Farm Stock KTIF Project – KTIF / 016 / 2017

Building Resilience into Scotland's Lamb Supply Chains

Project Report

1. PROJECT TITLE

1.1 Title

Building Resilience into Scotland's Lamb Supply Chains

1.2 Overview of the Lead Company

Farm Stock (Scotland) Ltd (FSS) was the lead organisation in this project. It is a farmer owned livestock marketing co-operative with 930 individual shareholder members and a total database of around 1,500 sheep and cattle producers across central and southern Scotland. Created in 1996, it is jointly owned by 6 regional livestock marketing co-operatives with an annual turnover of over £18m and handles around 165,000 sheep and 6,000 cattle each year.

2. EXECUTIVE SUMMARY

2.1 Overview

Farm Stock (Scotland) Limited (FSS) was awarded a KTIF grant on 28/7/17. The 100% grant of up to £187,620 covered a three-year project to be completed by 31/5/20. The operational group comprised of FSS, Scotbeef, SAOS and SRUC with M&S as the retail partner.

The project aimed to help M&S meet its year-round requirements for high quality and sustainable Scotch Lamb through achieving the following objectives:

- Forming a network of farms to provide trial lambs for processing and assessment to M&S specification by Scotbeef.
- Developing protocols for early, main and late season lamb production based on observed management on these farms plus industry best practice and Farmax modelling.
- Exploring how data can be better used at both farm and supply chain level to help deliver the right product.

Assessing the options for better coordination of lamb supply with demand.

2.2 Main Findings

The main findings of the project were:

- Too many lambs miss the M&S specification.

- The EUROP grading system requires modernisation.
- The eating quality of lamb is consistently good to excellent.
- Provenance is increasingly important to consumers.
- Low exploitation of digital technology by the sheep industry despite enforced use of EID tags since 2014.
- The spot market will continue to coordinate lamb supply with demand for the foreseeable future.
- Brexit could disrupt the spot market's pre-eminence.
- Focus on performance off grass to optimise margins from main season lambing.
- The potential of Scottish hill lambs for the late season market has been underexploited
- Early season lamb production in Scotland is unattractive without higher, guaranteed prices.

2.3 Main Impacts

The project has had two main impacts:

- Through supporting better collaboration between FSS and Scotbeef, problems have been addressed and opportunities for further improvement identified.
- Clarification of the actions and opportunities that can be taken at the production level to improve competitiveness. Both individually and equally importantly, by closer collaboration at producer level.

2.4 Issues Arising

Issues arising during and as a result of the project are:

- Sourcing enough lambs for trials especially early season.
- Limited improvement in proportion of lambs hitting specification.
- Limitations in the design and application of the EUROP grading system.
- Low farmer interest in measuring performance to set, monitor and achieve targets.
- The practicality of assessing sheep genetics on commercial farms. Technical and commercial barriers to use of EID technology.

3. PROJECT DESCRIPTION

The project aims to address some of the significant lamb supply chain issues identified by FSS in a supply chain survey and subsequent major industry conference. Specifically, the miss-match of the seasonal pattern of supply with retailer demand and the high proportion of lamb carcases failing to meet the standards and specification set by Scottish processors, both of which are exacerbated by the relatively poor communication that exists between stakeholders and the production orientated, adversarial and disjointed nature of the current supply chain. FSS believes that addressing and solving these issues would have significant economic benefits for the supply chain as a whole and would also offer the potential to enhance animal welfare and to reduce the carbon footprint of the Scottish sheep industry.

Successful delivery of the project depended on participants representing the entire supply chain hence the involvement of producers, FSS, Scotbeef as the processor, and M&S as the retailer, with SRUC and SAOS as consultants and contractors.

M&S had previously indicated an objective that only Scotch lamb would be sold in its Scottish stores but that they had difficulty in securing both year-round supply and their required carcass quality. The Scotbeef contract to supply M&S with lamb at their required standard is an important one for the Scottish sheep industry. Its importance will increase dramatically if Brexit results in a no deal and entry into the EU export market is hit. Thus, FSS farmers have a strong incentive to work closely with Scotbeef to ensure the contract terms are met and that the contract is renewed.

The project established a group of FSS producers and using EID over three lamb crops recorded detailed management practices each year of groups of individual lambs on each farm from birth to slaughter. Slaughter data and taste testing at Scotbeef was used to identify the best practice to produce the required M&S carcass. Best practice was refined each year with the objective of developing production blueprints for the required M&S carcass in early, peak and late season.

In addition, the project tested different pricing models to influence both carcass quality and the percentage in ‘in-spec’ lambs and also to influence the seasonal production pattern in an attempt to better match supply with demand.

Better co-operation both horizontally at the production level and vertically with the processor and retailer was a key objective of FSS as the leader of the project.

4. FINANCE

4.1 Sum awarded

The total sum awarded for the three-year project was £187,620.

4.2 Detail of spend

Project spend was on budget as detailed below

FSS – project delivery and management	£76,911.72
SRUC – project delivery, data collection and analysis	£85,345.47
Scotbeef – slaughter data and carcass evaluation	£11,391.42
SAOS – supply chain consultancy and analysis	£13,962.56

Total	£187,611.17

5. PROJECT AIMS/OBJECTIVES

5.1 Related to Application

The overall aim of the project was to improve the demand for M&S lamb with resultant benefits for the Scottish lamb supply chain (producers, processors and intermediaries). The objectives set out in application to meet this aim are summarised into;

- The development of three producer protocols covering

    i. Early season (May through July)
    ii. Main season (August to Christmas)
    iii. Late season (January till the end of April)

- Making better use of data.

- Improving the supply of lambs with that required by M&S.

6. PROJECT OUTCOMES

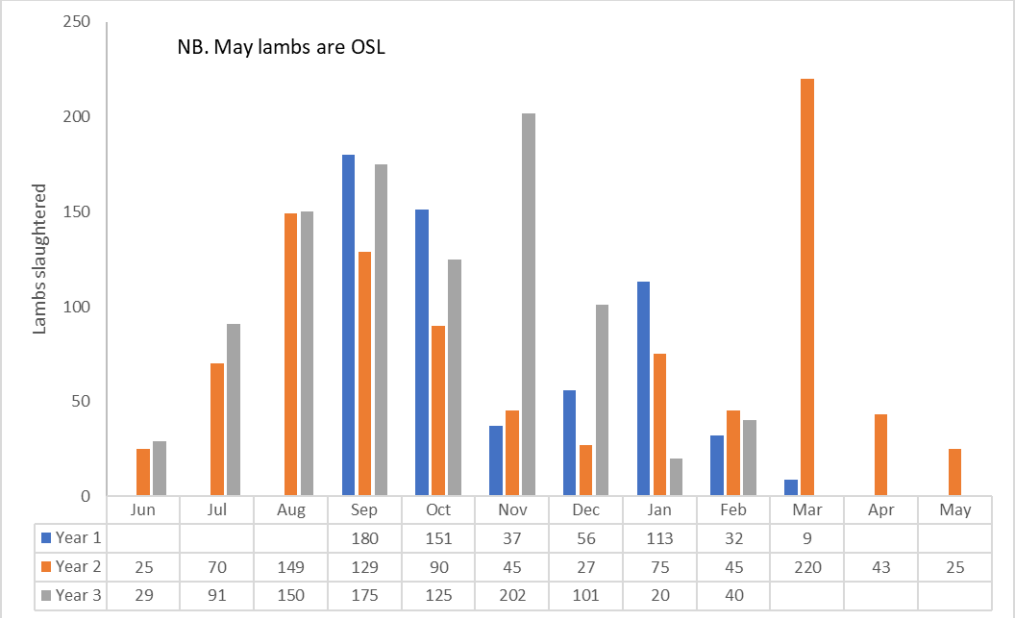
6.1 How aims/objectives were achieved

6.1.1 Development of producer protocols

1. Best practice protocols (blueprints) were developed based on an assessment of how prior knowledge of best practice was applied by a group of FSS sheep producers that supply Scotbeef. Critically, the success of how these producers applied best practice was gauged against how well they supplied lambs that met the M&S specification (R3L or better and 16-21kg dwt). In addition to this "physical" spec, a sub-sample of lambs were tested for eating quality of their meat. A leading industry budgeting tool (Farmax) was also used to model the impact of changes in key system variables on physical and financial performance. Finally, performance was checked against the carbon footprints on a number of farms.

2. The original plan was to test 900 lambs from the 2017 lamb crop year and 1,200 each for crop years 2018 and 2019. At 2,454, the total number of lambs tested was 74% of the planned figure (see Figure 6.1). While disappointing, extra lambs were built into the original plan as a contingency, so the numbers actually tested were sufficient to meet the data needs of the project.

Figure 6.1 – number and distribution of lambs slaughtered 2017-19



	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Year 1				180	151	37	56	113	32	9		
Year 2	25	70	149	129	90	45	27	75	45	220	43	25
Year 3	29	91	150	175	125	202	101	20	40			

3. A shortage of early season lambs accounted for most of the shortfall. Just 215 (9%) early season lambs (May-July) were available for testing (the 25 lambs slaughtered in May 2019 were born in 2018). While a delay in starting the trial explains the lack of lambs in the first year, strong competition in the early lamb market from Woodhead Bros at Turriff (traditionally very strong early buyers) accounted for the low numbers in the other years. It is understood that Scotbeef met the M&S early season lamb (April and May) needs from southern Britain lambs killed on contract in English abattoirs.

4. In addition, the 2018 lamb crop was hit by poor weather (beast from the east) which reduced lamb numbers and the onset of Covid-19 stopped trials in the latter part of the 2019 season.

5. Based on the trial lambs, the number of lambs meeting the M&S specification was relatively low and did not improve over the three-year course of the trial.

   - For the 2017 crop, 84% weighed 16-21kg, of which 73% graded R3L or better. 61% of lambs hit the M&S target spec.

   - For the 2018 crop, 82% weighed 16-21kg, of which 62% graded R3L or better. 51% of lambs hit the M&S target spec

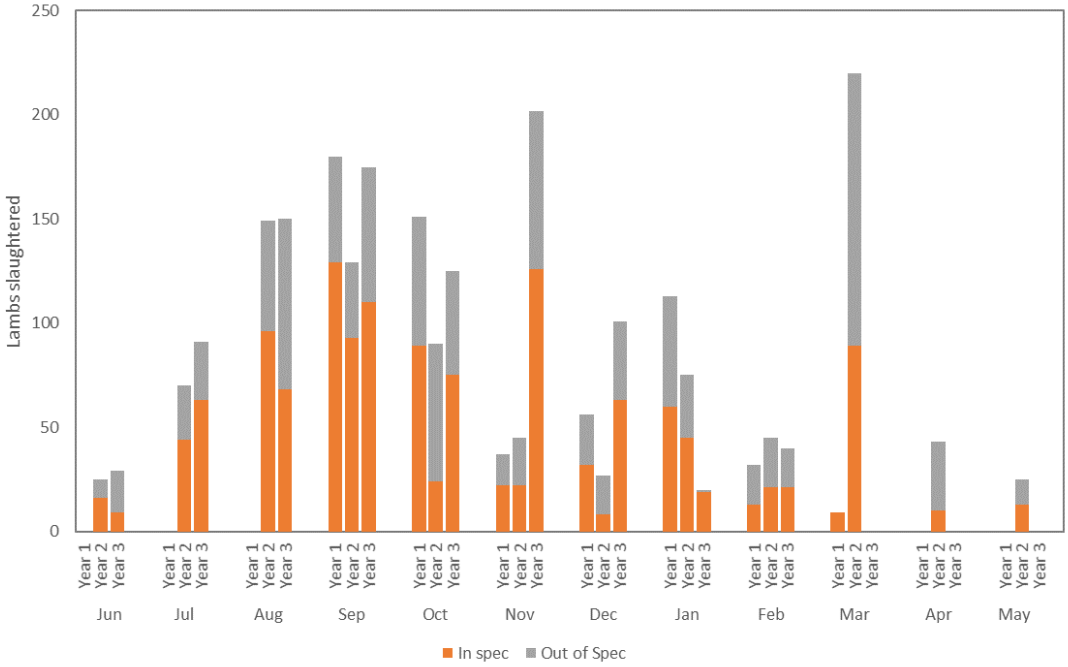
   - For the 2019 crop, 87% weighed 16-21kg, of which 68% graded R3L or better. 59% of lambs hit the M&S target spec

   It is believed that the most likely reason for this modest performance is the pricing system that favours weight over fatness levels. Specifically, the limited drop in price from a R3L to R3H grade. This issue is addressed in section 7.1. The problem was recognised, and Scotbeef did increase the

relative price in 2018 after winning the new M&S contract[1]. The impact of this change on lambs hitting spec is discussed in section 5.
Based on the above, the suitability of the EUROP grading system as a basis for communicating what consumers want, could be challenged. The scope to modernise the grading system now exists following Brexit.

6. Unexpectedly, the trial did not reflect a higher share of lambs hitting the spec in the main season. As Table 6.1 shows, the proportion of lambs hitting spec in the autumn of the second year was particularly low eg in October 2018 just 27% of lambs met the target grade or better. The late season kill includes a high proportion of hill lambs that "grow slowly into" the target weight range. Over-fatness, however, was still an issue during this period.

Table 6.1 – % of lambs hitting spec by month 2017-2019



7. There were no consistent differences between breeds or systems in hitting the physical specification. Feeding is the key factor driving finishing with lamb health an important factor ensuring the feeds available are well utilised. Regarding nutrition:

   - The period of the year where lambs are fully finished off grazed pasture is summer through to early autumn. By October most lambs are getting some concentrates or forage crop to help finish lambs.

   - Where farmers grew forage crops to finish lambs there were two distinct periods.

     i. Autumn finishing – red clover, chicory, forage rape or rape-kale hybrid with no or low concentrate feeding.

     ii. Winter finishing – rape, rape-kale hybrid or swedes with increased concentrate supplementation.

[1] An analysis of the total number of FSS lambs going to Scotbeef over the three years was consistent with the trial results, though the proportion of very fat lambs did improve. The particularly poor results for the 2018 crop reflect the large jump in numbers needed to supply the contract.

8. Farmers were encouraged to weigh lambs to provide evidence (lamb growth rates) that could help explain the impact of differing management on performance. Unfortunately, the take up was low, so there was limited empirical data to support trial work completed elsewhere.

9. Regarding **eating quality**, the results summarised in Table 6.2 of taste testing by a professional panel at Scotbeef support two positive conclusions:

   - Lamb consistently scores well with the range of results relatively limited between producers.

   - Late season lamb generally tasted better than lambs killed at younger ages.

TABLE 6.2 – Taste test results by lamb crops 2017-19

	2017 crop	2018 crop	2019 crop
Total lambs in trial	578	943	933
Lambs taste tested	106	151	179
1. Tenderness	5.59	6.77	6.43
2. Flavour	5.79	6.10	5.88
3. Succulence	5.44	6.32	6.07
Total score (out of 24)	16.83	19.18	18.39
Standard deviation	2.02	1.73	2.08

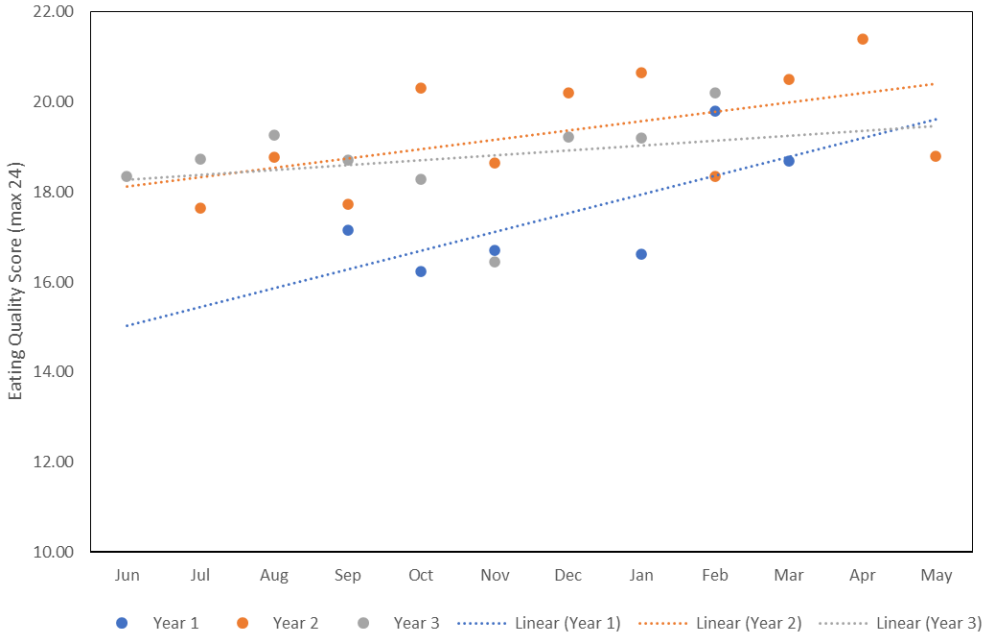
Source: Scotbeef

The relatively poor taste scores for the 2017 lamb are at least partially thanks to the very low scores through 2017 autumn pulling the average down. This may reflect the particularly bad weather conditions that autumn affecting lamb growth rates and the need to use more concentrates to produce sufficient finish on lambs.

Also, while the taste tests for the 2018 and 2019 lamb crops were consistent in that tenderness>flavour>succulence, for the 2017 crop the order was succulence>flavour>tenderness. Research elsewhere suggests that lambs growing slowly in the period prior to slaughter tend to yield tougher meat.

10. The improvement in eating quality with lamb age is highlighted in Figure 6.2.

Figure 6.2 – improvement in eating quality with lamb age



Tenderness and flavour seem to be the main contributors to the improvement with age, though the limited data means this conclusion should be treated with the utmost caution and checked with further trial work.

11. Despite first year indications that specific farm practices could affect eating quality, these were not verified by results in subsequent years. The project's findings are consistent with results from a major seven-year project[2] completed by Silver Fern Farms, a farmer owned New Zealand processor. SFF had hoped to find measurable carcase traits which could be used to incentivise the production of carcases with higher eating quality but, as a result of their study, have not changed their pricing system. Oddly, the SFF research excluded late season (hogget) lamb, so does not confirm if the eating quality of late season New Zealand lamb also rose.

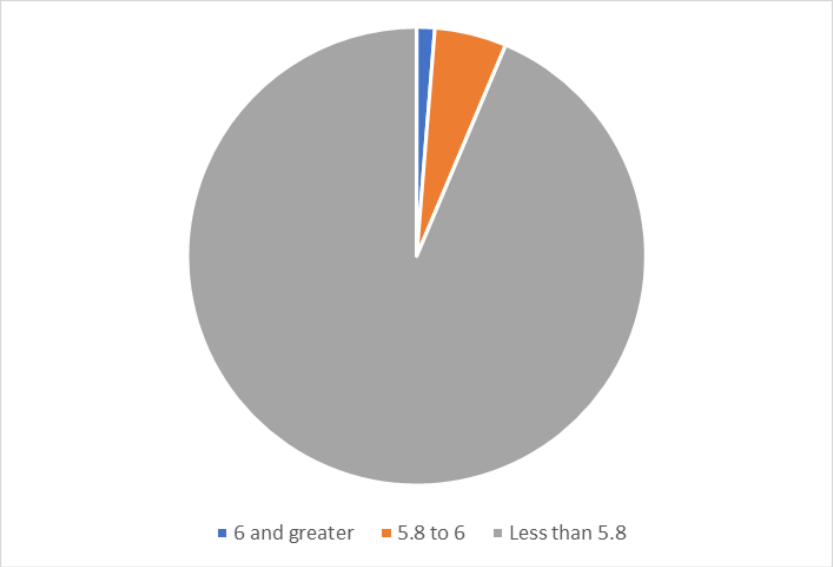
12. Another major New Zealand trial[3], however, claims that on-farm practices can produce a consistently high eating quality. The Omega lamb project identified genetics that produce lambs with more intramuscular fat (marbling) that is further enhanced by finishing on herb rich pastures. This (Te Mana) lamb targets the top end restaurant market to achieve premium prices for producers.

13. Acidity was also measured for each carcase for crosschecking against the taste scores. Figure 6.3 shows that just 1% of lambs exceeded a pH of 6, indicating low acidity and potential associated issues. The overwhelming majority (94%) scored lower than 5.8. However, no relationship was found between pH and the taste scores. The New Zealand literature suggests that greater acidity is more important for appearance than taste. Clearly an important factor for New Zealand given the long shelf life their chilled lamb requires.

[2] For overview of the SFF research click on https://www.usx.co.nz/uploads/paperclip/documents/1320/original/Media%20Release_%20Lamb%20Eating%20Quality.pdf?1491445263

[3] http://omegalamb.co.nz/

Figure 6.3 – pH results 2017-19



14. **Farmax modelling** was used to further explore options for improving best practice. Farmax software allows the user to build a digital model of a farm based on livestock numbers, performance levels (eg, lambing percentage, carcase weights), pasture production, purchased feeds, etc. Initially, the model is set to represent how the farm is currently run – the base run – to provide a benchmark. Then key changes (eg, later lambing date) are made to the model which is then rerun to look at the impact on performance.

15. The big advantage of such modelling is that it allows completion of trials in digital rather than real time. It also has the flexibility to undertake far more "what-if" testing than possible in the physical situation and, by implication, at much lower financial cost.

    Trials were completed for the three lamb production systems with scenarios and results summarised in Table 6.3 (see Appendix 1 for full details).

TABLE 6.3 – Farmax modelling results

System	Scenarios tested against base runs	Change in Profit cf. base (£)
Early lambing (February)	Base run	0
	S1 – extra creep feeding to finish lambs quickly	-719
	S2 – further raise lamb growth pre-weaning	+4,001
	S3 – as S2 plus extra post weaning lamb growth	+4,668
Main season lambing (March)	Base run	0
	S1 – increase lamb growth with creep feeding	- 1,084
	S2 – increase lamb growth by later lambing/earlier weaning	+9,405
	S3 – as S2 plus higher pasture quality	+10,516
	S4 – as S3 plus increased pasture production	+16,048
	S5 – as S2 plus grow a forage crop for autumn lamb finishing	+8,899
Late lambing (April)	Base run	0
	S1 – creep feeding to finish lambs quickly	-4,862
	S2 – grow forage crop to finish lambs quickly	-2,358
	S3 – as S2 plus lamb even later (May)	+1,010
	S4 – higher pasture covers at lambing to improve pre-wean lamb growth	-142

16. The modelling highlighted the key profit drivers across different sheep farm systems: Main season lambing is driven by cost of production; late season lambing systems are driven by output and early season lambing systems are driven by lamb price and feed cost. This helps to understand the vulnerabilities of the three systems, namely input costs, lamb price and weather. There is greater opportunity to improve profitability in the early and main season lambing flocks compared to late season lambing owing to the greater impact of input and output prices. However, late season lambing system is more vulnerable to weather and the influence of lower lambing percentage.

17. The modelling focused on understanding how flock profitability can be improved for a set number of livestock (ie, for a single year). The results suggest that some scenarios would result in longer term profit gains. Greater pasture productivity (through reseeding, better grazing management and soil health) enabling a rise in stocking rate and flock output.

18. Carbon footprints were assessed on four farms for two years (ie, eight audits). A carbon footprint shows how many grammes of carbon is produced per kg of (lamb and cull) carcase weight produced. For the four breeding flocks, the initial score averaged 25.83 (range 20.31-33.53) but worsened to 30.62 (range 22.04-36.63) for the follow-up audit.

19. The farms with lower (ie, better) scores, typically achieve higher production levels due to higher lambing percentages, less lambs sold store and lower death rates. In addition, a higher proportion of production is achieved from grazed pasture.

20. The sharp worsening of carbon scores on three of the four farms can be explained by the year measuring the 2018 lamb crop. Production was badly affected by the poor winter of 2017/18 (beast from the east) and by the late spring which also required an increase in the quantity of concentrates used.

6.1.2 Better use of data

21. Investigating how farm and supply chain data could be better used to improve delivery of the right lamb was the second objective of the project. A Canadian report[4] cites four specific areas where cooperatives should focus their digital data management efforts;

    - Precision agriculture.
    - Effective use of data.
    - Digital communication.
    - Advanced traceability.

22. Based on these headings, a working paper completed in July 2018 reviewed current and potential data usage applying to this project. Short and long-term options for improving data management were proposed. How these options have been progressed is discussed below.

23. **Precision agriculture** is more associated with arable (eg, GPS navigation) and dairy farming (eg, robot milking) where the growth in digital data is expanding rapidly. By law, sheep farmers must EID tag both their breeding stock and lambs going for slaughter.

24. Unfortunately, there is very limited use of sheep EID by FSS sheep farmers due to a combination of reasons.

    - The reliability of the technology is now robust but the cost of the package of tools needed (readers, scales, software) is significant (c.£5,000).
    - Lambs must be tagged at early age to get an appreciable benefit from the technology (selection of best replacements). Clearly of no benefit to producers that buy their breeding replacements, yet even for those that do, the benefit of the extra detail over conventional selection methods, is clearly unproven. Consequently, tagging lambs at birth to link to parentage is limited to leading tup breeders that performance test.
    - Kill sheets already provide valuable feedback to producers on how well they are drafting and growing lambs. Of course, it would be even more valuable if specific lambs could be identified to check lambs at the margin of being overfat or too thin. Linking grades to different breeding within a mob of lambs slaughtered is also possible if the tags of those lambs are recorded before leaving the farm. As readers are relatively cheap, cost is less prohibitive.
    - The problem is that not all processors accurately record grades to lamb tags on the kill line. Extra labour on the line could overcome this issue, but processors cite the lack of demand for such data from producers as justification for not taking corrective action. There is clearly an

[4] Agricultural cooperatives and digital technology (2016). PwC

opportunity to better explain to producers the value of more accurate feedback for improving farm performance and a more exacting price grid could potentially stimulate a higher level of interest.

25. The fact that Scotland is making EID tags compulsory for all beef cattle suggests that there is value in exploiting this technology. Technical issues, however, have delayed its introduction.

26. A major conclusion from the project is that sheep producers in general are not keen data users[5], whether digital or not. Few farmers seem to calculate relatively simple sheep KPI's (eg, ewe efficiency, lamb wastage) that require only basic data. Persuading participating farmers to weigh lambs at key stages to measure performance was difficult. Connecting with farmers to highlight the benefits of better data use remains a priority for sector competitiveness, especially if trading conditions become tougher in a post Brexit Scotland.

27. A good example of where EID technology would have helped was highlighted by the Shetland lamb finishing trial. The random livestock inspection by the department meant physical handling of lambs to confirm identification. The eventual sale of lambs also required extra physical sorting work to ensure that carcases related back to the individual supplying farm rather than simply using the kill sheets via EID tag numbers. Clearly, any chance of developing collaborative store-finisher arrangements will involve cleverer use of data.

28. **Effective use of data** is important for FSS. The review noted that FSS makes good use of data but suggested where further improvements are possible.

    - Individual kill sheets from the processor are emailed to producers soon after slaughter and are stored on the web for easy access. From the full kill sheet, FSS;

        i. Visually summarises how lambs graded with respect to a price grid where gold = excellent, green = very good, black = slightly fat, blue = too lean and red = very fat. This is a general classification and not customised to the actual spec of the target market. At the margins this is potentially confusing as, for instance, a O3L which grades "very good" does not meet the M&S spec.

        ii. Compares the batch of lambs killed to the overall daily kill of FSS lambs to benchmark performance. Again, the use of coloured pie charts is easy to understand.

        iii. Estimates the average daily growth rate for that consignment of lambs based on the average carcase weight and lambing information supplied at the start of the season. Again, benchmarks are shown to farmers for comparison purposes.

    - Member producers also have access through a secure web portal to a database that holds all invoices and individual kill sheets for sheep and cattle <u>wherever slaughtered</u> dating back three years. The interactive database also has a user-friendly *Single Farm Report* that allows a

[5] See QMS Livestock+ (summer 2020) for a FSS supplier who highly values measuring and EID (Kevin Stewart, Sharpitlaw, Kelso).

producer to benchmark his performance against the FSS average for whichever period is of interest.

- Making the data available to producers still involves a lot of double handling by FSS which has a cost. The main problem is the lack of data standardisation in the sector. Internal processes have been improved in the last 18 months, but further efficiencies are being explored and would be helped by data being available in a common format.

- A more fundamental problem uncovered in reviewing data effectiveness, is the inconsistency in grading between processors. Though this project focussed on the M&S lamb supply chain supplied via Scotbeef, the review revealed that, for instance, a lamb grading R3L with one processor may grade differently at another. Indeed, the same lamb might attract a different grade even if slaughtered at a sister plant of the same processor. Clearly this lack of consistency sends mixed messages back to producers and gives support to those in the industry that believe the EUROP grading system no longer fit for purpose.

- Further to the previous point, at Scotbeef's sister plant Vivers Scotland Ltd, their unique grading system has now been discontinued in favour of the EUROP system.

- Scotbeef, and most other producers, provide kill data direct to their supplying farmers. Scotbeef's portal provides excellent and easy to use benchmark reporting options covering grades, weight and animal health. The portal also allows Scotbeef to gather information from farmers on the provenance of the lambs supplied.

- Given processor investment in their own feedback portals, their limited enthusiasm to commit resource to sending data to intermediaries like FSS is understandable, particularly as the data is their property.

- In addition to its value in providing benchmarking information for members, FSS's large database provides a resource for strategic planning by the organisation.

An important objective of the project was to assess if eating quality was measurable in order that production of lambs that score well on taste, could be encouraged. In short, this has not been possible largely because lamb eating quality was found to be consistently good (though was higher for later season lambs). There was variation based on the scoring system used but the range was relatively limited and, importantly, there is no relatively simple in-line measuring option (eg, pH) that could proxy taste testing panels.

29. FSS use **digital communication** primarily to inform producers.

- At the end of each week, producers receive a market update for the coming week via email.

- These reports can also be accessed via the FSS website along with other news and guidance.

- Social media (Facebook Twitter and Instagram) is usefully employed as a channel for connecting with farmers especially regarding farmer-to-farmer trades.

- Most recently, and in response to covid-19 restrictions, Zoom has been used to hold membership meetings. The experience has been very positive with the recent AGM having its best attendance ever.

30. The project identified opportunities of how digital technology could be better employed by FSS to improve communication and to reduce costs. The covid-19 pandemic has hugely accelerated the deployment of these technologies and are likely to result in further significant savings and efficiencies in the coming 18 months.

31. The limitations of the FSS website have been accepted and improvements are planned for the coming year.

32. New smartphone app technology also offers low cost digital solutions for organisations like FSS. The *Knowby app* provides a low cost, easy to use platform to provide "point of time" training and guidance to farmer members.

33. The potential to move to an on-line booking system was originally listed as a potential opportunity. However, further investigation concluded that most farmers do like the personal touch of speaking to or texting field staff. The personal touch is also important in FSS-processor communications and consequently there are no plans to attempt to automate links until a clear advantage is identified.

34. The last area where better use of data has a role is in **improving traceability**. Not only is accurate traceability important in complying with legal regulations, it also provides the opportunity to differentiate lambs and potentially extract a better price from the marketplace.

35. Regarding basic compliance, all producers must complete *Food Chain Information* forms. Currently this remains a traditional paper-based process. The New Zealanders have recently developed an electronic Animal Status Declaration form (eASD) quoting the following benefits over a paper form;

    - Farmers find it's quicker and easier than a paper form,

    - Reduced administration for both farmers and processors,

    - Greatly improved data accuracy,

    - Fewer processing delays at plant.

    FSS are keen to replace the current paper trail, but action may well be needed at the industry level as occurred in New Zealand.

36. Moving beyond legal compliance requirements, FSS does not collect any data that might help differentiate its (farmers) lambs to gain a higher price. This is because;

- Farmers pay independently for the (lamb) QMS Assurance Scheme, so all FSS lambs meet this standard and can be called Scotch Lamb if killed and processed in Scotland.

- Some processors also inspect farms annually to ensure that lambs are produced to standards of individual retailers (eg, Marks and Spencer's Select Farms Audit).

- Further to the previous point, the supermarkets promote lamb as "own brand", so developing a specific, independent brand is all but impossible.

37. However, certainly the QMS scheme, and even the M&S one, are light on providing evidence of the (low) impact of lamb production on the environment. This may provide an opening for FSS to develop a measure of "naturalness" that can help gain a premium from the marketplace. The opportunity to use a follow on KTIF to look at developing an environmental scorecard is under consideration.

38. At this point there is no interest in the industry to use blockchain technology to improve the traceability of lambs.

6.1.3 Matching lamb supply to demand

39. The final objective of the project looked at how Scotbeef could get delivery of a M&S spec lamb throughout the year. While finding such lambs is less problematic between July and Christmas, procuring the number and quality of suitable lamb in early and late season is difficult.

40. Producers can change lamb supply is a number of ways;

    - More accurate drafting.

    - Earlier lambing.

    - Later lambing.

    - Better genetics.

    - Breed changes.

    - Manipulating feeding.

41. But use of these options is heavily influenced by the farmgate lamb price signals in two interrelated ways:

    - Signals that improve quality whatever the time of sale.
    - Signals that encourage producers to shift the availability of lambs into the beginning and end of the season.

    The project found that changing the first is easier than the second. Each are considered in turn below.

Use of pricing to improve quality regardless of season

42. Whatever the general price on the week, improving the delivery of in-spec lambs is possible via the pricing grid. Low fatness levels are a priority requirement for the M&S spec. However, as the Table 6.4 shows, before the project Scotbeef's grid (in common with other processors) included only a small bonus for 2 and 3L lambs over 3H lambs (5p/kg dwt in the first grid). Consequently, even if just half a kilogramme heavier, a fatter (3H) lamb more than compensates for the lower per kg price in 2015 to the value of 60p (£63 cf. £62.40) for a 19.5kg lamb.

43. The project highlighted this confusing price signal which Scotbeef subsequently corrected. The second grid for November 2019 shows the benefit of Scotbeef's extra 10p/kg bonus for 2 and 3L lambs with the fatter lamb grossing 90p less (£81 cf. £81.90).

Table 6.4 – Impact of change in Scotbeef price grid

Scotbeef
7 October 2015

	1	2	3L	3H	4L	4H	5
E							
U		3.30	3.30				
R		3.20	3.20	3.15			
O		3.05					
P							

If R3H 0.5kgdwt heavier

	R3L	R3H	0.5kg heavier 3H > lighter 3L
20	£64.00	£63.00	£0.60
19.5	£62.40	£61.43	£0.62
19	£60.80	£59.85	

Scotbeef
20 November 2019

	1	2	3L	3H	4L	4H
E						
U		4.25	4.25	4.10		
R		4.20	4.20	4.05		
O		3.60	4.05			
P						

If R3H 0.5kgdwt heavier

	R3L	R3H	0.5kg heavier 3H < lighter
20	£84.00	£81.00	-£0.90
19.5	£81.90	£78.98	-£0.83
19	£79.80	£76.95	

Note: bonus applies only to lambs weighing 16-21kgs dwt

The advantage of the leaner lamb is actually higher if the feeding cost of adding the extra weight is taken into account. Producing fat requires much more feed than producing lean tissue, an issue particularly in the early and late season when feed is relatively expensive. In addition, more efficient use of feed also has carbon footprint benefits.

44. The change in pricing has reduced the number of badly out-of-spec lambs going to Scotbeef. As Table 6.5 shows, the number of such lambs has effectively halved between 2018 (2,174 out of 27,522 supplied) and 2019 (1,045 out of 26,787). Comparison with FSS' overall lamb kill, supports the conclusion that the change in grid pricing has improved the quality of lamb going to Scotbeef.

Table 6.5 – FSS total new season kill compared to lambs sent to Scotbeef

%	In-spec	Black (slightly fat)	**Badly out-of-spec**
FSS (all)			
2019	69.7	24.4	**5.9**
2018	66.5	26.9	**6.6**
2017	70.6	23.7	**5.7**
FSS (Scotbeef)			
2019	72.4	23.8	**3.9**
2018	65.7	26.4	**7.9**
2017	73.7	18.7	**7.5**

New M&S contract started in 2018

45. The table also shows that significant room for improvement exists as just 72.4% of the 2019 crop graded in-spec, which is close to 2017 when no bonus existed[6]. Penalising very fat lambs (4L and 4H) even harder seems the prudent way of shifting more slightly fat (black on FSS grading reports) lambs into spec. How the grid might change to achieve this goal is shown in the following table.

Table 6.6 – Further refining the price grid to penalise very fat lambs

Current grid (summer 2020)							
	1	2	3L	3H	4L	4H	5
E	+10	+20	+20	+5	-30	-40	-50
U	0	+15	+15	Base	-30	-40	-50
R	-10	+10	+10	-5	-30	-40	-50
O	-40	-5	-5	-25	-40	-45	-60

Optional grid showing greater penalty on fat lambs							
	1	2	3L	3H	4L	4H	5
E	+10	+20	+20	+5	-35	-45	-60
U	0	+15	+15	Base	-35	-45	-60
R	-10	+10	+10	-5	-35	-45	-60
O	-40	-5	-5	-25	-40	-50	-70

46. Of course, Scotbeef must consider how competitor processors are pricing lambs the same week. Tighten the price grid too much and producers will ask FSS to send their lambs elsewhere.

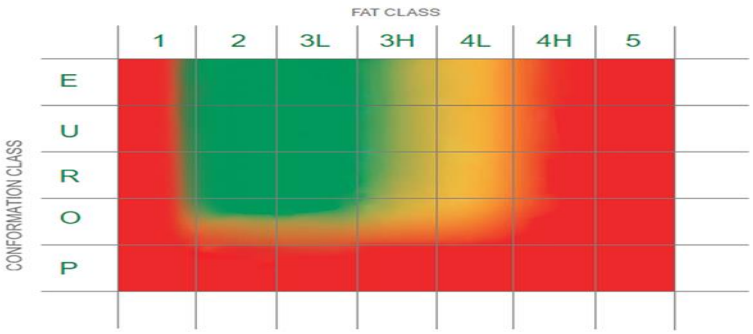
47. Unfortunately, the trial could not measure the presumed benefits of better genetics on delivering more lambs in-spec. While this was an ambition of the project, the cost-effective means of identifying and tracking lambs of known parentage in the commercial farm setting proved too difficult. For more information on the link between genetics, carcase quality and productivity see the RamCompare project[7].

48. This project has highlighted the inadequacy of the EUROP grading system. Particularly the subjectivity applied in the grading of lambs by graders not just between but also within processors. In autumn 2019, FSS field staff noted that the grader at Scotbeef was especially tough and more lambs than normal were grading 3H. The lack of a precise definition of the boundary between a 3L and 3H carcase exists helps to explain the variability in grades between graders (the below snapshot shows the range of fatness for a 3H grade). That graders

[6] The figures from analysis of the FSS database are markedly better than for the lambs trialled (2017 = 74% cf.61%; 2018 = 66% cf.51%; 2019 = 72% cf. 59%. The trial results exclude lambs that miss spec because outwith the weight range.

[7] https://signetdata.com/technical/ramcompare/the-results/

are not all independent of the processor (ie, MLC employed) also counts against strict objectivity in grade assessment.



49. In New Zealand, fatness levels are based on "total tissue depth over the 12th rib at a point 11cm from the midline of the carcass"[8]. The relevant bit of their grid is shown in Table 6.7.

Table 6.7 – New Zealand lamb grading system

Fat Classes	Weight Classes			
		M		X
Y Low fat	YM	Up to and including 7mm 13.3kg and up to but not including 17.1kg	YX	Up to and including 9mm >17.1kg
	YME	Well muscled	YXE	Well muscled
P Medium fat	PM	Over 7mm, up to and including 12mm 13.3kg and up to but not including 17.1kg	PX	Over 9mm, up to and including 12mm 17.1kg and up to but not including 21.3kg
	PME	Well muscled	PXE	Well muscled

**NZ farmers are paid on hot weight.*

In mid-April 2019, Silver Fern Farms (SFF) paid NZ$6.50/kg for all Y and P lambs weighing 14-22.9kg dwt.

50. Note that the New Zealand system is based almost entirely on weight and fatness with limited incentive for muscling (conformation).

51. Despite the failings of the EUROP grading system, the project has shown that more concerted use of it would improve the quality of lamb in terms of matching consumer demand. However, using price to move lambs into the shoulders of the season is more difficult largely due to how the general lamb price is set.

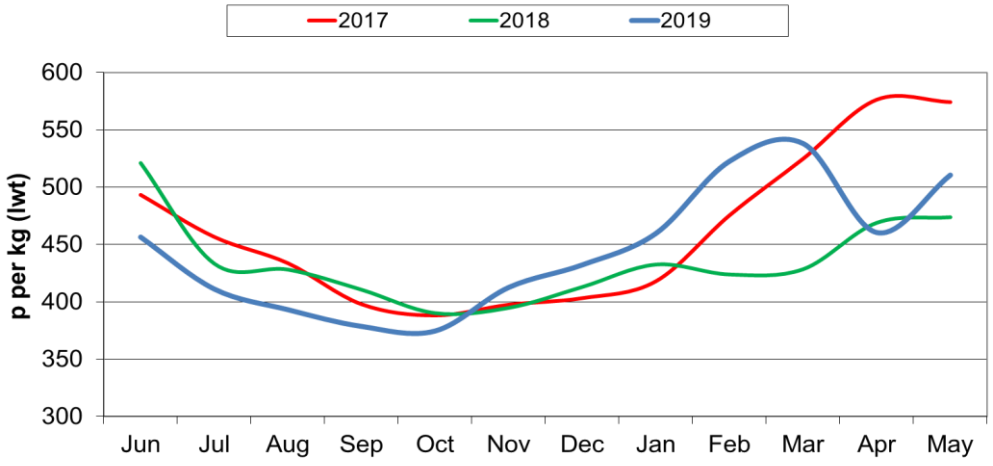
Use of pricing to shift lambs between seasons

52. The farmgate price of lambs is almost entirely determined by the balance of lamb demand with supply at the time of the transaction (so called spot or cash pricing). If demand is strong relative to supply, the lamb price is bid up and

[8] New Zealand Meat: Guide to lamb and mutton carcass classification. 2004.

vice versa if demand is weak. The annual price pattern shown in Figure 6.4 reflects the increased availability July and November simply due to the lambing pattern with the majority being born in March and April.

Figure 6.4 – GB lamb price for 2017-19 seasons



Source: AHDB

53. Supply rather than demand is generally the more dominant force in setting the farmgate price of lamb. Besides the size of the domestic lamb crop, supply is strongly influenced by cuts (mainly legs) of imported New Zealand lamb. By comparison, demand is a function of domestic consumption (heavily influenced by key holiday and religious festivals when supermarkets often apply price promotions) and exports to the EU (affected by the exchange rate especially through late summer and autumn). Demand for store (and breeding) lambs can also impact the finished lamb price as short keep finishers compete for nearly finished lambs.

54. A potential solution to better match lamb supply with demand would be forward contract farmgate prices. The project investigated the **potential of contracts** and found the following reasons for their very low usage.

    a. Processors are unable to set price mainly because they are intermediaries in the supply chain. That is, farmers sell live lambs to processors (many via the live mart), processors sell parts of that lamb as shelf ready lamb cuts to retailers as well as whole or part carcases to other buyers plus non-carcase parts like the pelt.

    b. Supermarkets do contract in some specific cuts especially for key demand periods (eg, New Zealand lamb legs for Christmas and Easter) though other parts of those NZ carcases will be disposed of through spot markets.

    c. Strong competition between processors results in thin margins making processors risk averse.

    d. There are no mechanisms available for processors to offset the risk of offering a set farmgate price. By comparison, thanks to the futures market, grain buyers can offer crop farmers forward prices and a range of other pricing options to guard against shifts in the spot market.

e. Without a futures market, second-best mechanisms are available to set prices[9];

   - A simple fixed premium over the spot price on day lamb killed.
   - A "give and take" system involves use of a forward price linked to the spot price at slaughter to smooth pricing.
   - A premium over the cost of production (COP) – see point below.

f. Tesco introduced a COP contract a few years ago that highlighted the pros and cons of such trading arrangements. In autumn 2019 contracted farmers enjoyed prices well above the spot market, however by the end of the autumn the price relationship had flipped and farmers were reportedly breaking contracts. Farmers are required to supply lambs to an agreed schedule, though with some flexibility to allow for weather affecting lamb growth. The calculation of the COP is also open to debate given the wide range of sheep systems.

g. Experience in the crop sector also points to buyers using contract small print to tighten specifications when the spot price drops well below contracted prices. This has not been suggested as a problem with the Tesco lamb contract.

h. While forward price contracts are available in New Zealand, their use has been limited to a small proportion of winter lambs over the past two winters. Their limited application is a consequence of overuse of forward pricing when processors were competing strongly for throughput against a backdrop of continued contraction of the New Zealand flock. Also, the fact that the spot market has delivered record lamb prices in recent years, has reduced the interest of New Zealand producers n forward pricing.

55. With limited appetite for contracts, could producers themselves focus on controlling lamb supply to better match demand? Unsurprisingly the answer is no, for several reasons.

   - Lambs are a commodity product, so finding supply is relatively easy throughout much of the year.
   - There are thousands of sheep farmers both in the UK and abroad and they are generally competitive, independent types by nature.
   - Processors have a logical interest in keeping farmer supply competitive. Not only will they procure lamb from overseas, they typically develop a good relationship with a network of producers close to their plants to ensure an element of control over lamb supply especially in the shoulders of the season[10].

[9] Livestock Risk Protection insurance is available in the USA to protect sheep farmers against declines in lamb prices relative to the expected price trend as calculated by the USDA. As with any insurance it involves payment of an insurance premium. Price insurance is underpinned (subsidised) by the US government. There appears little appetite for introducing such government backed price insurance in the UK.

[10] As Scotbeef explained at the January meeting in Glasgow, they also freeze product to ensure sufficient supply for holiday promotional events – Valentine's day lamb racks in that instance.

- Even if producers did all act together, the competition authorities are compelled to breakup such collusion to defend the consumer.

56. **Vertical integration** was the final option considered to better match lamb supply to demand. A big share of New Zealand red meat processing is owned and controlled by Kiwi farmers[11] – forward integration. Morrisons, by comparison, integrates backwards into the chain through controlling the processing stage of the chain (Woodheads). In the US, independent processors control cattle flow by buying cattle at the store stage and finishing them in their own feedlots. Costco, a major US supermarket, has fully integrated its chicken supply, thereby coordinating production and processing with its retail outlets.

57. Scottish or UK sheep farmers integrating forward into processing on any significant scale is highly unlikely. Furthermore, there appears no appetite for processors integrating back into lamb production. Therefore, the project looked at whether better integration at the production stage between lamb rearers and finishers could improve the supply of lambs to;

    - Improve profitability per se at the production stage.

    - Demonstrate to processors and retailers the potential benefits of working closer with farmers to organise supply.

58. The current linkage is simple. Live markets run big store lamb sales from summer through the autumn for finishers to select and buy from. Generally, ownership[12] of the lamb passes from the rearer to the finisher, with full control (and all risk and reward) passing to the finisher. Once paid, the rearer has little interest in what eventually happens to the lambs and has no formal feedback on how well his lambs meet the ultimate consumer's requirements. The project therefore considered two models that might better suit a modern consumer orientated supply chain, namely fixed price finishing and collaborative finishing. Importantly, these models may fit well with a procurement co-operative like FSS, and could be used to better match supply with demand.

59. **Fixed price finishing** involves a lamb producer, or group thereof, paying another farmer a fee to finish lambs. The finisher provides feed, emergency veterinary costs and management (including drafting for sale) for the lambs through to dispatch to the processor and charges a weekly sum per lamb for the service. Ownership remains with the rearer(s) who receives the sale income less deductions and haulage to the processor.

60. To investigate the pros and cons of fixed price finishing, FSS facilitated a tie up between seven Shetland farmers and two finishers in the Borders. The arrangement worked on the following basis;

    - 2,000 mainly hill type stores (c.25kg lwt).

    - Lambs left Shetland at the end of August with all lambs receiving the following before boarding; Ovivac-P, a wormer and minerals.

[11] Two NZ farmer owned processors exist; Alliance (100% farmer owned) and Silver Fern Farms (50% farmer owned / 50% Chinese owned).
[12] Some markets will finance a transaction for a fee if the same animals when finished are sold back through the market.

- Shetland farmers organised and paid for haulage to finishing farms.
- Lambs insured by the Shetlanders.
- The target was to finish lambs between November and February at 17-19kg dwt).
- Initially all lambs grown on pasture with pellets introduced as finishing period moved into winter.
- The cost of uplifting dead lambs covered by the Shetlanders.
- The cost of haulage to the processor was deducted from the sales receipt along with deductions including FSS's fees for drawing and marketing lambs.
- 1,947 of the original 2,000 lambs were eventually slaughtered and averaged £72.27 (390p @ 18.53kg dwt) with 61% hitting the target grade (16-21kg, R2 and R3L or better).
- A verbal rather than written contract.
- The finishers bill the Shetland group for grazing with labour charged separately.
- The finishing margin was £23,851, or £11.93 per lamb. So, added to the original store/transfer value of £40/lamb, the 2,000 lambs achieved a net sale price of £51.93.

61. Both parties were pleased with the outcome. Physical performance was very good on the one farm, but disappointing on the other, which was attributed to inexperienced management, a trace element issue and low-quality aftermaths through the autumn. One big negative was the administration required to track lambs back to their original farms to ensure accurate payment and compliance. One of the finishing farms also underwent a random government inspection that required a detailed check of tag numbers adding unwelcome work.

62. To reduce the administration difficulties associated with linking lambs to the original suppliers, a pooling arrangement could be introduced. That is, suppliers split the overall margin from the finishing contract in proportion to the number of lambs originally committed. To work, it is presumed that there is consistency in the type and size of lamb originating from the supplier farms. However, a government inspection would still require matching lambs to their actual owners.

63. One way to simplify the paperwork would be for FSS to buy the store lambs (ie, take ownership) and then fixed price finish them as above. The risk and reward is fully assumed by FSS under this arrangement as the finisher remains on an income fixed per week per lamb. The potential cost-benefit of this long keep option was modelled for the three crop years covered by the project with results summarised in Table 6.8.

Table 6.8 – Potential margin from fixed price finishing 2017-19

	2017	2018	2019
Number of lambs bought	2,500	2,500	2,500
Number of lambs sold	2,250	2,250	2,250
Deaths (%)	10%	10%	10%
Average weight sold (kg dwt)	18kg	18kg	18kg
Average cost of stores (£/hd)	£40	£40	£40
Average finished price (£/hd)	£83	£70	£82
Finishing charge (£/hd)	£17	£17	£17
Gross receipts (£)	£186,300	£157,950	£184,781
Total cost of stores (£)	£100,000	£100,000	£100,000
Total finishing charge (£)	£42,500	£42,500	£42,500
Total other costs (£)	£15,225	£15,225	£15,225
Total Net Margin (£)	£28,575	£225	£27,039
Net Margin per lamb (£/lamb bought)	£11.43	£0.09	£10.82

The results suggest that such an arrangement could have paid well in two of the past three years but just broke even in the third. However, the financing cost is considerable with potential cash flow implications and unlikely to be attractive to a risk averse organisation like FSS. One solution could be for FSS to arrange and manage a "lamb finishing pool" on behalf of farmers that finance the arrangement. The margin is ultimately split between the participating farmers and FSS is rewarded through its fee for managing the arrangement.

64. The biggest weakness of finishing on a fixed fee basis is that the margin is very dependent on the ability and diligence of the finisher especially if weather conditions adversely affect feed availability or lamb health (death rates can be significant in long keep lamb finishing). In fixed fee finishing, the finisher has effectively a guaranteed income, even where the per head fee is linked to the final number sold, with the rearer carrying all the risk.

65. One potential option for incentivizing finisher performance would be to offer a bonus for every lamb successfully sold finished. The size of the bonus could be linked to a reduced death rate rather than the market price at the time of sale being ahead of the budgeted figure.

66. Greater incentive to perform could be achieved by moving to a more ambitious **collaborative finishing** basis. This involves an arrangement that better shares risk and reward with the key points being;

- The finisher buys the store lamb at the outset (thereby gaining ownership to simplify administration), but the rearer defers part of the sum due until the lambs are eventually slaughtered.
- Agreement by both parties on the target sale period and finishing system.
- Supplier of lambs covers cost of haulage to finisher.
- The finisher covers cost of all feed, vet & med and sundry charges like deadstock removal.
- Both parties insure the lambs for the finishing period.

- From the eventual sale of finished lambs, processors and FSS charges are deducted along with the balancing value of the store lambs purchased to the rearer.

- The resulting Net Added Value is then split as agreed.

A long keep collaborative deal was modelled, again, for the three project years with the results summarised in Table 6.9 below. The case study involves a hill lamb store producer working with a crop farmer to finish 500 lambs in February and March. The value of lambs and costs are based on those used in the fixed price finishing modelling case above.

Table 6.9 – Potential margin from collabarative finishing 2017-19

	2017	2018	2019
Lambs shared	500	500	500
Number of lambs eventually finished	470	470	470
Deaths (%)	6%	6%	6%
Average weight sold (kg dwt)	18kg	18kg	18kg
Share of Net Added Value (NAV) to finisher (%)	75%	75%	75%
Share of store cost paid at start (%)	50%	50%	50%
Average cost of stores (£/hd)	£40	£40	£40
Average finished price (£/hd)	£83	£70	£82
NAV (£)	£18,258	£12,148	£17,788
NAV to store producer (£)	£4,565	£3,037	£4,447
" " " (£/lamb contracted)	£9.13	£6.07	£8.89
NAV to finisher (£)	£13,694	£9,111	£13,341
" " " (£/lamb contracted)	£27.39	£18.22	£26.68
Finishers costs (£/lamb contracted)	£18.66	£18.66	£18.66
Margin to finisher (£/lamb contracted)	£8.73	-£0.44	£8.02

Under this arrangement, the finisher potentially gains most of the value added over the finishing period. Thus, in addition to rewarding technical competence in physically getting lambs finished (eg, low death rates, efficient feeding), the finisher also benefits from "hitting spec" and any beneficial move in the overall market price.

67. For the store producer the obvious benefit is the top up to the store value, which for 2019 resulted in an overall value of £48.89 (ie, £40 + £8.89). More importantly however, this arrangement provides an alternative to attempting to finishing lambs at home which many producers default to. Attempting to finish at home can be expensive in terms of the direct costs (eg, creep feed) but it also typically reduces flock performance in the following season ie offloading lambs earlier in the autumn allows farmers to focus on getting the breeding flock and farm in condition to maximise the coming year's lamb crop.

68. The obvious downside for the rearer is the reduction in autumn cashflow from deferring part of the store transfer price. Clearly this will depend on the agreed sharing arrangement, but it seems likely that the store producer will have to defer at least half of the transfer value to gain a meaningful share of the final finished value. Given these limitations, the most likely outcome is that store producers would only commit part of their lamb crop to such an arrangement.

69. In terms of attractiveness to the finisher, as the results in the table show, the finishers' margin is most exposed to finished prices turning out less than originally forecast. Thus, unless the finisher has borrowing issues, it would appear logical to simply buy the lambs outright at the start.

70. The Shetland trial suggests that like-minded store producers and finishers working together can both benefit financially through more structured integration. Furthermore, FSS is well placed to facilitate more ambitious finishing arrangements of a scale that could attract the interest of processors and retailers to enter a contracting arrangement for late season lambs (see Appendix 2 for the model agreement). Collaborative integration and organised finishing could potentially offer the processor and retailer greater security of supply of 'in-spec' lambs and at the same time offer environmental and climate change benefits such as reduced haulage, lower fuel emissions and increased soil organic matter. It must be conceded that the advantages over the traditional store market by which lambs are shifted into the latter part of the season are not overwhelming.

71. Brexit, however, could potentially disrupt the current (spot) market situation in two ways.

    - By changing the sheep industry's trading arrangements which could, under a no deal scenario, result in the loss of the EU market that accounts for a third of the UK's lambs. Even with the deal currently requested by the UK government where zero tariffs are applied, non-tariff measures will add administrative cost to trading with the EU. Also, Australasian sheepmeat is likely to get easier access to the UK market whether, or not, the UK strikes a deal with the EU.

    - A reduction in direct support payments to farmers. Along with the possibility of LFASS being converted into a public goods scheme[13].

72. Under the best-case scenario (a zero-tariff trade deal and a limited reduction in BPS), after a 2-3 year period of adjustment, UK sheep production would be expected to stabilise at a lower level. Under a worse-case scenario (a no deal with the EU plus more significant cut in BPS), the UK flock would be expected to shrink much further. Without the EU market to export surplus lamb to through the glut period, getting lambs slaughtered through the autumn could be difficult. While the traditional store market will still provide a mechanism for moving lambs out-with the autumn period, the clearing price could be very low. Better integration could provide the rearer with a means to better benefit from what his lambs eventually sell for.

73. Whatever trade/policy scenario plays out, replacing the out-dated EUROP grading system is an issue that all parts of the sheep industry should find agreement on. The long-term viability of the industry will be best served with a grading system that clearly communicates what the consumer wants to all stakeholders in the supply chain and which will extending beyond the boundaries of current practice.

[13] Potentially agri-environmental schemes to improve soil quality could incentivize the finishing of lambs on crop farms to build up organic matter. The Irish have run such a scheme under their Green Low-carbon Agri-Environmental Scheme (GLAS) over recent years.

6.2 Milestones

Key milestones during the project were as follows

- 12 farmer producers representing different farm types were recruited and data from a total of 2,454 lambs from 2017,2018 and 2019 lamb crop years was gathered and included in the trial
- On farm data collected included management practices, lamb weights, growth rates and health, genetic and feeding information
- Eating quality tests were completed on a total of 436 lambs and the results related to management practices
- Two farms were modelled using Farmax software to model the cost/benefit of changes in management practices and to review system efficiency, quantify key performance indicators and to plan lamb supply throughout the year
- Regular meetings were held of the Operational Group to review progress and decide on actions required with annual reports produced for the Scottish Government
- Regular communications took place with all project participants and a project review day for all participants was held at Scotbeef's meat cutting plant at Queenslie near Glasgow
- Early, mid and late season blueprints for the production of the carcase required by M&S were produced
- Price modelling to investigate the impact on the supply pattern was completed
- The project was managed within the approved budget and a final report produced in October 2020.

7. LESSONS LEARNED

7.1 Issues/Challenges

74. The specific challenges that arose during the project have been fully covered in section 6 and are also further discussed in the section 9 but are listed below reference.

    - Sourcing enough lambs for trials especially early season.
    - Limited improvement in proportion of lambs hitting specification.
    - Limitations in the design and application of the EUROP gradings system.
    - Low farmer interest in measuring performance to set, monitor and achieve targets.

- The practicality of assessing sheep genetics on commercial farms.

- Technical and commercial barriers to use of EID technology.

7.2 Impacts

75. Despite the challenges incurred in completing this project, the benefits have been significant including identification of opportunities for future progress. Two broad impacts are set out below.

76. Active participation in this project has helped Scotbeef develop their business relationship with M&S. Critically, by encouraging close collaboration with FSS, communication up and down the chain has improved. Opportunities and problems have been identified in order that issues can be assessed, discussed and appropriate action taken. Specific examples are summarised below.

    - A large number of the extra lambs required for Scotbeef's M&S contract were sourced via FSS's Scottish network of farmers, thereby reducing transaction costs and removing the need for Scotbeef to find and coordinate delivery of lambs directly.

    - The anomaly in the pricing grid was corrected by Scotbeef introducing a bonus for lean carcases.

    - Scotbeef developed a robust means of testing the eating quality of lamb in a commercial setting. This testing confirmed that the eating quality of lamb is consistently good.

    - Further to the last point, the indication that eating quality is higher in late season provides a market opportunity for retailers to exploit to the benefit of all in the chain.

    - During the course of this project, the increasing importance of how lamb is produced in terms of animal welfare and impact on the environment became more evident. Highlighting and reinforcing the provenance of Scottish lamb should be a priority.

    - Both Scotbeef and FSS have improved their feedback of slaughter and associated data to producers. FSS farmers now have a much clearer view of what type of lamb is needed to meet the M&S customer's requirements.

77. Clarification of the actions and opportunities that can be taken at the production level to improve competitiveness. Both individually but, equally importantly, by closer collaboration at producer level.

    - Clearly written production blueprints along with a video on the importance of measuring lamb growth rates have been provided to FSS farmer members (See Appendix 3 for the main season blueprint).

    - As a result of examining the options to better manage lamb supply to meet retailer demands, a formal basis for store producers to profitably finish more lambs was developed.

- The knock-on benefit of better farmer-to-farmer linkage is that more store lambs are retained in Scotland for underpinning Scottish processing. Finishing of lambs on lowland Scottish farms also has significant benefits for soil carbon levels and, by implication, reducing climate change.

- Finally, developing the production protocols allowed a detailed examination of the suitability of Farmax software for the Scottish situation. This powerful budgeting tool provides a low cost means of modelling, or testing, different management systems. Greater use of this tool at industry, if not farm level, should be promoted.

8. COMMUNICATION & ENGAGEMENT

8.1 Engagement during the project

78. During the life of the project, communication and engagement was undertaken through a range of channels that are described below.

79. The **operational group** (FSS, SAOS, Scotbeef and SRUC) met at the outset of the project to agree how the plan for delivering the project. As chair of the lead organisation, Ian Watson led and coordinated the project and ensured that agreed actions were communicated and delivered. The group formally met annually to review project progress and update the plan as needed. The group also met with M&S at Scotbeef to ensure that the retailer was fully aware of how the project was progressing. Within each year, the chair managed the project, communicating with group members and the project funders (SG) as necessary. Working papers were produced to inform the group and provide a basis for decision making on how best to progress the key aims of the project.

80. **SRUC worked closely with Scotbeef, FSS and participating farmers** to organise the three years of trials. This required constant engagement given how external factors changed the best laid plans. In 2018 the very bad late winter and spring meant that the programmed availability of lambs was unavailable. Action was taken to find other lambs, but it was not possible to fully meet that year's target. Likewise, completion of the 2019 trial was curtailed by covid-19. Participating farmers received feedback on how their lambs performed in the trial. As a special thank you to participating farmers, in early 2020 Scotbeef hosted a tour of its Queenslie plant in Glasgow at which the draft findings of the project were presented.

81. **FSS farmers (shareholders)** were updated with the progress of the project throughout the three years of the project. The October 2018 update is shown in Appendix 4 as an example. The production blueprints and lamb weighing video were also placed on the FSS website for easy access and reference, along with guidance on how to reduce antibiotic usage.

82. As this was an innovation rather than knowledge transfer KTIF project, communication to **the wider industry** has been limited to date (see 8.2). Nevertheless, FSS took the opportunity to promote the value of the project at a well-attended panel session at Agriscot in 2117. Also, Scotbeef asked Poppy Frater of SRUC to occupy a stand at its 2019 winter fair to communicate how the project was progressing as a means of reaching sheep producers that deal directly with the processor.

8.2 Communication of findings

There are essentially four distinct audiences to communicate the results to, each with different levels of interest in the detailed findings

- Trial partners, participants and stakeholders
- The Scottish Government as the funding body
- The FSS community
- The Scottish sheep industry as a whole

Trial partners, participants and stakeholders will receive the full report with follow-up meetings to prioritise individual findings and to agree appropriate action on each

The Scottish Government as the funding body will also receive the full report but are more likely to be interested in the Executive Summary and the actions arising from the most significant findings.

The FSS community (members) are unlikely to read a 70 page report including appendices, but undoubtedly will be interested in many of the findings and conclusions and any actions arising. There is however a danger in swamping members with too much information in one communication and individual messages being lost as a result. It is therefore considered that once findings are prioritised that individual messages/findings and resultant actions should be drip fed to the FSS membership in order of priority through newsletters, weekly bulletins social media and the FSS website.

Similar to the FSS community, it is considered that the Scottish sheep industry would have difficulty in assimilating the detail contained in the full report and consequently communication to the industry as a whole will follow similar lines to the FSS community ie drip feeding individual findings through the publication of press releases and articles.

9. KEY FINDINGS & RECOMMENDATIONS

Too many lambs miss the M&S specification

83. The proportion of lambs meeting the M&S specification is modest and has not improved over the three years of the project. Overfatness remains the main problem (too many 3H's), with lambs falling outside the weight bracket (16-21 kg dwt) also important.

84. The reasons for missing specification were;

- Weight pays, so a farmer will logically aim to take a lamb right up to the level of finish at the boundary of 3L/3H. It is difficult to achieve the required weight and fat cover simultaneously.

- For the 2017 lamb crop, the pricing grid did not penalise slightly fat (3H) lambs.

- The "sharpening" of the price grid in 2018 corrected the anomaly noted above. While this reduced the number of "badly out-of-spec" lambs (ie, >4L fatness grades), it did not significantly improve the proportion of 3L's or leaner.

- Seasonality of lambing means crossbred lambs become too big from late summer onwards.

- Natural variation within a batch of lambs even of the same breeding (eg, a small triplet ewe lamb may finish at a carcase weight below 16kg).

Recommendation – to further adjust the price grid. Hitting fat lambs harder would further encourage farmers to draw lambs leaner. But better to add further bonus to 3L. Given the premium retail prices charged by M&S for lamb, the latter is more obvious.

Recommendation – to feedback to FSS members the key finding of the project that too many lambs are missing specification. FSS to highlight the consequences of this via feedback through kill sheets and field staff.

The EUROP grading system requires modernisation

85. The first finding points to how the current (EUROP) grading system could be better used. However, there are inherent weaknesses in the design of the EUROP grading system which system dates from the 1970's.

86. The EUROP system grades a lamb on meat yield and visible fatness using a grid system. This is consistent with how lambs are graded in competitor countries like New Zealand. The issue is that while the New Zealand system has precise measures on, for instance, fat grades, the EUROP system is based on the judgement of the grader. Consequently, the same lamb carcase may not return the same grade at two factories (even those owned by the same company). While admittedly this can work to a producers benefit, it results in a system that sends mixed messages to producers and a lack of progress overtime in producing the leaner cuts that retailers consistently claim consumers want to buy.

87. Machine grading (eg, VIAscan) of lambs not only offers objective measurement, it provides hard data that can be used to calculate indices for meat yield that can be used by farmers to identify better tups. Clearly there is a cost implication for processors, but such cost may be well worthwhile in underpinning the long-term competitiveness of the Scottish sheep industry.

Recommendation – It is understood that AHDB has an initiative underway to modernise the grading system. The findings of this project should be sent to AHDB.

Recommendation – examine the cost-benefit of supporting machine grading in Scottish lamb abattoirs.

The eating quality of lamb is consistently good to excellent

88. Taste testing over the three years of the trial found that generally, lamb scores consistently well for eating quality. There was variation but at the higher end of the scale. Results from the professional taste panel also indicate that taste improves with age, with late season lamb consistently scoring higher.

89. Unfortunately, it was not possible to relate specific farm practices to eating quality. There is some evidence to suggest that lambs finished purely off certain forage crops in autumn have lower scores and that the speed at which lambs are growing prior to slaughter may be positively related to taste. A recent major New Zealand trial by Silver Fern Farms (SFF) concluded that producers can do little, if anything, to influence eating quality, which would appear to agree with the findings of this project.

90. The Australians, however, are developing a star graded system based on breed, meat yield, carcase weight and intramuscular fat to help predict eating quality. Te Mana lamb of New Zealand has also developed a production system to deliver a premium product based on taste. Consequently, efforts to look further at improving the eating quality of Scottish lamb, especially late season lamb, are warranted.

Recommendation – to prompt QMS to look closer at the star grading system developed by Meat Standards Australia to improve lamb eating quality.

91. SFF's major eating quality study did find clear links between farm practices and the eating quality of beef. As a result, SFF has adjusted its kill sheet feedback and pricing system to encourage producers to deliver cattle that can yield beef for premium markets.

Recommendation – given the importance of beef to Scottish agriculture, the merits of developing a beef grading system that helps differentiate Scottish beef on eating quality should be urgently explored.

Provenance is increasingly important to consumers

92. How a product is produced (its provenance) has grown markedly in importance over recent years. Though not a stated goal of the project, lower antibiotic use was identified as an issue that FSS should encourage its farmer members to act toward.

93. Premium consumers are particularly concerned with the naturalness of their meat and its positive impact on the environment. Scottish lamb can score highly on both counts which would benefit both farmers and processors.

Recommendation – FSS should seek further KTIF funding to investigate how farmers can be incentivised to produce lambs in a manner that improves the environment.

Low exploitation of digital technology by the sheep industry despite enforced use of EID tags since 2014

94. The introduction of EID tags to meet compliance requirements gave the UK sheep industry an opportunity to use data to exploit commercial advantage. Unfortunately, the industry has squandered this head start as key competitor countries – New Zealand and Australia – have increasingly embraced this technology to improve their competitiveness.

95. Several reasons were identified for the incomplete availability of grading data for individual lambs;

- A lack of demand from farmers for data relating to individual lambs (the current feedback on kill sheets is acceptable)
- The big practical difficulties of linking lambs to the sire in the field situation which would be required to give accurate feedback on genetic gain.
- Extra labour (cost) required on the kill line to collect the data.
- Grading data is owned by the processor not the farmer.
- Inconsistency between the national sheep EID recording systems used by the home countries.

96. The lack of demand from farmers for a more detailed data probably relates more to farmers' general poor use of data, whether that be in analogue or digital form. The project found that few of the farmers participating in the trial used industry recommended KPI's as standard. Indeed, the robustness of those KPI's could be challenged given the dearth of data in the industry.

Recommendation – to encourage QMS to redouble efforts to explain the benefits of better use of data to bottom line sheep performance.

97. Take up of sophisticated decision support software like Farmax, that is widely used by New Zealand sheep farmers, will be constrained by a lack of basic farm level data. Nevertheless, the project demonstrated that Farmax has potential as a modelling tool to educate both farmers and consultants at industry level.

98. Using digital data does require hardware (eg, stick reader, weigh heads, weigh scales) and specialist software. The project found that a number of the farmers involved in the trial had various bits of digital kit, but the usefulness of "the package" was limited by the lack of /or poor transferability of data back down the chain, and also to the limitations of available software. The new Sustainable Agriculture Capital Grant Scheme introduced by the SG, which provides 50-60% funding of EID equipment, is a welcome development.

99. SCOTEID is a tremendous national resource that is perhaps best placed to make digital technology work for the Scottish red meat industry. This would include improving traceability by converting paper-based *Food Chain Information* forms to an electronic format (eg, as New Zealand has with the electronic Animal Status Declaration form[14]).

Recommendation – for SG to explore with SCOTEID the potential of extending its responsibilities to lead on progressing the use of digital technology for the benefit of the sheep (and red meat) industry.

The spot market will continue to coordinate lamb supply with demand for the foreseeable future

100. The current system whereby deadweight prices are set weekly and even daily, is understood and follows a predictable pattern, inextricably related to supply and demand and inevitably results in lower farmgate prices in the July to November period. However, in a typical year when set against the relatively low cost of production during that period, prices and the resultant margins achieved during the glut period can look reasonable relative to higher prices at other times of the year.

101. The farmgate price is less predictable in early and late season. Consequently alternatives (contracts and vertical integration) should have more merit during these periods to ensure lamb supply meets demand. The Tesco lamb contract is a good example of a contract. However, the weaknesses of its "cost of production" pricing mechanism have been exposed and with price volatility has often resulted in the contracted price being less than the spot price in the last 12 months.

102. Vertical integration between FSS farmers was found to have potential given the co-operative nature of FSS. Currently, there is almost no integration with finishers buying store lambs in late summer/autumn for finishing as they wish. Simple and clear cut, but weak in terms of driving a long-term improvement in lamb quality (better genetics) and achieving provenance benefits that are being increasingly valued by the market. Two different integration models were examined, namely fixed price and collaborative finishing.

103. Fixed price finishing, where the store lamb producer pays another farmer a set fee to finish lambs, is the simpler. However, it is very dependent on the ability and attention to detail of the finisher and it is recommended that some form of performance bonus be built into the arrangement. Where the arrangement involves lambs from a number of store producers, EID technology is essential for traceability.

Recommendation – where store producers enter into an agreement to finish lambs at another farm, a formal contract should be used to protect the interests of both parties.

[14] An assessment by Scarlatti limited has estimated that the Electronic Animal Status Declaration (eASD) technology is saving farmers, livestock representatives and meat processors' time and reducing costs. In 2025, the eASD development is projected to be generating an annual economic benefit of NZ$6.69 million across the industry.

Recommendation – FSS should explore the option of "lamb finishing pools" for FSS members. That is, members subscribe to underwrite the purchase of store lambs by FSS for finishing on either a fixed or collaborative basis. FSS manage the arrangement for which a fee is received with the members sharing the net margin based on the size of their subscription.

Collaborative finishing is more ambitious in terms of sharing risk and reward. However, the key conclusion from the modelling work was that with the risk and potentially small margins in lamb finishing, increasing the attractiveness of the arrangement to one party, reduces it too much for the other party.

Brexit could disrupt the spot market's pre-eminence

104. Brexit, especially on a no deal basis, is likely to cause major disruption to the lamb market both in the short and longer term. Even if a zero tariff deal is agreed, barriers to exporting lamb to the EU will be notably increased due to non-tariff measures (NTM's). No deal would means tariff of up to 45% which implies that the farmgate price of lamb falling by up to half (allowing for NTM's too) to maintain competitiveness in EU countries. Under this worse-case scenario, lamb destined for the domestic market (eg, M&S) might well be better priced under some form of contractual arrangement.

105. By extension, retailers and processors may look more favourably on working with producers (and organisations like FSS) that can better organise the supply of out of season lamb. Not only can such integration increase the proportion of in-spec lambs, it should better deliver on the provenance benefits that premium consumers are increasingly looking for.

Focus on performance off grass to optimise margins from main season lambing

106. Where most lambs are sold into the glut market (July to November), lambing should be timed to maximise production from grazed pasture and minimise concentrate use and labour input. Farmax modelling shows that delaying lambing till early April better matches flock requirements to pasture production.

107. Slightly later lambing also offers potentially large labour savings and the opportunity to scale up. If a bad Brexit markedly lowers the lamb price, especially through the glut period, labour efficiencies will be critical to remaining viable.

Recommendation – encourage QMS to use Farmax modelling to demonstrate the importance of production of grass and scale to main season lamb production.

The potential of Scottish hill lambs for the late season market has been underexploited

108. The project found that May born Scottish hill lambs, grown slowly, could provide the size of carcase (16-21kg) required by supermarkets through the late season. However, the proportion hitting this weight range at the required low level of fatness would benefit from better use of genetics.

109. The project also found that lambs killed through late season scored well for taste. A combination of age, lamb type, growth rate prior to slaughter and feeding systems are judged to explain the better eating quality.

110. It is also suggested that exploiting the potential of these hill lambs would benefit from more structured integration of store lamb producers with specialist low-ground finishers. Not just an economic advantage for both parties, but also significant environmental benefits given the low carbon (organic matter) content of many cropping farms.

Recommendation – for FSS to disseminate the benefits of better farmer integration in supplying the late season lamb processors and retailers want.

Recommendation – to ask QMS to renew industry led efforts to get far more value from Scottish hill lambs based on the findings of this project.

Early season lamb production in Scotland is unattractive without higher, guaranteed prices

111. In general, Scottish sheep producers cannot compete with producers in southern parts of the UK due to the shorter grazing season. For the small number that do have significant numbers of lambs in early May, other processors are prepared to pay premium prices to get them.

112. For producers that are considering the early market, Farmax modelling confirms that achieving very high lamb growth rates to sell lambs by the end of June is critical.

10. CONCLUSION

113. Scotbeef's contract to supply M&S with lamb is an important one for the Scottish sheep industry. It will have contributed to "prime sheep slaughter in Scotland rebounding to a four-year high in 2019, rising 13.4% to 1.245m head"[15].

114. This project sought to encourage closer supply chain collaboration between Scotbeef, the processor, and co-operating producers under the FSS umbrella. Working together, the aim was to improve the supply of lambs that meet the specification demanded by M&S. The proportion of lambs "hitting spec" was too low and indeed, is still too low. However, the project has identified and examined the options for delivering more of the lambs of the standard required. Better use of those options is needed with some requiring action by government to make them happen.

115. Brexit, whether on a deal or no-deal basis, will put immense new pressures on the Scottish sheep industry. Contracts with the big UK retailers will be even more important in underpinning the viability of the Scottish sheep industry. Thus, it is vitally important that the findings from this project, especially the many challenges identified, are collectively discussed and acted upon.

[15] The Scottish Red Meat Industry Profile. 2020 edition. QMS

11. ANNEXES

Appendix 1 – Farmax modelling

Farmax[16] software was used to measure the impact of changes in key management practices on a pasture-based farm system. Essentially Farmax allows the user to look at how changes in how a farm is run affect physical and financial performance. By capturing a farm in digital form, Farmax allows a low-cost way to trial the pros and cons of various farm systems which can then be rolled out to farmers with greater confidence. Farmax modelling involves the following steps:

- Building the base farm model;
- Validating that modelled performance accurately reflects actual performance;
- Defining a range of scenarios to test on the model;
- Re-running the model under each scenario;
- Benchmarking the results against the base run to measure the change in physical and financial performance (retesting as results dictate);
- Based on the results, deciding what changes should be pursued on farms.

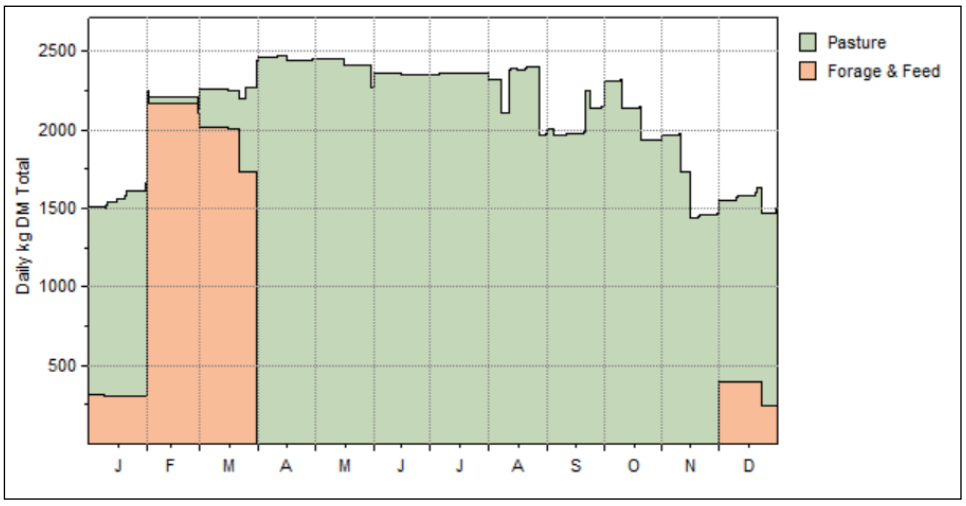
Below each step is considered in turn for main, late and early-season lamb producing farms.

1) Main season lambing

a) Base model assumptions

Farm size, 255ha	Lambs weaned 12 August (140 days)
217 GLU*, 0.8GLU/ha (49% sheep)	47kg concentrate/ewe (incl. tailend lambs feed: 4.9t)
398kg sheep output/ha	Concentrates, £250/t
800 ewes tupped	Annual pasture production, 4.5 tDM/ha
Ewe condition, 2.5 BCS** at tupping	Average pasture cover at lambing, ~1,200kgDM/ha (Figure 1.1)
Ewe condition, 2.5 BCS at lambing	40kg Nitrogen/ha (cultivatable land only)
175% scanning (1,400 lambs)	Nitrogen, 71p/kg N
140% weaning	Lamb growth rate to 90 days***, 250g/day
Planned Start lambing 15 March	Lamb growth rate postweaning, 130g/day
Average lambing date 25 March (planned start +10 days)	Average carcase weight, 19.5kg

*Generalised Livestock Units (GLU); **Body Condition Score (BCS); ***All lamb growth rates based on average lambing date.



[16] http://www.farmax.co.nz/

Figure 1.1 The feeding for the main season lambing flock; Late pregnancy feeding shown in February and March and tail end lambs feeding in December and January.

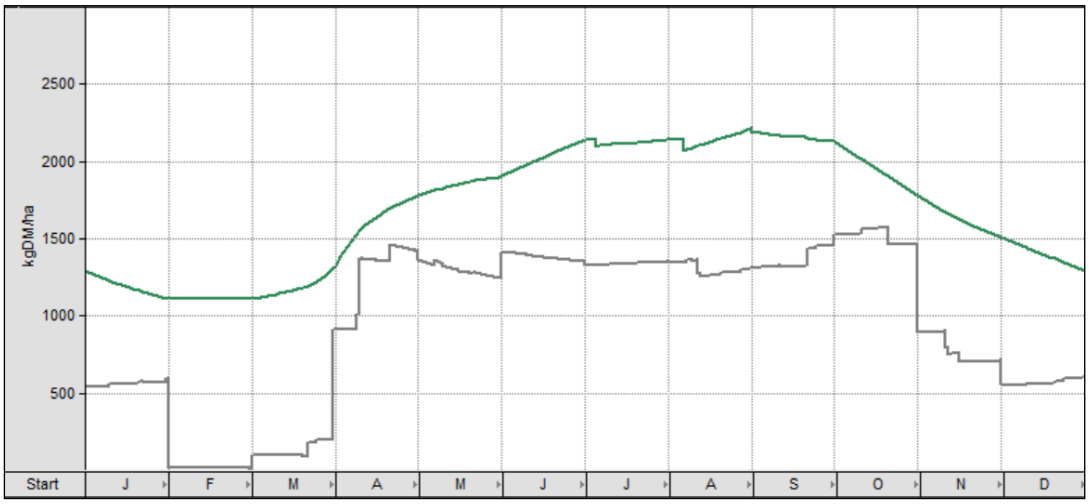


Figure 1.2 Base farm average pasture covers (green) and minimum cover required to sustain stocking (grey). Pasture is quantified in kilograms of dry matter per hectare (kg DM/ha).

Table 1.1 Monthly farm pasture growth rates and quality for each scenario

Scenario		units	J	F	M	A	M	J	Jy	A	S	O	N	D	Total
Base	Growth	kgDM/ha/d	0	0	3.8	23	24.6	29.7	22.8	22.2	13.5	6.5	1.2	0	4,500
	Quality	MJ ME/kgDM	10	10.1	11.1	10.8	10.7	10.3	10.2	10.2	9.8	9.9	10.1	10.0	
Scenario 1	Growth	As Base run													
	Quality	As Base run													
Scenario 2	Growth	As Base run													
	Quality	As Base run													
Scenario 3	Growth	As Base run													
	Quality	MJ ME/kgDM	10.1	10.5	11.1	10.8	10.7	10.6	10.5	10.5	10.0	9.9	10.1	10	
Scenario 4	Growth	kgDM/ha/d	0	0	4.3	25.6	27.3	33.0	25.3	24.7	15.0	7.2	1.3	0	5,000
	Quality	As S3													
Scenario 5	Growth	As Base run													
	Quality	As Base run													

Nb. These pasture attributes are across the whole farm (include hill and cultivatable land). Growth quantified in kilograms of dry matter per hectare per day (kg DM/ha/d); quality is measured in megajoules of metabolizable energy per kilogram of dry matter (MJ ME/kgDM)

Table 1.2 Monthly lamb (base) price sensitivity analysis (+/- 10%)

£/kg deadweight	M	J	Jy	A	S	O	N	D	J	F	M	A
Base	4.99	4.96	4.38	4.18	3.95	3.83	3.96	4.15	4.09	4.20	4.45	4.83
Higher	5.49	5.45	4.82	4.60	4.35	4.21	4.36	4.57	4.49	4.62	4.90	5.31
Lower	4.49	4.46	3.95	3.76	3.56	3.44	3.57	3.74	3.68	3.78	4.01	4.35

Source: Average last three years Standard Quality Quotation AHDB 2017-19

b) Management scenarios tested

Scenario 1 – Increase lamb growth rates with creep feeding

- Provide 0.2kg/ewe/day in creep feed followed by 0.2kg/lamb/day post weaning;
- Pre-weaning growth rates increased to 300g/day and post-weaning growth rates to 200g/day.

Scenario 2 – Key dates moved and lamb growth rates raised off grass but overall pasture production and quality unchanged on base run.

- Lamb three weeks later starting 5 April;
- Lambing later reduces housing and associated straw requirement and reduces concentrate feeding;
- Longer winter resting of lambing fields to increase pasture covers.
- Wean lambs 40 days earlier (24 July);
- Body condition score (BCS) increased to 3 at tupping due to earlier weaning;
- Though covers at lambing better, monthly pasture growth rates and quality as per base run.

Scenario 3 – as Scenario 2 but with higher pasture quality achieved by:

- Increased grazing pressure through better grazing management in early summer raises pasture quality on sheep ground by 0.5 MJ ME/kgDM through mid and late summer.

Scenario 4 – as Scenario 3 but with increased pasture production achieved by:

- Optimising fertiliser use;
- Increased use of rotational grazing.

Scenario 5 – as Scenario 2 with a forage crop grown to help finish lambs through the autumn.

- 9ha rape grown and fed to lambs from September 20th – November 31st. Forage rape assumptions: cost: £180/ha, yield: 5t DM/ha, 12 MJ ME/kgDM, lamb growth rates 200g/head/day.

c) Results and interpretation

Table 1.3 Performance of main season base run versus scenarios

		Base farm	Scenario				
			1	2	3	4	5
Revenue	Sheep Revenue	£77,241	£81,323	£76,919	£76,629	£76,629	£76,458
	Beef Revenue	£67,007	£67,007	£67,007	£67,007	£67,007	£67,007
	Subsidy	£55,000	£55,000	£55,000	£55,000	£55,000	£55,000
	Total Revenue	£199,248	£203,330	£198,926	£198,636	£198,636	£198,465
Key variable costs	Conservation	£15,643	£15,643	£9,811	£9,811	£7,599	£9,811
	Forage Crops	£0	£0	£0	£0	£0	£1,620
	Purchased Feeds	£13,332	£18,498	£9,437	£8,036	£4,716	£7,862
	Reseeding	£0	£0	£0	£0	£0	£0
	Nitrogen	£3,550	£3,550	£3,550	£3,550	£3,550	£3,550
	Other	£111,230	£111,230	£111,230	£111,230	£111,230	£111,230
Total Farm Expenses		£143,755	£148,921	£134,028	£132,627	£127,095	£134,073
Rent/Leases		£20,000	£20,000	£20,000	£20,000	£20,000	£20,000
Farm Profit before Tax		£35,493	£34,409	£44,898	£46,009	£51,541	£44,392
Difference in Net Profit (cf. base)			-£1,084	£9,405	£10,516	£16,048	£8,899
Farm Profit per ha before Tax		**£131**	**£127**	**£166**	**£170**	**£191**	**£164**
Difference in Net Profit per hectare (cf. base)			-£4	£35	£39	£59	£33
Annual Pasture production	t DM/ha	4.5	4.5	4.5	4.5	5	4.5
Concentrates	kg/ewe (inc. lamb feed)	47	73	28	21	4	20
Lamb growth rate to 90 days	g/day	250	300	300	300	300	300
Average age at slaughter	days	197	144	184	169	169	163
Average lamb price	£/kg DW	3.93	4.17	3.91	3.89	3.89	3.88
CO2 equiv/kg product	kg CO2 e/kg product*	17.5	17.3	17.3	17	17	17.1

*As calculated in Farmax based on methane and nitrous oxide emissions only

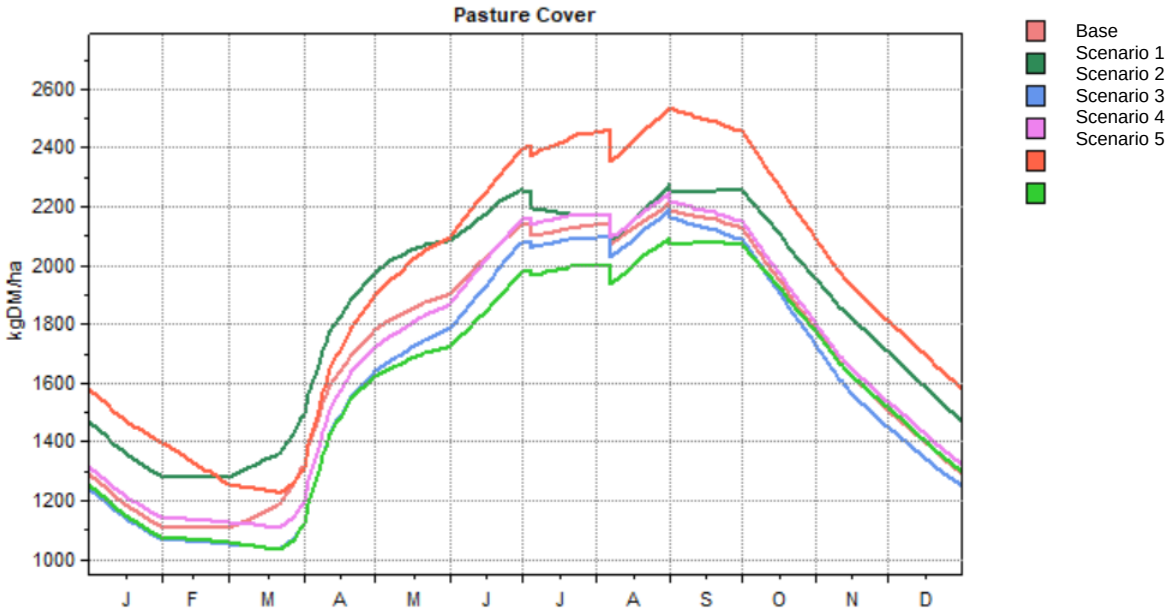


Figure 1.3 The effect of the scenarios of farm average pasture cover (a gauge of pasture supply on farm)

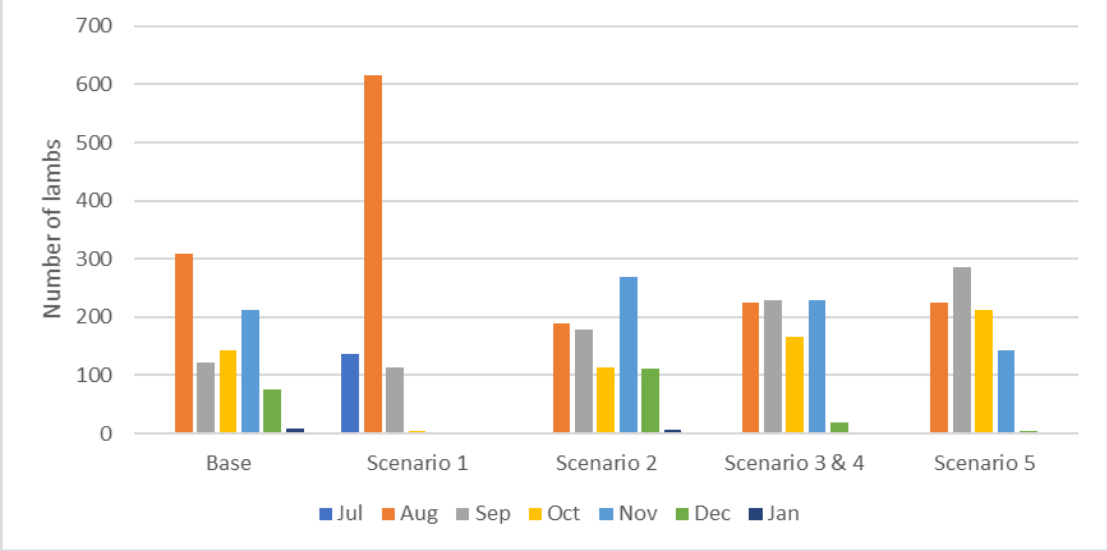


Figure 1.4 Lamb sales profile

The most profitable scenario was Scenario 4 – worth over £16,000 in greater net profit compared with the base run (table 1.3).

Scenario 1 (creep feeding) resulted in a better average lamb price (average sheep revenue increased by £4,082) but this did not offset the greater feeding costs (£5,166 greater than base run). However, by getting lambs away sooner (see figure 1.4), the pasture covers in the autumn are greater (figure 1.3) which should result in ewes in better condition for tupping and a greater subsequent lamb crop.

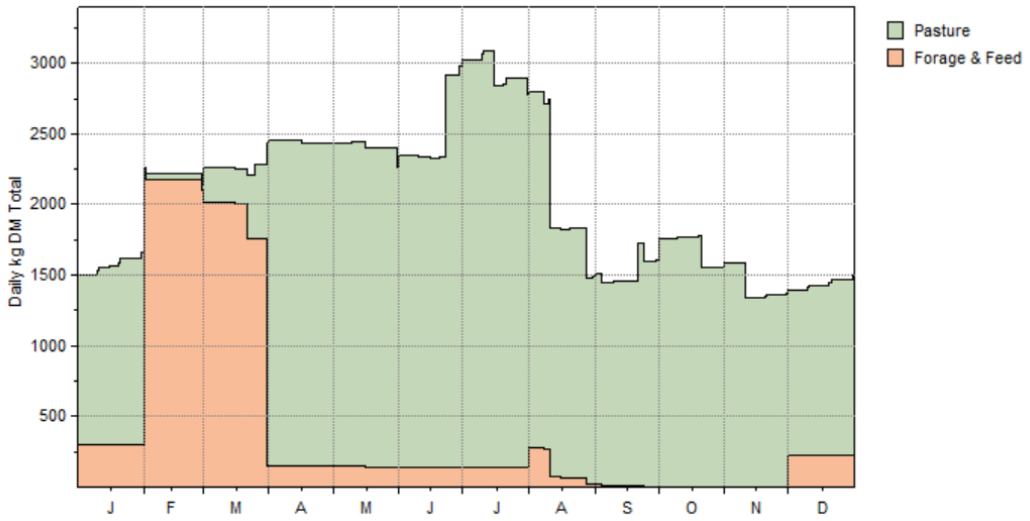


Figure 1.5 The feeding for a creep feeding scenario; Late pregnancy feeding shown in February and March, creep feeding through the summer and tail-end lambs feeding in December and January.

Scenario 2 (lambing later and weaning earlier) delivered the greatest step change in farm profit (£9,405; Scenarios 3, 4 and 5 build on Scenario 2). The revenue dropped marginally due to later lamb sales (figure 1.4). However, by better matching the flock's feed requirements to pasture growth, total concentrate use is 62% lower at 28kg/ewe. That is, by moving lambing back, the pasture covers at lambing are around 200 kgDM/ha higher at lambing and support better lamb growth through lactation. The reduced wintering requirement also lowers the tonnage of silage and straw needed affording significant savings. Weaning earlier not only allows lambs to be priority fed on the best pastures post weaning, it gives more time to get ewe condition and pasture covers right for optimal mating conditions in the autumn.

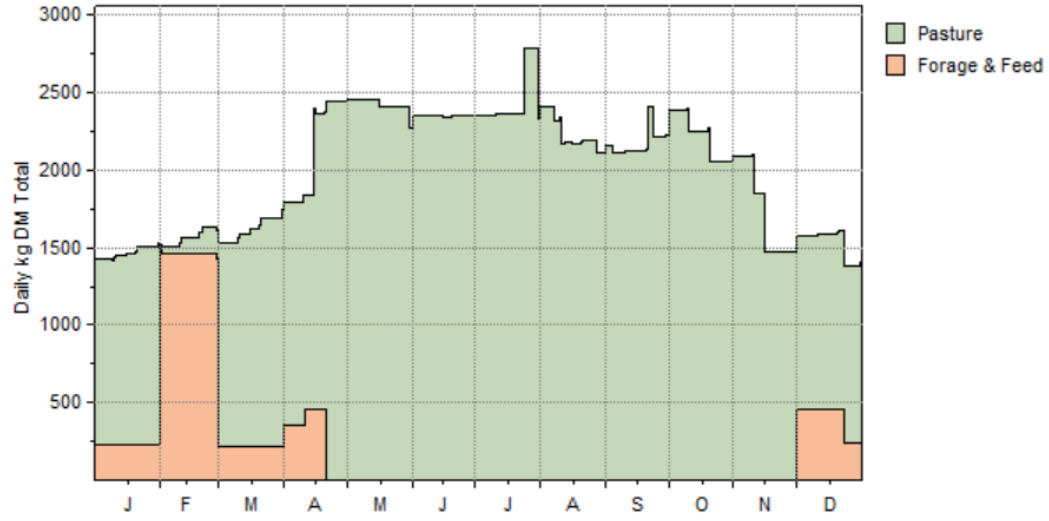


Figure 1.6 The feeding for the lambing later scenario; The ewes are given silage in February to conserve grass for lambing on to, some targeted feeding is given in the lead up to lambing and tail-end lambs feeding in December and January

Scenario 3 (lamb later with better quality pasture) led to greater lamb growth rates post weaning (from 130g/day to 170g/day) resulting in lambs away sooner. This caused a marginal drop in the average lamb price to £3.89) due to fewer sales in November and December. However less purchased feed was required for the tail-end

lambs (reduced by 3.9t compared with base) which resulted in a further £1,111 increase in net profit compared with Scenario 2.

Scenario 4 builds upon this further again to understand how greater grass yield would improve profit. The base model assumed set stocking. Under set stocking, the understanding is up to 50% of the grass is wasted. If we were to assume an additional 500kgDM/ha/year yield is possible with rotational grazing (modest assumption as 15-35% improvement in utilisation is oft quoted), the amount of purchased feeding pre-lambing can be reduced by over 13 tonnes and the silage area can be reduced. This demonstrates one aspect of greater pasture productivity for greater profitability. Further to this, the greater pasture covers (figure 1.3) indicate greater stocking rate potential.

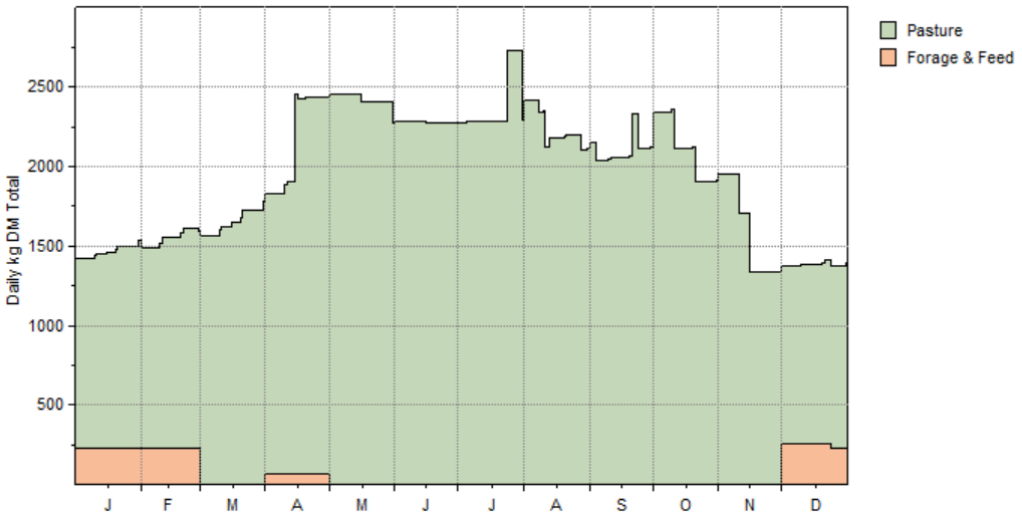


Figure 1.7 The feeding for the lambing later scenario with greater pasture production; Some targeted feeding is given around lambing and tail-end lambs feeding in December and January

Scenario 5 involves forage rape to increase lamb growth rates in the autumn to reduce lamb feeding requirement alongside later lambing. This scenario has the lowest average lamb price due to a greater proportion of lambs sold in September. However, with the same pasture production as the base, the purchased feed cost drops due to the reduction in tail-end lamb feed requirement. Additional benefits of a forage crop not captured here could be the reseeding benefit after the crop which will increase grass yield and quality.

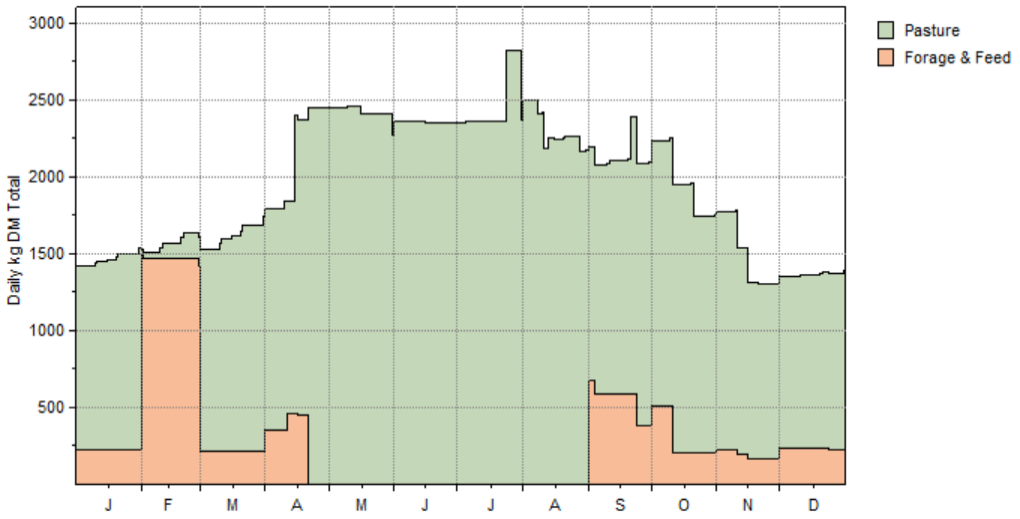


Figure 1.8 The feeding for the rape crop scenario with later lambing; some targeted feeding is given around lambing but the tail-end lamb feed has been reduced.

For main season lambing, the key improvements in profitability are driven by reduced feeding costs with better pasture utilisation. Scenario 1 and 4 (creep feeding and rotational grazing respectively) indicates further potential not realised in this round of modelling: greater grass availability in the autumn (figure 1.3) which could benefit ewe condition and thus subsequent lamb crop. Teagasc have quantified the benefit of an additional condition score at mating time to be worth 10% more lambs reared[17] - a big opportunity to improve profitability.

[17] Ewe Body Condition Impacts on Weaning Rate; Tim Keady and Noel McNamara https://www.teagasc.ie/media/website/publications/2010/EweBodyConditionImpactsWeaningRate.pdf

2) Late season lambing

a) Base model assumptions

Farm size, 255ha	Lambs weaned 8 August (100 days)
217 GLU*, 0.8GLU/ha (49% sheep)	21kg concentrate/ewe (incl. lambs feed: 17kg/ewe)
398kg sheep output/ha	Concentrates, £250/t
800 ewes tupped	Annual pasture production, 4.5 tDM/ha
Ewe condition, 2.5 BCS** at tupping	Average pasture cover at lambing, ~1,600kgDM/ha (figure 1.9)
Ewe condition, 2.5 BCS at lambing	40kg Nitrogen/ha (cultivatable land only)
175% scanning (1,400 lambs)	Nitrogen, 71p/kg N
140% weaning	Lamb growth rate to 90 days***, 250g/day
Planned Start lambing 20 April	Lamb growth rate postweaning, 130g/day
Average lambing date 30 April (planned start +10 days)	Average carcase weight, 19.5kg

*Generalised Livestock Units (GLU); **Body Condition Score (BCS); ***All lamb growth rates based on average lambing date.

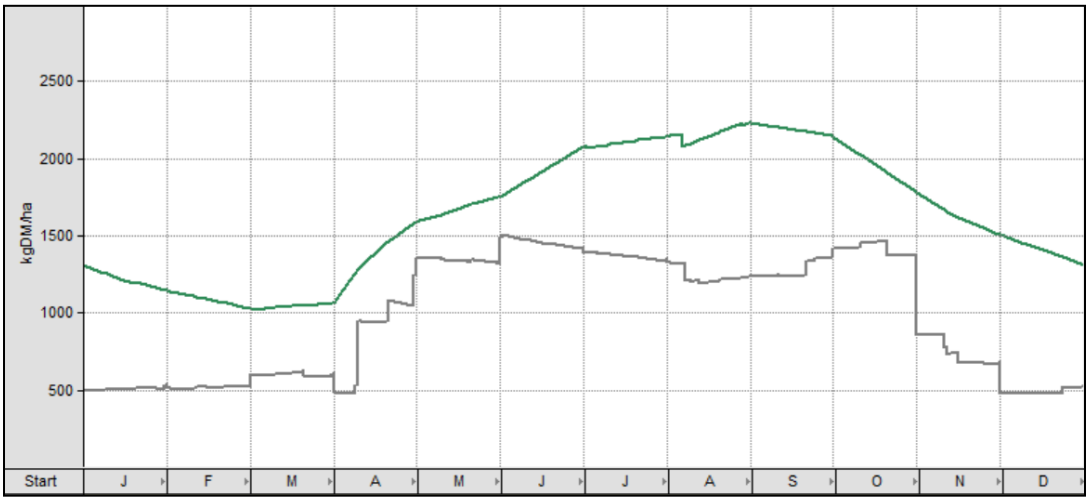


Figure 1.9 Base farm average pasture covers (green) and minimum cover required to sustain stocking (grey)

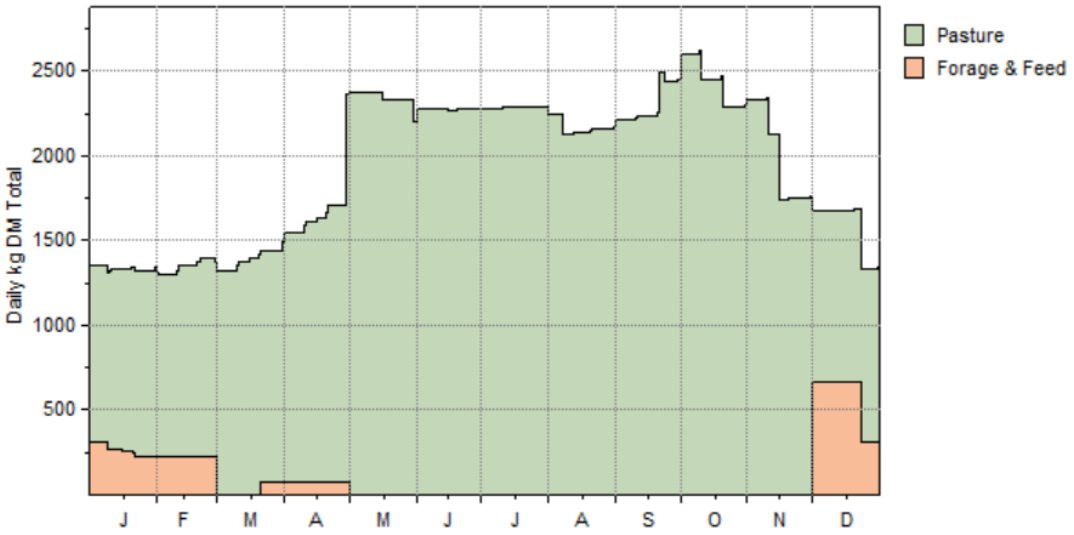


Figure 1.10 The feeding for the late season lambing flock; Targeted feeding at lambing and tail end lambs feeding in December and January.

Pasture attributes and lamb price as described in main season lambing section.

b) Management scenarios tested

Scenario 1 – Creep feeding to finish lambs quickly

- Provide 0.2kg/ewe/day in creep feed followed by 0.2kg/lamb/day post weaning;
- This should increase pre-weaning growth rates to 300g/day and post-weaning growth rates to 200g/day.

Scenario 2 – Forage crop grown to help finish lambs quickly

- 25ha rape grown and fed to lambs from weaning – end November;
- Forage rape assumptions: cost: £180/ha, yield: 5t DM/ha, 12 MJ ME/kg DM, lamb growth rates 200g/head/da.

Scenario 3 – Forage crops and later lambing to target hogget sales

- Lambing moved back two weeks, starts 4th May;
- 15.5ha swedes grown and fed to lambs from November 20th – February 31st;
- Swede assumptions: cost: £348/ha, Yield 8t DM/ha, 12.8 MJME/kgDM, lamb growth rates 100g/head/day.

Scenario 4 – Silage feeding to rest pasture and improve pre-wean growth rates.

c) Results and interpretation

Table 1.4 Performance of late season base run versus scenarios

		Base farm	Scenario			
			1	2	3	4
Revenue	Sheep Revenue	£74,727	£73,941	£73,461	£77,645	£74,271
	Beef Revenue	£67,007	£67,007	£67,007	£67,007	£67,007
	Subsidy	£55,000	£55,000	£55,000	£55,000	£55,000
	Total Revenue	£196,734	£195,948	£195,468	£199,652	£196,278
Key variable costs	Conservation	£7,884	£7,884	£7,884	£7,884	£9,811
	Forage Crops	£0	£0	£4,500	£5,394	£0
	Purchased Feeds	£8,167	£12,243	£4,759	£4,681	£5,926
	Reseeding	£0	£0	£0	£0	£0
	Nitrogen	£3,550	£3,550	£3,550	£3,550	£3,550
	Other	£111,230	£111,230	£111,230	£111,230	£111,230
Total Farm Expenses		£130,831	£134,907	£131,923	£132,739	£130,517
Rent/Leases		£20,000	£20,000	£20,000	£20,000	£20,000
Farm Profit before Tax		£45,903	£41,041	£43,545	£46,913	£45,761
Difference in Net Profit (cf. base)			**-£4,862**	**-£2,358**	**£1,010**	**-£142**
Farm Profit per ha before Tax		**£170**	**£152**	**£161**	**£174**	**£169**
Difference in Net Profit per hectare (cf. base)			-£18	-£9	£4	-£1
Annual Pasture production	t DM/ha	4.5	4.5	4.5	4.5	4.5
Concentrates	kg/ewe (inc. lamb feed)	21	41.5	4.1	4.05	10
Lamb growth to 90 days	g/day	250	300	250	250	300
Average age at slaughter	days	210	158	147	239	179
Average lamb price	£/kg DW	3.93	3.86	3.85	3.89	3.89
CO2 equiv/kg product	kg CO2 e/kg product	17.4	16.8	17.0	17.3	16.9

*As calculated in Farmax based on methane and nitrous oxide emissions only

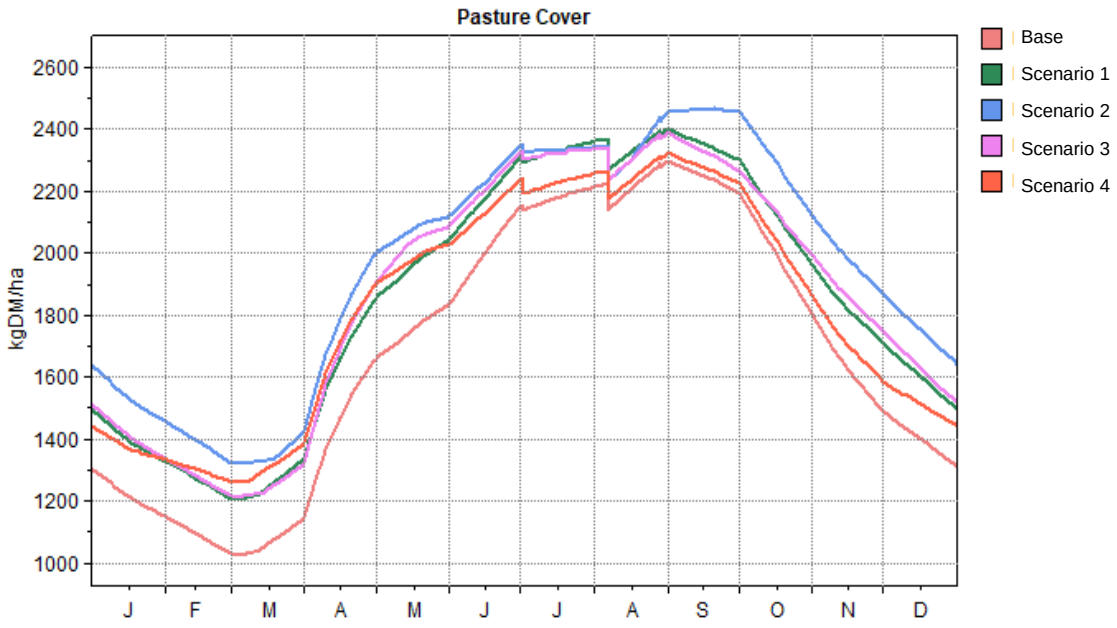


Figure 1.11 The effect of the scenarios of farm average pasture cover (a gauge of pasture supply on farm)

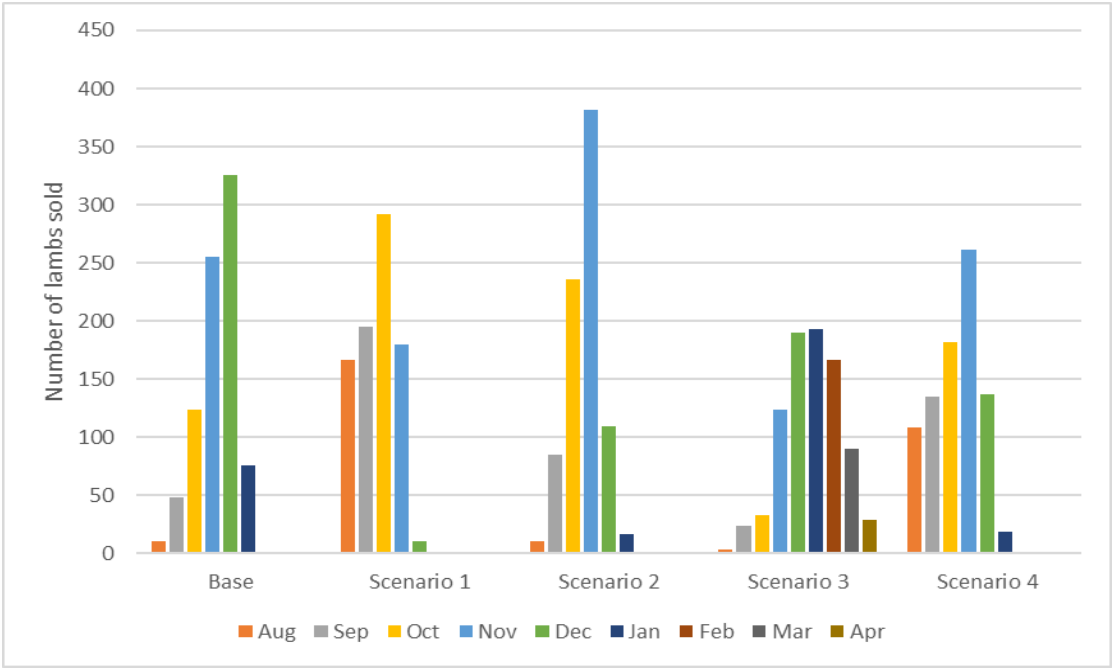


Figure 1.12 Lamb sales profiles

Due to lower lamb price and lower expenses compared with the main- and early-season bases (table 1.7), the opportunity to increase profitability is lower. Although the modelling increased lamb performance, this increase is not rewarded with greater lamb price. Therefore, the only scenario that increased profitability was the one that markedly **shifted the lamb sales to the next calendar year (scenario 3**, table 1.4). However, the modelling indicated the best strategies to increase pasture supply (figure 1.11) which will benefit flock productivity through greater ewe condition and therefore rearing rate.

Scenario 1 (creep feeding) reduced revenue because more lambs were sold during typically low-price months (September and October). Coupled with increased feeding costs, the scenario resulted in lower net profit compared to the base. Creep feeding is not cost-effective for late season lambing flocks. However, as with all the scenarios for late season modelling, getting lambs off farm sooner results in greater pasture availability (figure 1.11) and could benefit the subsequent lamb crop. If grass supply is a limiting factor, e.g. during drought years, creep feeding might be the best option to ensure that the effects of the drought year are not incurred in the subsequent years due to ewe condition impacts.

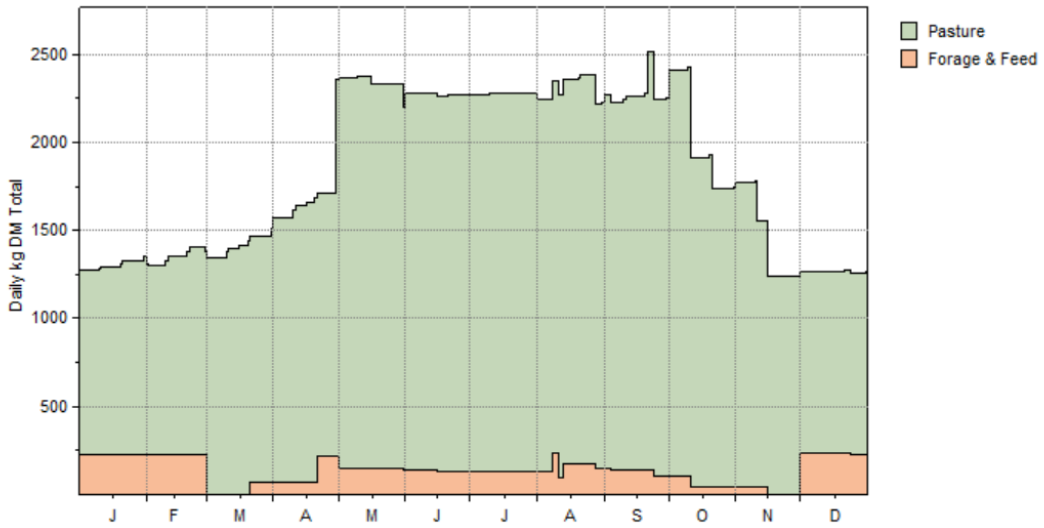


Figure 1.13 The feeding for the late season lambing flock with creep feed; most the feed depicted is for lambs

Scenario 2 (rape crop) reduced revenue as well for the same reason. The main benefit of using a forage crop would be to reduce the cost of finishing lambs. As the base file involved feeding lambs on farm from December, finishing lambs sooner with a forage crop did reduce purchased feeds but this did not offset the forage crop growing costs.

Scenario 3 investigated the feasibility of lambing later and producing hogget lamb with swedes over winter. This increased the average lamb price and reduced concentrate feeding increasing profitability by £1,010 compared to the base. However, price fluctuates greatly from year-to-year and therefore this would be deemed a high-risk strategy for a modest projected improvement in profit. The swede crop would often be followed by a reseed which would increase pasture productivity across the farm and increase stocking rate potential. The other issue with this strategy is the challenge to keep lamb size within abattoir specification. Often lambs will exceed 22kg at this time and will be penalised.

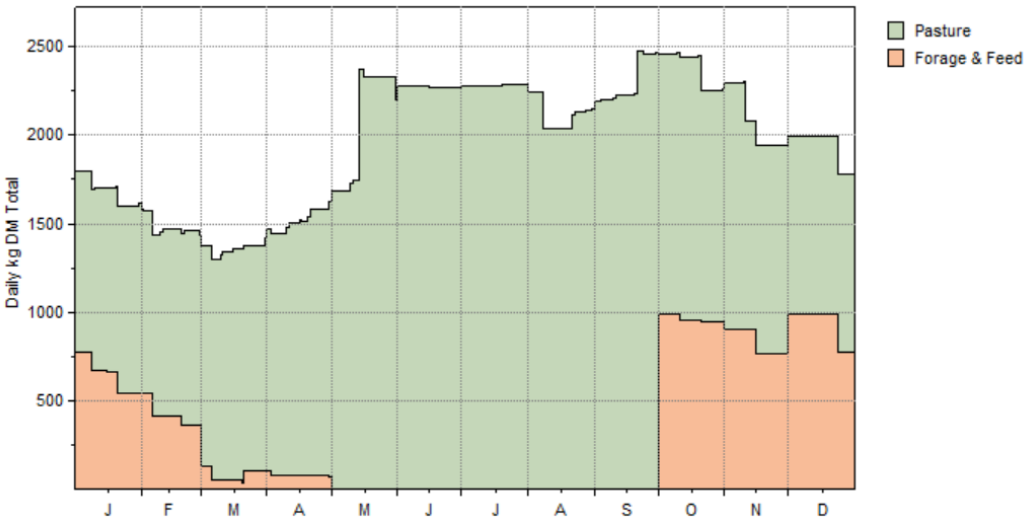


Figure 1.14 The feeding for lambing later to target more lamb sales in Jan-April using swedes over winter

Finally, **Scenario 5 considered the value of resting pasture to achieve better pasture for lactation**. This reduced the days to slaughter but had minimal impact on the value of the lamb. Greater silage conservation costs lead to a small projected decline in profit even though concentrate feed costs reduced.

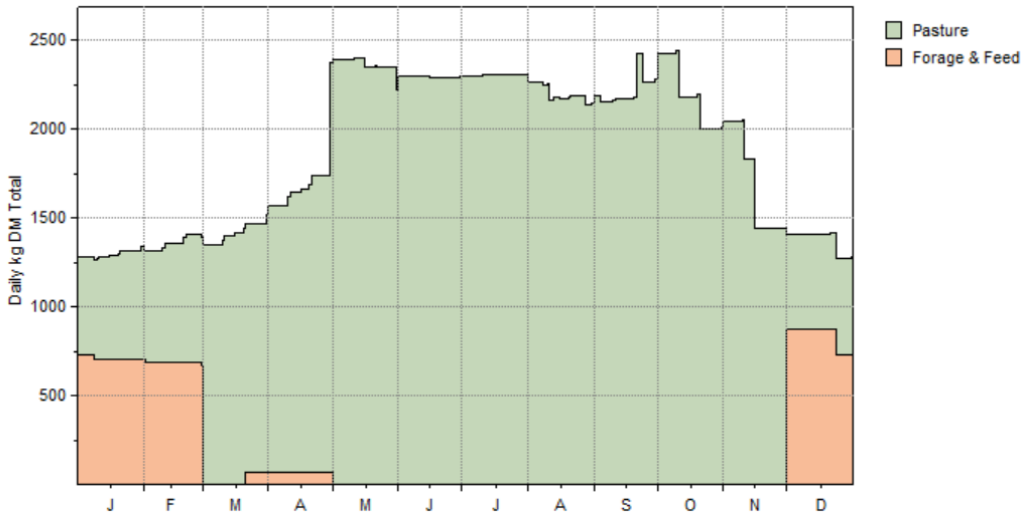


Figure 1.15 The feeding for winter silage feeding scenario with targeted feeding at lambing

For late season lambing, there is less opportunity to reduce ewe feeding costs therefore increasing output of the ewe flock should be the main strategy to increase profitability. There is some indication that lambing later and targeting hogget production is viable as well. Utilising a forage crop such as forage rape leads to the greatest gain in pasture covers in the Autumn (figure 1.11) indicating the potential for increased lambing percentage though greater ewe condition at mating time.

3) Early season lambing

a) Base model assumptions and KPI's

Farm size, 255ha	Lambs weaned 30 May (100 days)
217 GLU*, 0.8GLU/ha (49% sheep)	56kg concentrate/ewe
398kg sheep output/ha	Concentrates, £250/t
800 ewes tupped	Annual pasture production, 4.5 tDM/ha
Ewe condition, 2.5 BCS** at tupping	Average pasture cover at turnout , ~1,400kgDM/ha (figure 1.16)
Ewe condition, 2.5 BCS at lambing	40kg Nitrogen/ha (cultivatable land only)
175% scanning	Nitrogen, 71p/kg N
140% weaning	Lamb growth rate*** to 90 days*, 300g/day
Planned Start lambing 10 February	Lamb growth rate postweaning, 150g/day
Average lambing date 20 February (PS+10)	Average carcase weight, 18.5kg

*Generalised Livestock Units (GLU); **Body Condition Score (BCS); ***All lamb growth rates based on average lambing date.

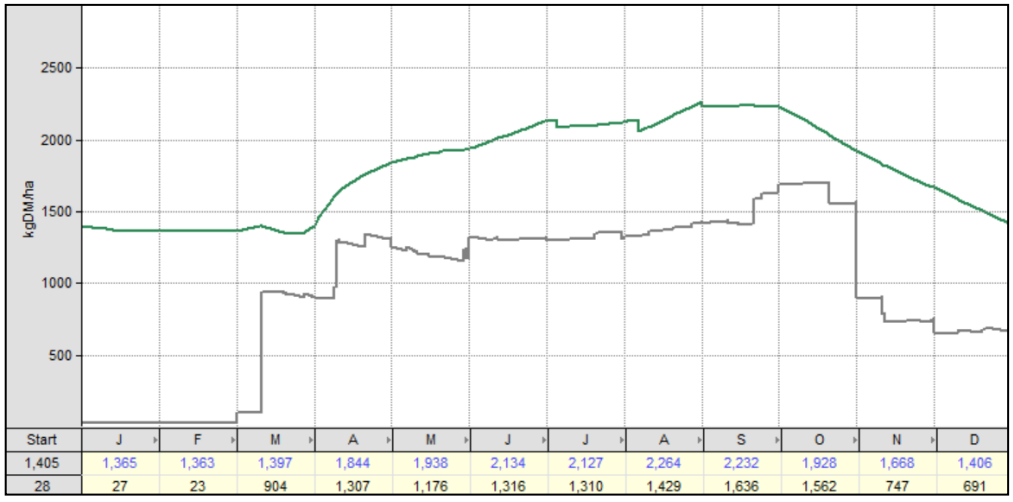


Figure 1.16 Base farm average pasture covers (green) and minimum cover required to sustain stocking (grey)

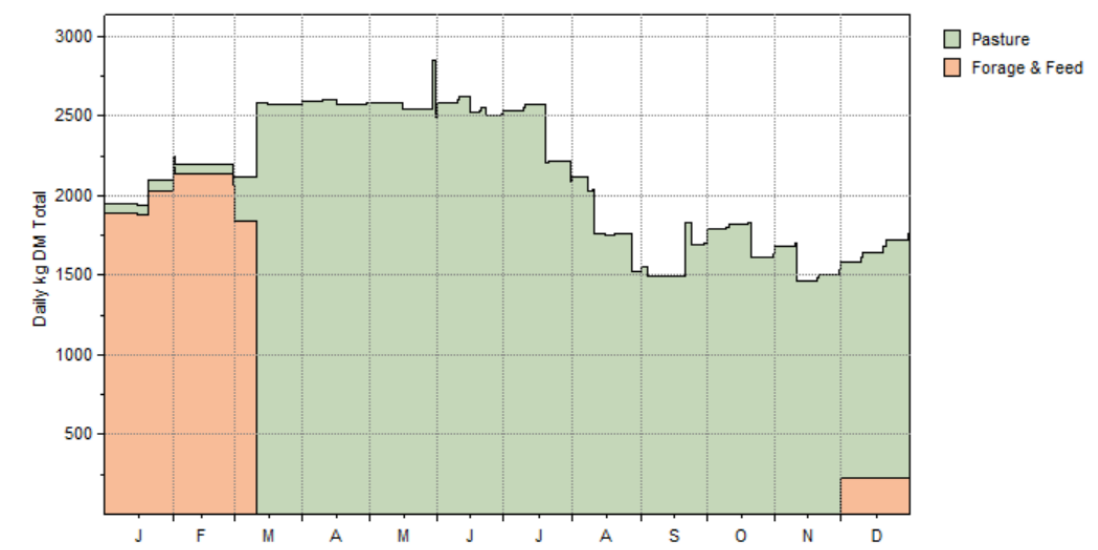


Figure 1.17 The feeding for the early season lambing flock; all feed is allocated to the ewes around lambing with some silage feeding to ewe lambs in December

Table 1.5 Monthly pasture growth rates and quality for each scenario

Scenario		units	J	F	M	A	M	J	Jy	A	S	O	N	D	Total
Base	Growth	kgDM/ha	0	0	3.8	23	24.6	29.7	22.8	22.2	13.5	6.5	1.2	0	4,500
	Quality	MJ ME/kg DM	10	10.1	11.1	10.8	10.7	10.3	10.2	10.2	9.8	9.9	10.1	10.0	
Scenario 1	Growth	As Base run													
	Quality	As Base run													
Scenario 2	Growth	As Base run													
	Quality	As Base run													
Scenario 3	Growth	As Base run													
	Quality	MJ ME/kg DM	10.1	10.5	11.1	10.8	10.7	10.6	10.5	10.5	10.0	9.9	10.1	10	

Nb. These pasture attributes are across the whole farm (include hill and cultivatable land). Growth quantified in kilograms of dry matter per hectare per day (kg DM/ha/d); quality is measured in megajoules of metabolizable energy per kilogram of dry matter (MJ ME/kgDM)

b) Management scenarios tested

Scenario 1 – Creep feeding to finish lambs quickly

- Provide 0.4kg/ewe/day in creep feed followed by 0.5kg/lamb/day post weaning;
- Increase pre-weaning growth rates to 375g/day and post-weaning growth rates to 300g/day.

Scenario 2 – The value of better lamb growth pre-weaning

- Ewe on target condition score and early pasture growth will be the most cost-effective means to increase lamb growth in an early lambing flock;
- Increase weaning weight by 5kg (50g in lamb pre-wean daily liveweight gain) as response to the above practises.

Scenario 3 – as with scenario 2 but with better pasture quality and clean grazing achieved by:

- Increased grazing pressure through better grazing management in early summer raises pasture quality through mid and late summer;
- Switching cattle and sheep grazing areas.

c) Results and interpretation

Table 1.6 Performance of early lambing base run versus scenarios

		Base farm	Scenario		
			1	2	3
Revenue	Sheep Revenue	£78,324	£86,296	£83,305	£83,972
	Beef Revenue	£67,007	£67,007	£67,007	£67,007
	Subsidy	£55,000	£55,000	£55,000	£55,000
	Total Revenue	£200,331	£208,303	£205,312	£205,979
Key variable costs	Conservation	£16,927	£16,927	£16,927	£16,927
	Forage Crops	£0	£0	£0	£0
	Purchased Feeds	£15,183	£23,874	£15,183	£15,183
	Reseeding	£0	£0	£0	£0
	Nitrogen	£3,550	£3,550	£4,530	£4,530
	Other	£111,230	£111,230	£111,230	£111,230
Total Farm Expenses		£146,890	£155,581	£147,870	£147,870
Rent/Leases		£20,000	£20,000	£20,000	£20,000
Farm Profit before Tax		£33,441	£32,722	£37,442	£38,109
Difference in Net Profit (c.f. base)			**-£719**	**£4,001**	**£4,668**
Farm Profit per ha before Tax		£124	£121	£139	£141
Difference in Net Profit per hectare (c.f. base)			-£2.66	£14.82	£17.29
Annual Pasture production	t DM/ha	4.5	4.5	4.8	4.8
Concentrates	kg/ewe (inc. lamb feed)	43.8	89	43.8	43.8
Lamb growth rate to 90 days	g/day	300	375	350	350
Average age at slaughter	days	158	110	126	123
Average lamb price	£/kg DW	4.29	4.79	4.60	4.64
Greenhouse gas emissions	kg CO2 e/kg product	17.5	16.8	17.0	17.3

*As calculated in Farmax based on enteric and nitrous oxide emissions, excluding sequestration and off farm sources

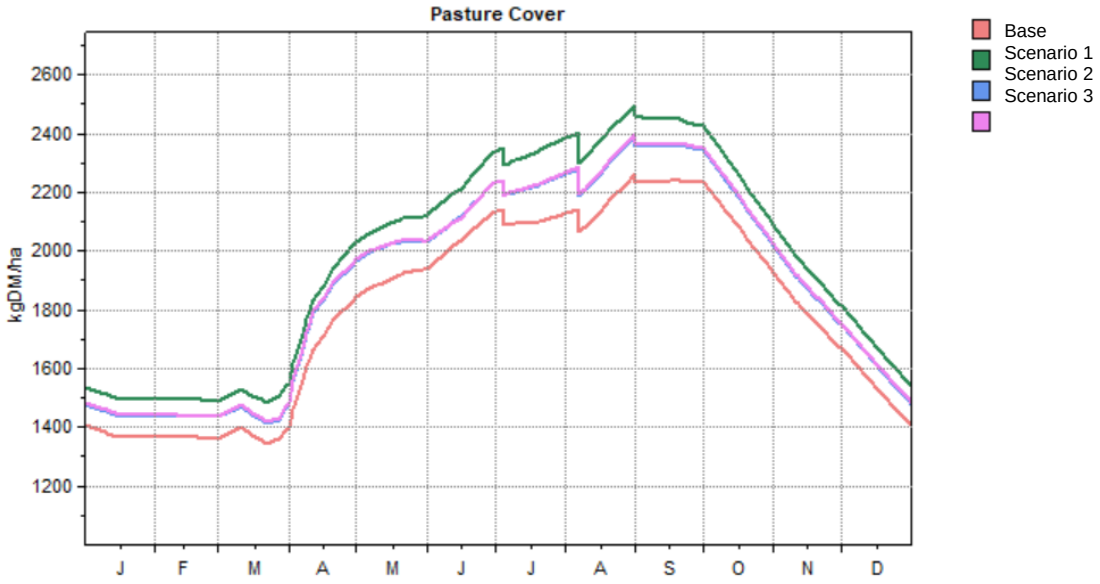


Figure 1.18 The effect of the scenarios of farm average pasture cover (a gauge of pasture supply on farm)

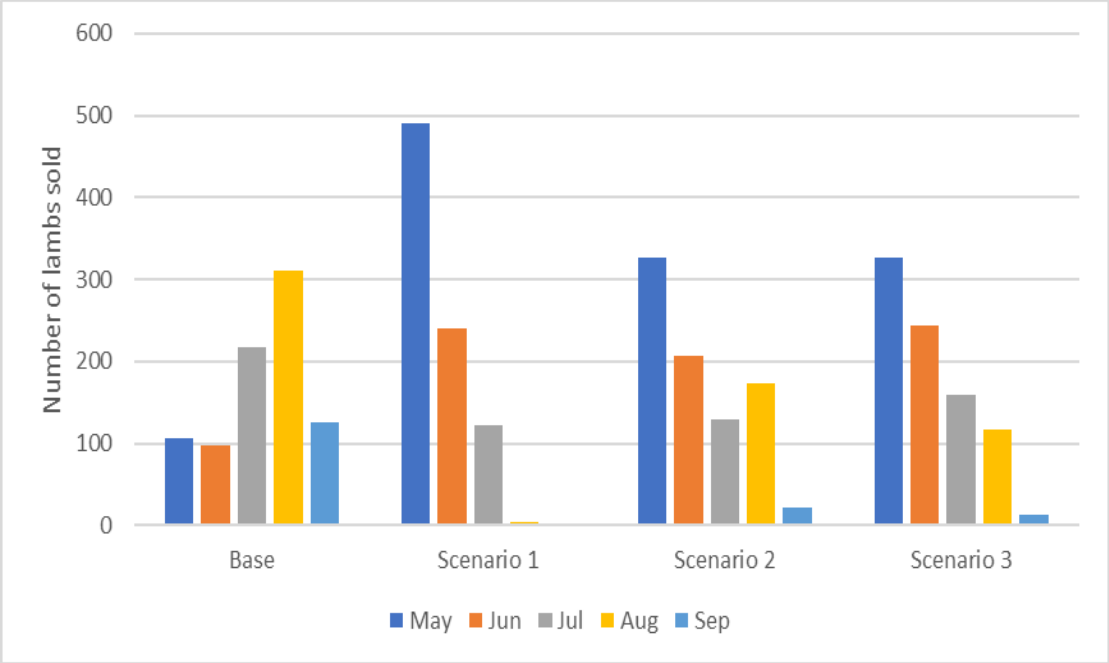


Figure 1.19 Lamb sales profile

The modelling indicated that the greatest opportunity is achieving a good lamb price without creep feeding (scenario 3, worth over £4000 improved net profitability). However, many early lambing flocks will depend on creep feed to reach peak lamb price if they don't have cattle on the farm and lack early season grass growth.

Scenario 1 (creep feeding) might be the best option for well stocked farms without cattle. At 375g/day growth rates pre-weaning and 300g/day post-weaning, this scenario had the best average lamb price and therefore revenue was nearly £8,000 greater. However, the cost of feeding was not offset by the increased revenue. This

reduced profitability is marginal (£719, table 1.6) and this margin will be sensitive to changing input cost and lamb price. For example, if lamb price is 10% greater, the comparison shifts and the creep feeding scenario becomes more profitable by £59.

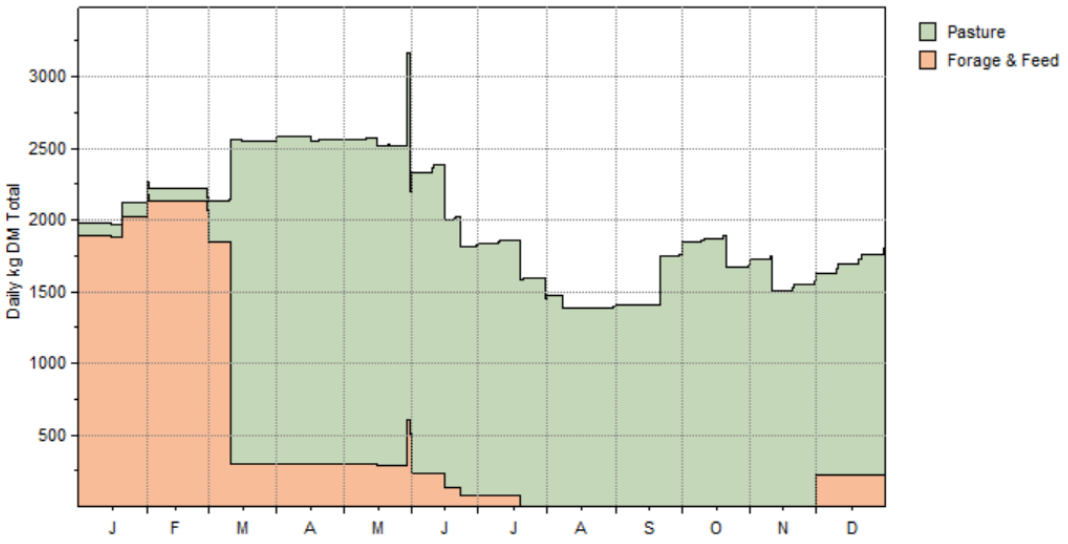


Figure 1.20 The feeding for creep feeding in the late season lambing flock

Scenario 2 showed the benefit of improved lamb growth pre-weaning. The main practises to achieve this is to improve ewe body condition and pasture supply during lactation. We increased nitrogen applications to March by 20kg/N/ha on the sheep grazing land to achieve greater spring grass production.

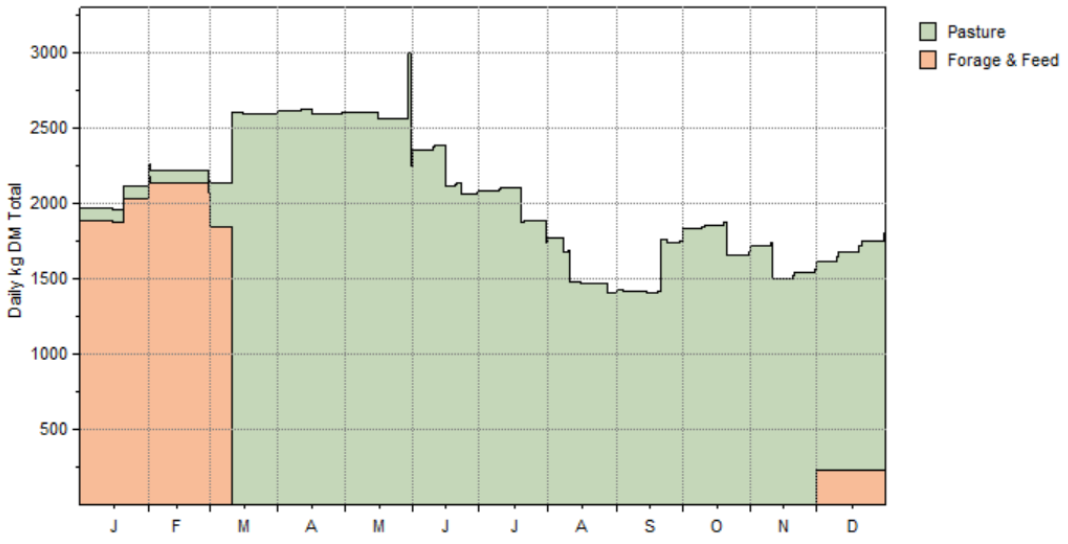


Figure 1.21 The feeding for late season lambing flock without creep

Scenario 3 built on Scenario 2 to **improve lamb growth rates post weaning**. This would be achieved on this farm by utilising the cattle for cleaner grazing and improving the grazing management through the summer to manage feed quality. With growth rates post weaning increased from 130g/day to 170g/day this increased the number of lambs sold early in the season resulting in better lamb price at no extra cost.

4) Modelling justifications

The modelling focused on opportunities to achieve greater revenue at fixed flock output (175% scanning and 140% weaning) and fixed stocking rate (0.8 livestock units/ha). We aimed to understand how improving feeding and lamb performance affected profitability. However, as implied in the results and interpretation sections, further rounds of modelling would demonstrate opportunities to capitalise on greater pasture availability: increased flock output through better pasture availability in the autumn and increased stocking rate through better pasture supply across the year.

The three base files were based on assumptions derived from the project farmers and national farm datasets (Farm Business Survey and QMS Enterprise Profitability data). With main season lambing being a more common practise, these assumptions will be skewed. One might argue that scanning would be lower in the early- and late-season compared with main season lambing due to sheep breeding seasonality. However, we often observe greater technical efficiency in systems that specialise in early- and late-season lambing and often this seasonal breeding effect is offset by reduced lamb mortality.

The late season base has the greatest profitability (table 1.7). Although lamb price is lower, the markedly lower expenses due to lower feeding levels drives profitability. The base model for the early season lambing flock has the lowest profitability (table 1.7). This is due to the greater concentrate costs with the same level of flock output, albeit at a better lamb price.

The sensitivity to lamb price is not vastly different across the scenarios. The lamb price schedule follows the typical annual pattern as outlined in table 1.2. However, lamb price shows greater volatility from January to June than during peak supply months (July-December). Therefore, the early season base will be more exposed to lamb price fluctuations than the other systems. The early season base is also most sensitive to feed cost.

Table 1.7 Base file comparisons and sensitivity to lamb price and concentrate cost

		Main Season Base	10% greater lamb price	25% lower feed cost	Late season Base	10% greater lamb price	25% lower feed cost	Early Season Base	10% greater lamb price	25% lower feed cost
Revenue	Sheep Revenue	£77,241	£84,239		£74,727	£81,481		£78,324	£85,422	
	Beef Revenue	£67,007			£67,007			£67,007		
	Subsidy	£55,000			£55,000			£55,000		
	Total Revenue	£199,248			£196,734			£200,331		
Key variable costs	Conservation	£15,643			£7,884			£16,927		
	Forage Crops	£0			£0			£0		
	Purchased Feeds	£13,332		£11,285	£8,167		£7,715	£15,183		£12,367
	Reseeding	£0			£0			£0		
	Nitrogen	£3,550			£3,550			£3,550		
	Other	£111,230			£111,230			£111,230		
Total Farm Expenses		£143,755			£130,831			£146,890		
Rent/Leases		£20,000			£20,000			£20,000		
Farm Profit before Tax		**£35,493**	**£42,491**	**£37,540**	**£45,903**	**£52,657**	**£46,355**	**£33,441**	**£40,539**	**£36,257**
Difference in Net Profit (c.f. base)			£6,998	£2,047		£6,754	£452		£7,098	£2,816

Conclusions

Farmax is a valuable tool to understand economic and biological factors of flock feeding and performance. It has demonstrated the implications of different scenarios to understand how we can improve profitability across different lambing systems. The assumptions used were based on typical Scottish upland sheep farm data to help improve industry understanding of key strategic management practises. It is less useful for the minute detail of farm operation such as health and grazing management.

The modelling has highlighted the key profit drivers across different sheep farm systems: Main season lambing is driven by cost of production; late season lambing systems are driven by output and early season lambing systems are driven by lamb price and feed cost. This helps to understand vulnerabilities of the three systems, namely input costs, lamb price and weather. There was greater opportunity to improve profitability in the early- and main- season lambing flocks compared with the late season lambing flocks due to the greater impact of input and output prices, however the late season lambing system will be more vulnerable to weather and the influence of lower lambing percentage.

The modelling was focused on understanding how flock profitability can be improved for a set number of livestock. Further to the scenarios examined, the model can be used to demonstrate the value of increased pasture productivity (through reseeding, better grazing management and soil health) on stocking rate and flock output.

Appendix 2 – Model finishing agreement

1. Minute of Agreement

BETWEEN

Farm Stock Scotland Ltd, Tweed Mill Business Park, Dunsdale Road, Selkirk TD7 5DZ

AND

1. Mr Hill Farm, Hill Farm, Upland Area, BO6 41LL (hereinafter referred to as the Store Producer) on the one part.

2. Messrs Low Ground, Low Ground Farm, Nicetown, EA5 1EY (hereinafter referred to as the Finishing Farmer) on the other part

All of which farming companies or sole traders as represented by the individuals designated above, and their successors and assignees if appropriate.

2. WHEREAS

The parties to this Agreement enter it with the intention of reducing the financial uncertainty of their lamb enterprises and increasing their productivity and financial returns by enabling improved management practices and through the exchange of information related to market requirements.

The parties to this Agreement wish to set out their various obligations, rights and duties to ensure that there is clarity as to how Agreement will be implemented.

3. NOW THEREFORE

The parties agree as follows:

4. Interpretations

5. In this Agreement the following terms shall have the following meanings:

   a. ‘Agreement’ means this minute of Agreement and any Management Guidelines attached as relative herto;

   b. ‘Marketing Agent’ means Farm Stock Scotland Ltd;

   c. ‘Store Producer’ means the firm of Mr Hill Farm;

   d. ‘Finishing Farmer’ means the firm of Messrs Low Ground;

e. ‘Finishing Farm’ means Low Ground Farm, Nicetown, EA5 1EY;

f. ‘Lamb’ means a male, female or neutered ovine animal(s) less than 14 month old;

g. ‘Buyer’ means the buyer(s) to whom the Lambs are sold for slaughter.

h. The term “Management Guidelines” shall mean the guidelines that stipulate the practical arrangements which must be followed by the Store Producer and the Finishing Farmer.

Obligations of the Store Producer and the Finishing Farmer

6. The Store Producer agrees to supply Lambs to the Finishing Farmer subject to the Management Guidelines issued from time to time and appended to this agreement and shall share in the sale proceeds subject to clauses 8 and 9.

7. The Finisher Farmer agrees to finish the Lambs provided by the Store Producer subject to the Management Guidelines issued from time to time and appended to this agreement.

8. The Store Producer and the Finishing Farmer agree to exchange the information required in the Management Guidelines.

9. Passing of property

10. Title to the Lambs shall remain at all times with the Store Producer until is passes to the buyer. Ownership of the Lambs shall not pass to the Finishing Farmer at any time.

1 Financial provisions

11. The parties to this agreement shall agree a financial value at transfer for each Lamb or an average financial value for all the Lambs subject to this Agreement and enter a value in the relevant table specified in the Management Guidelines.

12. The Marketing Agent shall receive all payments due for the Lambs including all proceeds from the Buyer and shall be entitled to deduct their marketing fees and insurance costs and haulage costs before paying the parties to this agreement.

13. Once the marketing fees, insurance costs and haulage costs have been deducted, the Marketing Agent shall pay the Store Producer for his share of the Lambs based on the value achieved in sterling per kilogram deadweight at slaughter multiplied by the average liveweight determined in clause □ multiplied by a factor of 0.45 less £1/lamb. For clarity the formula is as follows:

    Value = (deadweight price in £/kg x liveweight at transfer x 0.45) - £1.00

14. The Marketing Agent shall pay the Finishing Farmer the all the remaining monies from the transaction less any compensation due if more than …… Lambs die or become injured and have to be slaughtered.

15. The Marketing Agent shall send the Store Producer and the Finishing Farmer a self-billing invoice detailing the amounts due, how they were calculated, and the date the payment is to be received.

16. Any loss suffered by the Store Producer and the Finishing Farmer as a result of failure by a Buyer to pay the purchase price of any Lambs shall be borne by both parties to this Agreement in proportion to the payment method outlined.

2

3 Death or loss of lambs

17. If during the course of this Agreement a Lamb dies, becomes injured and has to be slaughtered or is lost from the Finishing Farm, the Finishing Farmer shall immediately inform the Store Producer. The Store Producer shall be responsible for paying the disposal costs of the dead or injured animal.

18. If more than …… Lambs die, become injured and have to be slaughtered or are lost at the Finishing Farm then any further losses shall be the liability of the Finishing Farmer and he shall compensate the Store Producer in full for the value of the Lambs agreed in clause 6 and pay for their disposal cost.

Theft of lambs

19. If during the course of this Agreement a Lamb(s) are stolen from the Finishing Farm, the Finishing Farmer shall immediately inform the Store Producer and report the matter to the police. Any losses shall be borne by the Store Producer.

4 Marketing

20. The Marketing Agent shall market the Lambs on such terms and conditions as they think are most advantageous to both parties to this Agreement.

21. The Marketing Agent shall notify the Store Producer and the Finishing Farmer of proceeds received from the Buyer for the Lambs and shall provide a copy of the Buyers remittance advice.

5 Insurance

22. The Store Producer and the Finishing Farmer shall take out and maintain insurance with a reputable insurance company against theft, product liability and third party liability arising out of the production and supply of Lambs and procure a minimum cover per claim of £2,000,000.

6

7 Assignation and delegation

23. Neither party may assign his rights and obligations under this Agreement.

Administration, duration and modification

24. This Agreement will commence on…… 201… and shall continue until all payments due for the Lambs have been made by the Marketing Agent.

25. If either of the parties to this Agreement shall die during the continuance of this Agreement, the personal representatives of the deceased party shall assume the benefit and burden of this Agreement.

8 Other provisions

26. The Store Producer and the Finishing Farmer give the Marketing Agent permission to aggregate their production data for the purposes of analysis and review towards improving the productivity of lamb finishing.

27. The Agreement constitutes the entire Agreement between the two parties.

28. The parties to this Agreement understand that this Agreement is written in plain language and may therefore not cover every legal eventuality. The parties agree to be fair and reasonable at all times when administering this Agreement. In the event of any dispute on interpretation it shall be resolved by arbitration. The arbiter to be appointed by the Scottish Agricultural Arbiters Association. All parties party to the dispute agree to pay equal costs of arbitration, and the arbiters decision shall be final.

29. This Agreement shall be governed by and construed in accordance with the Law of Scotland.

As signed and witnessed together:

Farm Stock Scotland Ltd (Marketing Agent) Name: Signature:	Mr Hill Farm Store Producer Name: Signature:	Mr Low Ground Farm Finishing Farmer Name: Signature:

Management Guidelines referred to in the foregoing **Agreement**

Planning

Prior to transferring the lambs the Store Producer and the Finishing Farmer shall:

- Select and agree the lambs to be sent to the finishing farm and record the identification numbers of the selected lambs.
- Agree a desired level of liveweight performance (kg/day).
- Agree which vaccinations to deliver to the lambs for clostridial and pasteurella infections prior to uplift and transport to the Finishing Farmer.
- Agree if a changeover diet requires to be fed to the lambs, and if so, what the changeover diet should be and how much should be fed.
- Agree a financial value at transfer for each lamb or an average financial value for all the lambs.
- Agree any security measures and protocols to be implemented at the Finishing Farm.
- Complete the table below.

Lambs identification no(s)	
Desired liveweight performance kg/day	
Actual liveweight performance achieved kg/day	
Desired health and vaccination programme to be delivered by the store producer	
Actual health and vaccination programme delivered by the store producer	
Desired change over diet to be fed to the lambs by the store producer	
Actual change over diet fed to the lambs by the store producer	
Livestock valuation at transfer (£/head liveweight)	
Security measures and protocols at the finishing farm	

Transport of livestock

- Both parties will agree a mutually agreeable delivery schedule to transport the lambs from the Store Producer to the Finishing Farm.
- Prior to transportation to the Finishing Farm all the Lambs should be housed or penned for at least 10 hours to deny them access to feed or forage.
- The Store Producer will be liable to pay for transporting the lambs to the Finishing Farm.

- When the lambs are finished, the Marketing Agent will arrange to transport the lambs to an abattoir.
- Whoever arranges the transport will make sure the transport company holds insurance to cover death or loss in transport.

Measuring and Monitoring Performance

- The Lambs must be weighed on a public weighbridge while being transferred from the Store Producer to the Finishing Farm. The average liveweight shall be the gross weight minus the tare weight divided by the number of animals in the consignment. The Store Producer must notify the Finishing Farmer and the Marketing Agent of the number of animals and the average liveweight determined in kilograms. The Store Producer must also send the relevant weight tickets to the Marketing Agent to verify the calculation of the average liveweight.
- If requested by any party, a meeting between all parties must be held at the Finishing Farm to review Lambs performance. Any corrective action which all parties consider necessary in line with maximising their returns and achieving the desired liveweight performance specified above will be implemented immediately.
- After slaughter, the Marketing Agent will notify the Store Producer and Finishing Farmer of the deadweights achieved from the Lambs which have been consigned to a Buyer.
- All parties to the agreement will meet once the transaction is complete and the related data has been collated to review the performance of the Lambs and plan how it may be improved.

9 Livestock Health

- Lambs may be rejected immediately on arrival at the Finishing Farm if in the opinion of the Finishing Farmer he/she considers they are unhealthy. In these circumstances, the Finishing Farmer must notify the Store Producer at once of the Lambs to be rejected and the Store Producer must remove the rejected Lambs at his own expense as soon as is practicably possible thereafter.
- Once accepted by the Finishing Farmer any liability to treat the Lambs for any such disease as may arise shall be the responsibility of the Finishing Farmer.

Appendix 3 – Main season blueprint

This management blueprint sets out the management factors that drive the profitability of March-April lambing flocks where lambs are sold between June and November. This blueprint is a key output of a KTIF project funded by the Scottish Government. Overall targets for this system;

- Rearing 140-175% (based on ewes tupped).
- Grading >80% 16-21kg R3L or better.
- Largely achieved off grazed pasture (minimal concentrates).

The start of the year – weaning to mating

A good scan with a low empty rate begins at weaning by making good use of the late summer and early autumn to get ewes, tups and pasture in ideal condition for mating. Achieved by;

Correcting ewe body condition score (BSC)	➢ Score all ewes at weaning and split into fats >3.5, thins <3 and ideal 3-3.5. ➢ Preferentially feed thins and keep fats tight. ➢ Periodically check and draft accordingly so that by two weeks before mating all should be 3-3.5 BCS. ➢ Pay particular attention to gimmers whether mated as hogs or not, they should reach 80% of ewe weight at mating. ➢ Only drench thins if a worm problem identified.
Growing replacement ewe lambs fast	➢ Regardless of whether mating or not, ewe lambs should be a minimum of 60% of mature ewe weight at tupping time.
Building pasture covers to reduce winter feed costs (and allow flushing where required)	➢ Rotationally graze from at least weaning onwards to control grazing intakes of low priority stock. ➢ Grazing pressure should decline over the late summer as lambs and culls are sold and forage areas reintroduced into the rotation. ➢ Apply a light rate of N to best pasture growing fields in late summer if not too wet and pasture is growing.
Fit tups ready to work	➢ Monitor tup condition (aim for “fit not fat”). ➢ Don’t wait till 2 weeks before mating before doing tup MOT!
Correcting trace element deficiencies	➢ Is your locality/soils prone to deficiency? ➢ If so, test your flock to check and treat accordingly on your vets advice so that deficiency corrected well before mating.
Strict biosecurity	➢ Quarantine and treat new tups (and females) to protect flock health. ➢ Avoid grazing sheep in fields next to neighbours’ sheep unless double fenced. ➢ Where away wintering, don’t mix with other farmers sheep. ➢ If sharing equipment, thoroughly disinfect before using.

Finishing lambs (June to November)

To finish lambs profitably during the main selling period focus on minimising cost and growing lambs fast. Achieved by;

A high average weaning weight	➢ >30kg at 100 days from the planned start of lambing is a good <u>average</u> target.
Minimising the weaning check	➢ If introducing novel forages, do a week or so pre-weaning. ➢ Move the ewes from the field, not the lambs. The ewes should be out of earshot of the lambs.

	➢ Minimise handling stress. Don't vaccinate or drench the same day.
Knowing your crop	➢ A week or so after weaning. ➢ Band your lambs by weight (eg. 30-34kg, 35-39kg, >40kg) and sub-divide into separate mobs. If keeping in 1 mob, use a simple stripe system (eg, lightest = 1 stripe). ➢ Use scales to monitor growth rates (see back page). Where growth rates fall behind target find out why and take corrective action.
Providing plenty of high quality pasture	➢ Pastures, especially aftermaths, with high (white) clover content preferable. ➢ Rotationally graze to ensure lambs eat leaf not stem. Do not graze below 5cm (rule of thumb is to eat the top 1/3 then move). ➢ A 25-30 day rotation typical, though rotation will lengthen as move through the autumn. ➢ Fit ewes can be used to graze down stem to improve next grazing for lambs (also beneficial for managing worm burden). ➢ Where possible include reseeds with high digestible grasses and clover in the lamb finishing rotation. ➢ Late N (August) is cheaper than creep but only of applied to swards that will yield a good response (ie, high % ryegrass, good pH, not water-logged).
Feed concentrates as an exception not a rule	➢ Specialist finishing crops such as red clover, plantain, forage rape or rape/kale hybrids are good for finishing lambs but depend on high yields and good utilisation to be cost effective for main season finishing. ➢ Ad lib feeding of concentrates (creep) in autumn should be the exception not the rule. ➢ Limited feeding of creep (if practicable) is an option in a difficult year to finish lambs quicker before grazing runs out. But, again, should be the exception.
Correcting any trace element deficiencies	➢ Test for deficiencies if lamb growth poorer than target off good grazing. ➢ Cobalt is the most common mineral deficiency in weaned lambs in Scotland, consider long acting vitamin B12 injections. ➢ Involve your vet in the decision process.
Preventing a worm challenge	➢ Use a "knockout" drench (Zolvix or Startect) around weaning but not the same day. Nor worm and move to clean pasture the same day. ➢ Silage aftermaths and reseeds (especially if containing chicory or plantain) will reduce the worm challenge. But when worming, leave the best 10% of lambs undrenched to avoid wormer resistance. ➢ Use a faecal egg count to test that main wormer types still effective.
Minimising other health issues	➢ Regardless of whether vaccinate to control clostridial diseases, minimise stress when handling to limit triggering pasturella in particular. ➢ Aim to get lambs away before fluke becomes an issue as drenching is impractical because of long withdrawal period. ➢ Where treating to prevent flystrike watch for long withdrawal periods. ➢ Regularly check the NADIS website for health updates.
Drafting when ready	➢ Go through singles at 8-10 weeks post-lambing, check loin and tail head to determine readiness for sale. ➢ Weighing helps but watch for ewe lambs that finish lighter. ➢ Splitting the lamb crop by weight post weaning reduces the chances of inaccurate drafting and saves time whether run all together or in distinct mobs. ➢ Identify lambs that should be ready next draft to further help next time handled. ➢ Draft regularly (every three weeks typically). ➢ Handle carefully and keep dogs well controlled to avoid bruising lambs.
Preparing lambs for trip to abattoir	➢ Liaise with FSS to book lambs in. ➢ Check all lambs tagged. ➢ Complete paperwork accurately and have ready. ➢ Take lambs off feed at least 6 hours before loading. ➢ Belly clip if required by abattoir. ➢ House drawn lambs if wet weather forecast to ensure loaded dry.

Mating through early pregnancy

Lambing (and hence mating) must be timed to maximise use of grazed pasture and minimise the level of concentrates fed to ewes and lambs. If lambing clashes with calving, then earlier or later lambing blueprints may be more appropriate. Or, a switch to a system that involves less labour at lambing time. Achieved by;

Using better genetics	➢ Good maternal genetics to minimise intervention requirement ➢ Good growth rate EBVs to get lambs away quickly. ➢ Good carcase EBVs to ensure all lambs grade at least R conformation.
Keeping lambing period tight	➢ Have tups fit and healthy. ➢ Fit tups can manage 100 mature ewes on moderate terrain. Lower ratios prudent for gimmers with ewe lambs as low as 1:30. ➢ Use a raddle to spot failing tups and take corrective action quickly. ➢ Two cycles (34 days) preferable. ➢ If using teasers, run with ewes 14 days before planned start of mating for at least 10 days.
Using saved pasture wisely	➢ If ewes are in target condition, no need to flush. ➢ Don't flush prolific ewe breeds. ➢ Better to have ewes in target condition for the start of mating and ration pasture to maintain feeding post conception to achieve high embryo survival and a good scan. ➢ For ewes in light condition, put into good pasture covers from 12 days pre-mating through first cycle. ➢ Avoid grazing breeding females on red clover or lucerne for at least two weeks before mating.
If applicable, keep ewe hogg lambing period even tighter	➢ Run teasers for 34 days before tups introduced. ➢ Mate for 1 cycle only (17 days). ➢ Use an easy lambing breed of tup. ➢ Can use teasers post tupping to ID empty hoggs quicker.
Minimising stress	➢ Avoid diet changes during the first 45 days from tup introduction. ➢ Don't gather or yard the flock unless essential (dog control important).
Protecting against abortion	➢ Ideally run a closed flock. ➢ Vaccinate pre-mating where the disease present.
Supplementing trace elements where deficient	➢ Test / speak with your vet if a problem suspected. ➢ Low selenium levels can result in high embryonic losses. ➢ Low iodine levels may reduce lamb survival rates.

Mid pregnancy

Success during this period will result in low embryonic losses, good lamb birth weights and good placental growth (improving lamb growth rates from birth to weaning). Achieved by;

Avoiding drastic underfeeding	➢ After 45 days, fit ewes (3-3.5BCS) need maintenance only so can be grazed relatively hard to clean up pastures. ➢ Overfat ewes (BCS >4) can safely lose half a condition score gradually through this period. ➢ If there are any thin ewes, run separately on the best grazing. ➢ Tupped ewe lambs also need preferential feeding to keep growing and can be run with the thin ewe mob.

Managing the fluke situation	➢ Establish a fluke management plan well in advance of the winter. ➢ Has your flock resistance to triclabendazole drenches (eg, Fasinex)? ➢ Involve your vet/adviser in preparing this plan. ➢ Periodically check NADIS forecast for your area. ➢ Adjust your plan accordingly and implement.
Minimising stress	➢ Good yard design (and access to it) key to making sure drenching as stress free as possible.
Look after tups post mating	➢ Check tups and treat if a problem identified. ➢ Put on decent grazing to start recovering body condition immediately. ➢ Sell old and/or broken down tups.

Late pregnancy (from scanning to lambing)

Feeding over the last 6 weeks of pregnancy is critical to lamb survivability and milk production (lamb growth rates through early lactation). Achieved by;

Scanning flock	➢ Allows splitting into groups based on lamb number to ration accordingly. ➢ Also condition score ewes at scanning to fine-tune how flock is split (eg, group lean twins (<BCS 3) with triplets, fat twins (above BCS 3.5) with singles). ➢ Changing raddle colour every 10 days at mating gives an extra option for grouping based on expected lambing date.
Not underfeeding or overfeeding ewes	➢ Know your forage quality and ration accordingly. ➢ Avoid overuse of starchy feeds. ➢ Split daily concentrate allowance to triplets where feeding >0.5kg/day. ➢ High quality silage (>11M/D) will minimise need for concentrates and give option of simply feeding straight soya to supplement multiples. ➢ Where lambing outside aim to have covers of at least 1200kgDM/ha in the two weeks before lambing to set stock ewes onto. ➢ Monitor situation and adjust feeding to changing circumstances to avoid problems (eg, prolapses, twin lamb disease).
Close attention to flock health	➢ Monitor number of aborted (slipped) lambs closely and send samples for testing if concerned. ➢ Give all ewes their annual clostridial booster 4-6 weeks before lambing and bring replacements into the system regardless of whether mated or not. ➢ Stock up with life savers well in advance (eg, colostrum, glucose, calcium, mag, antibiotics, iodine, prolapse harnesses, etc)
Setting up fields for lambing	➢ To have pasture for lambing, fields must be rested for at least 90 days. ➢ On freer draining soils, break feeding of saved (high) pastures covers is a good option especially when combined with a forage crop to provide a 6-8 week “break” mid-winter before set-stocking 10-14 days before lambing. ➢ Alternatively, where soils and/or high rainfall make breakfeeding and forage crops impractical, stock will need restricting to less vulnerable land (eg, “bony” rough grazing) or housed and fed primarily silage.

Lambing

Whether lambing inside or outside, planning and preparation is critical to a high lamb survival rate especially if the weather is difficult. Achieved by;

If lambing indoors	➢ Thoroughly clean/disinfect lambing sheds prior to use. ➢ Provide at least 1m^2 per ewe, 15cm of forage feeder space/ewe and 25cm of trough feeder space/ewe. ➢ Pen in groups of 40-50 with access to plentiful clean water. ➢ Use plenty of straw and iodine. ➢ Get feet right before housing and periodically footbath to prevent lameness thereafter (lime around hot spots like water troughs can help). ➢ Have plenty of mothering up pens and maintain a high state of cleanliness.
If lambing outside	➢ Choose fields wisely (eg, good shelter, no burns). ➢ Set-stock 10-14 days before lambing onto pastures with at least 3-4cm of cover (1200kgDM/ha). ➢ A stocking rate of 4-6 medium sized twin ewes per hectare is typical given an April pasture growth rate around 15kgDM/ha/day. ➢ Supplementing with buckets (eg, Life-line) provides insurance especially in a late spring.
Limiting antibiotic use where lambing indoors	➢ In consultation with your vet, do not treat all lambs with antibiotics at birth (eg, Spectam Scourhalt). ➢ As a minimum, leave singles and lambs born in the first week untreated. ➢ Cleanliness, especially of lambing pens, critical to a low/no antibiotic policy.
Maximising colostrum	➢ Ewes in fit condition and fed to budget through late lactation should produce plenty of colostrum for singles and twins and sufficient for triplets. ➢ Stomach tube saved or artificial colostrum to top up lambs from ewes with insufficient colostrum. ➢ Don't keep replacements from ewes with inadequate colostrum supply.

The golden 100 days (lactation)

Lambs grow fastest during this period, with the first 8 weeks when lamb largely dependent on the ewe especially important. Achieved by;

Making most of ewe body condition by lambing at 3-3.5 BCS	➢ Hit BCS targets at tupping and scanning. ➢ Feed to plan through late pregnancy.
Maximising intakes of pasture after lambing	➢ Rest pastures from January. ➢ Set stocking works as well as rotational grazing if well managed. ➢ If set stocking, aim for a minimum of 1200kgDM/ha (3-4 cm) and an ideal of 1500kgDM/ha ➢ For rotational grazing, shift when covers at 1400kgDM/ha with a rotation of 16-21 days.
Maintaining pasture quality especially in final third of lactation	➢ If grass is getting ahead, shut off some of the area, use a mower or use cattle to maintain sward height at 5-10cm (set stocking).
Checking DLWG @ 8 weeks	➢ Weigh a sample of lambs from the main mobs run and arrive at an overall average.

	➢ For a typical crossbred flock, average must be around 23kg if want a +30kg average at 90 days post mid-point of lambing[18] (adjust if lambing % significantly outwith norm).
Controlling the worm challenge to lambs	➢ Know your worm status (use a FEC reduction test) ➢ Don't drench all ewes for worms pre-lambing. ➢ Monitor NADIS report for nematodirus threat and act accordingly. ➢ Base decision to drench on faecal egg counts. ➢ Follow best practice dosing rules (eg, don't under dose).
Vaccinating lambs to cover clostridial diseases	➢ Vaccinate early in lactation to allow time for second jag to work. ➢ Minimise stress through careful handling.
Don't wean too late	➢ Weaning can be done after 8 weeks if lambs are gaining <200g/day, pasture is in short supply and/or ewe condition is less than 2.5. All should be weaned by 100 days unless pasture is plentiful and lambs growing >200g/day. ➢ Weigh a sample of lambs at weaning to get your average weaning weight.

Useful resources

Get your management right and the **target lamb growth rates** shown in the table below are very achievable. Click on the following link for guidance on how to accurately calculate your lamb growth rates.

http://farmstock.org.uk/ktif-project-resilient-lamb-lamb-weighing-guide/

Period	Daily target for period	Cumulative target
0-56 days (8 week)	>320g	>280g to 90 days (ie, an average of 30kg at weaning)
67-90 days (weaning)	>240g	
Post weaning for finishing summer and autumn	>150g pasture (eg, aftermath)	>250g from birth to sale for spring lambing flocks aiming to finish most lambs off pasture
	>180g aftermath or reseed with high % white clover	
	>200g forage rape, turnips, hybrids	
	>300g red clover	
Winter finishing following a store period	>120g swedes, fodder beet	Not relevant. Focus on good growth to weaning, minimising cost during store period and hitting target DLWG in finishing period

Supplementing with an appropriate concentrate will boost growth rates above targets noted and in some instances (eg, feeding of forage crops) may be essential for finishing lambs.

For a refresher on **Body Condition Scoring ewes** click on the following website.

https://beefandlamb.ahdb.org.uk/wp-content/uploads/2013/06/brp_l_Sheep_BCS_190713.pdf

To get **pasture growth rates** for your area and tips on how to manage your grazing better go to the following website.

https://grasscheckgb.co.uk/

[18] Take mid-point of lambing as 10 days after the planned start of lambing where don't record actual mid-point.

Appendix 4 – Example of project engagement with FSS farmers

KTIF Project Resilient Lamb

Update October 2018

Maximising your returns is our priority. Working with the leading Scottish processor of lamb – Scotbeef – we drew up a three year project that aims to make Farm Stock sourced lambs the number one supplier to M&S. The project is 100% funded by the Scottish Government's Knowledge Transfer and Innovation Fund.

Why bother?

A lot of people don't eat lamb and the downward trend in consumption is worrying. Cost is a factor, but eating quality and provenance are as important in lifting the demand for lamb. This project aims to establish blueprints that deliver lamb that tastes consistently excellent through the year and is produced in a manner that enhances that taste. Yes, psychologists have established that a positive view of how our food is produced improves our sense of taste.

What the project involves?

Physically the ideal M&S lamb grades R3L and weighs 16-20kg dwt. Eating quality must be consistently high, accepting that the eating characteristics of lamb will change through the season mainly because of age. Consequently three blueprints are being developed to cover;

- Early season (May through July).
- Main season (August to Christmas).
- Late season (January to the end of April).

Developing these blueprints involves three inter-related pieces of work;

- Studying the management practices of a number of members to identify the practices that result in the lambs M&S want.

- Looking at how farm and chain data can be better used to improve production.

- Exploring the options for moving the supply of lamb to better match consumer demand.

What we've found so far?

- Plenty of lambs of the right size, conformation and (low) fatness are available between July and December. But thereafter a lot of lambs are "out of spec" mainly because they are too big for M&S (and other supermarkets). More early season lambs are also needed, but cost of production relative to an unpredictable price is the more limiting factor here.

- The good news is that lamb is notable among meats for its good eating quality. Nevertheless, our trial work suggests that doing certain things will increase the likelihood of producing consistently tasty lamb. We are looking closely at how feeding in the month prior to slaughter affects taste, especially outwith the main season when forage crops and concentrates are widely used. And while overseas work suggests breed does not influence taste, the trial should help us confirm this finding under Scottish conditions.

- Good growth rates prior to slaughter are generally considered a positive. Of course, while lambs killed post Christmas (particularly hill breeds) will go through a long period of low or no growth, lambs targeted at the early market must grow fast. Does such variation in growth rates affect taste?

- New Zealand research warns that selecting tups solely for (high) growth rate and meat yield (ie, the amount of muscle relative to carcase weight) may reduce eating quality. The trial should help establish whether such a relationship exists under Scottish conditions.

- Animal health and welfare is important to M&S shoppers. So knowing and implementing best practice protocols on farm is essential. Minimal use of antibiotics is particularly important (*link to guide on reducing antibiotics here*).

- A lot of data is available on kill sheets. However, its value is not being realised thanks to the poor flow of kill data between the processor, farmer and FSS. Work is in hand to allow the necessary consents to improve this flow.

- Not only will the better flow of this data improve administration efficiency at Farm Stock, it will allow Farm Stock to provide data that members can use to benchmark their performance. The data should also help give Farm Stock an advantage in managing the flow of lambs through the season to meet customer's demands.

- Perhaps more importantly, the trial points to how little data is collected and used on farm to guide management decision-making. Weighing lambs at certain stages of the year can provide invaluable feedback on feeding and health, yet few farmers weigh lambs other than to draw them (*insert lamb weighing video here*). Farmers that have invested significant sums in sophisticated electronic scales, readers and software are missing a trick, especially if we can get kill data easily downloadable into their systems.

- Finally, the project is exploring the options for manipulating the supply of lamb to better match demand. We are looking at how pricing could be used to move lamb out of the glut period. And also developing innovative ways of linking store lamb producers with specialist finishers.

If you have any questions about the project, or suggestions that could enhance it, please get in touch with Jonny Williams at the Farm Stock office.

KTIF Final Report Guidance

Guidance:

- Introductory section explaining the basis for the project utilising rural development regulation you appropriate EU Grant Measure (ie. 16.1), making mention of the operational group (if appropriate), the roles and responsibilities of members and what the group set out to achieve;
- Report back on project aims and objectives and if they've been achieved – much of this can be pulled from the KTIF application;
- Detailed information on actual spend and how much was underspent (if any and a reason). How much funding was provided, from where (ie. 75% or 100% co-funded by SG/EU) and details of the project duration and milestones;
- Section on 'Lessons Learned'. Things which were highlighted as issues, resolved or to do better if done again. We understand some project won't work out as well as hope but be honest about this. By identifying limitations we can target the problem;
- Pull information in from the other reports your project has produced (ie. Progress Reports and Evaluation Reports) or as appropriate annex these;
- Remember your audience. Avoid too technical language and don't assume the reader has in-depth knowledge.
- A table detailing communications which have gone out (where, when and the size of the audience) and commentary would be beneficial;
- Detailed information on actual spend and how much was underspent (if any and a reason). How much funding was provided, from where (ie. 75% or 100% co-funded by SG/EU).