

- no slurry or manure application
- no storage of fertiliser (including temporary field middens)
- no livestock feeders

Within 50m of spring, well or borehole

- no storage of fertilisers (including temporary field middens)
- no slurry or manure application

NVZ - Scotland (SMR 1)

NVZ fertiliser and manure management plan prepared before 1 Mar

NVZ closed periods (organic manures with a high available N content):

	Grassland	Other land
Shallow or sandy soils	1 Sep - 31 Dec	1 Aug - 31 Dec
All other soil types	15 Oct - 31 Jan	1 Oct - 31 Jan

NVZ closed periods (manufactured nitrogen fertiliser):

	Grassland	Other land
Moray, Aberdeenshire, Banff & Buchan NVZ	15 Sep - 20 Feb	1 Sep - 20 Feb
All other Scottish NVZ areas	15 Sep - 15 Feb	1 Sep - 15 Feb

NVZ - England, Wales and Northern Ireland

NVZ closed periods (organic manures with a high available N content):

	Grassland	Other land
Shallow or sandy soils	1 Sep - 31 Dec	1 Aug - 31 Dec
All other soil types	15 Oct - 31 Jan*	1 Oct - 31 Jan*
		*(15 Oct - 31 Jan NI)

NVZ closed periods (manufactured nitrogen fertiliser):

	Grassland	Other land
England and Wales	15 Sep - 15 Jan	1 Sep - 15 Jan
Northern Ireland	15 Sep - 31 Jan	15 Sep - 31 Jan

Business Management

Tax Return

- paper forms submit by 31 Oct
- online submit by 31 Jan

IACS forms (Scotland) submit by 15 May

AECS annual management options claim submit by 15 May

Scottish Suckler Beef Support Scheme claim submit 1 Sep - 31 Dec

Scottish Upland Sheep Support Scheme claim submit 1 Sep - 16 Oct

Beef Efficiency Scheme - data recording

- calves born 1 Jan - 1 Jun submit by 15 July
- calves born 2 June - 31 Dec submit by 7 Feb

Beef Efficiency Scheme - genotype tissue tagging

- calves born 1 Jan - 1 Jun by beginning of Nov
- calves born 2 June - 31 Dec by end of Apr

Agricultural and horticultural census (Scotland) at 1 st Monday in June	complete within 14 days
Agricultural survey (Scotland) at 1 st Monday in December (DAS)	complete within 14 days

Livestock Management

Physiological values and breeding cycles for livestock:

	Cow	Ewe	Red Deer	Sow	Poultry
Gestation (days)					
- mean	285	150	231	114	21
- range	269-299	140-160	226-238	109-125	-
Oestrus period (days)					
- mean	21	16	19	21	-
- range	18-24	14-20	17-21	19-23	16-24

Cattle (Scotland SMR 7):

Tagging calves (after birth):	
▪ beef	within 20 days
▪ dairy - one tag	within 36 hours
▪ dairy - second tag	within 20 days
Replace illegible or lost tags	within 28 days of discovery
Registering calves with BCMS	within 7 days of tagging
Cattle deaths to be reported to BCMS	within 7 days
Cattle movements to be reported to BCMS	within 3 days
Cattle within business movements reported to ScotEID	within 48 hours
Retention of cattle records	at least 10 years

Sheep and goats (Scotland SMR 8):

Identify all animals (after birth):	
▪ intensive systems	within 6 months
▪ extensive systems	within 9 months
	(or before they leave the holding whichever is soonest)
All animals double tagged (one tag must be EID) from 12 months of age	
Replace illegible or lost tags	within 28 days of discovery
Record details of identification, illegible or lost tags and movements	within 48 hours
Movements sent to SAMU	within 3 days
Retention of sheep records	at least 3 years
Annual inventory for animals kept (SGAI)	at 1 Dec

Pigs (Scotland SMR 6):

Register with local APHA office	within 30 days of the date pigs are first kept
Notify APHA changes of details	within 30 days of the change
Notify off movements to ScotEID	before or on the day of the movement
Notify on movements to ScotEID	within 3 days of arrival
Record on and off movements	within 48 hours of the movement date

Shooting open seasons for birds *

	England, Scotland & Wales	Northern Ireland
Pheasant	1 Oct - 1 Feb	1 Oct - 31 Jan
Partridge	1 Sep - 1 Feb	1 Sep - 31 Jan
Grouse	12 Aug - 10 Dec	12 Aug - 30 Nov
Ptarmigan (Scotland only)	12 Aug - 10 Dec	-
Common snipe	12 Aug - 31 Jan	1 Sep - 31 Jan
Woodcock (except Scotland)	1 Oct - 31 Jan	1 Oct - 31 Jan
Woodcock (Scotland)	1 Sep - 31 Jan	-
Wild duck and geese:		
- below high water mark	1 Sep - 20 Feb	1 Sep - 31 Jan
- elsewhere	1 Sep - 31 Jan	1 Sep - 31 Jan

Shooting open seasons for ground game *

	England, Wales & Northern Ireland	Scotland
Brown hare (not NI)	1 Jan - 31 Dec	1 Oct - 31 Jan
Brown hare (NI)	12 Aug - 31 Jan	-
Mountain hare	-	1 Aug - 28/29 Feb
Rabbit (not NI)	1 Jan - 31 Dec	1 Jan - 31 Dec

Shooting open seasons for deer *

	England, Wales & Northern Ireland	Scotland
Red deer:		
- stags	1 Aug - 30 Apr	1 Jul - 20 Oct
- hinds	1 Nov - 31 Mar	21 Oct - 15 Feb
Sika deer & red/sika hybrids:		
- stags	1 Aug - 30 Apr	1 Jul - 20 Oct
- hinds	1 Nov - 31 Mar	21 Oct - 15 Feb
Fallow deer:		
- bucks	1 Aug - 30 Apr	1 Aug - 30 Apr
- does	1 Nov - 31 Mar	21 Oct - 15 Feb
Roe deer (not NI):		
- bucks	1 Apr - 31 Oct	1 Apr - 20 Oct
- does	1 Nov - 31 Mar	21 Oct - 31 Mar

* all dates inclusive

Imperial-Metric Conversion

Conversion factors

	Imperial	A	Metric	B
Length	inch	25.4	mm	0.03937
	foot	0.3048	m	3.281
	yard	0.9144	m	1.094
	chain	20.12	m	0.04971
	mile	1.609	km	0.6214
Area	acre	0.4047	ha	2.471
	ft ²	0.0929	m ²	10.76
	yd ²	0.8361	m ²	1.196
Volume	ft ³	0.02832	m ³	35.31
	yd ³	0.7646	m ³	1.308
	pint	0.5682	litre	1.76
	gal	4.546	litre	0.22
	gal	0.004546	m ³	219.969
	fl oz	28.41	ml	0.0352
	oz	28.35	g	0.03527
Weight	lb	0.4536	kg	2.205
	cwt	50.8	kg	0.01968
	ton	1.016	t	0.9842
	therm	105.5	MJ	0.009478
Energy	kWh	3.6	MJ	0.2778
	btu	1.055	KJ	0.9478
	hp	745.7	W	0.001341
	°F	(°F-32)	°C	(°Cx1.8)
Temperature		x0.5556		+32
Rate of use	lb/ac	1.121	kg/ha	0.8922
	cwt/ac	125.5	kg/ha	0.007966
	ton/ac	2511	kg/ha	0.0003983
	lb/gal	99.78	g/litre	0.01002
	gal/ac	11.23	litre/ha	0.08902
	units (fert)/ac	1.25	kg/ha	0.8
Unit cost	£/ft ²	10.76	£/m ²	0.0929
	£/yd ²	1.196	£/m ²	0.8361
	£/ac	2.471	£/ha	0.4047
	£/yd ³	1.308	£/m ³	0.7646
	£/gal	0.220	£/litre	4.546
	£/ton	0.9842	£/t	1.016
	£/cwt	0.01968	£/kg	50.8
	£/lb	2.205	£/kg	0.4536

Note: Imperial unit x A = Metric unit
Metric unit x B = Imperial unit

	Imperial	Metric
Length	foot = 12 inches yard = 3 feet mile = 1,760 yards	cm = 10 mm m = 100 cm km = 1,000 m
Area	ft ² = 144 inches ² yd ² = 9 ft ² acre = 4,840 yd ² mile ² = 640 acres	m ² = 10,000 cm ² km ² = 1,000,000 m ² km ² = 100 ha ha = 10,000 m ²
Volume	pint = 20 fluid ounces gallon = 8 pints fluid ounce = 1.734 inches ³ pint = 34.6774 inches ³ gallon = 277.42 inches ³ foot ³ = 1,728 inches ³ yard ³ = 46,656 inches ³	litre = 1,000 ml cm ³ = 1,000 mm ³ m ³ = 1,000,000 cm ³
Weight	lb = 16 oz stone = 14 lb cwt = 112 lb ton = 2,240 lb	kg = 1,000 g tonne = 1,000 kg
Milk	1 litre = 1.03 kg	1 kg = 0.971 litre
Irrigation	1 inch/acre = 102.75 m ³	25 mm/ha = 250 m ³
Energy	hp = 550 ft lb force/sec	hp = 75 m kg force /sec
Velocity	mph = 1.609 km/hr	km/hr = 0.6214 mph m/sec = 3.281 ft/sec
Volume	ft ³ /second = 0.02832 m ³ /sec	m ³ /sec = 35.31 ft ³ /sec
Flow rate	gallon/min = 0.07577 litres/sec	litre/sec = 13.2 gallons/min
Specific volume rate	ft ³ /ton min = 0.02787 m ³ /t min	m ³ /t min = 35.88 ft ³ /ton min
Mass flow rate	ton/hr = 0.2822 kg/sec	kg/sec = 3.543 ton/hr

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