KTIF SG Final Report Template

Contents:

1. PROJECT TITLE/APPLICANT

1.1 Title Keeping Cow with Calf: Bringing Innovation to Scottish Dairying

1.2 Overview of your company
Scotland's Rural College (SRUC) was formed on 1 October 2012 by the merger of Barony, Elmwood and Oatridge Colleges and SAC (Scottish Agricultural College), and has a long history dating back over 113 years of support to farming and rural industries.

SRUC consists of three divisions - SAC Consulting, SRUC Research and SRUC Education. As a large, modern, and multi-disciplinary organisation, SRUC has a concentration of skills and resources that are unique in the UK. It provides advanced education and training, research and development; advisory and consultancy work on an extensive range of subjects but with particular emphasis on food, land and environment, and rural resource and business management. SRUC has a dedicated Research Division that achieved the top UK ranking for Research Power in the 2014 Universities Research Excellence Framework assessment in collaboration with the Roslin Institute and University of Edinburgh Veterinary Sciences. This was due to the high quality of research but also to the high quality of the impact that the science has had on UK agriculture. Dairy research has always been a major strength of SRUC. In 2018, SRUC was awarded the Queen's Anniversary Prize for research carried on the Langhill Herd, the longest running dairy cow selection experiment in the world.

2. EXECUTIVE SUMMARY

2.1 Overview
Dairy farming in Scotland faces many challenges including low profit margins, volatility in prices, isolation, and problems in staff recruitment. This indicates that there is a need to explore novel dairy production models that bring greater returns to the farmer and are more attractive to new entrants to dairying and potential staff. Additionally, there is increasing concern from some members of the public about the ethical nature of some livestock farming practices.
Rainton Farm in south-west Scotland is successfully running a commercial-scale dairy enterprise in which calves remain with their dams for 5 months, in contrast to conventional systems where they are separated soon after birth. The aim of this project was to use Rainton Farm as a model to provide information on the economic, environmental and animal health and welfare aspects of the cow-with-calf (CwC) system. The project also used a social science approach and interviewed potential new entrants and farmers currently operating the system to identify challenges and benefits of the system. In addition, a market analysis was performed to determine how CwC products might be sold.

The project reached a number of conclusions:

- The social science study identified a number of key challenges and benefits to entrants to the CwC system. There is a lack of information available on how to manage a CwC system, and how buildings need to be adapted. There are economic challenges due to less saleable milk available and health challenges of keeping calves with adult cows. The social pressure of going against the dairy industry norm can also represent a burden. However, the benefits included a highly valued and saleable product and better relations with consumers, and better animal welfare.

- In terms of economics, partial budget modelling showed that compared to conventional and organic farms, there was a major reduction in income from milk. This was partially off-set by reduced purchase of milk replacer and by sales of youngstock for beef. To match the profits of a similar sized organic farm, a CwC system would need to sell milk for ~40ppl and all beef calves for a premium.

- Cow udder health is better in CwC systems, with lower mastitis and somatic cell counts. Calf growth is higher pre-weaning. The metrics are difficult to equate, but it appears that the rate of antibiotic use is lower on Rainton than the national targets set. The holistic approach of the farm to animal welfare and environment is reflected in good soil fertility and carbon capture.

- Currently, farmers selling milk or cheese from a CwC system are using the appealing narrative around the CwC system to create their own brand and sell product to consumers who value this approach. Direct sales approaches are being used, such as vending machines, doorstep deliveries or on-line sales.

- A discussion with a large processing company around promoting a niche-product was held. The sales potential of a high welfare, ethical product was attractive, but the idea was not taken forward due to other commitments. Greater consumer demand must be matched with increased supply for CwC products to reach the mainstream.

The project generated a great deal of interest in the public, farmers and other stakeholders. A website was set up which attracted over 1900 views from 31 countries and 32 sign-ups for newsletters. There was a wide array of press coverage in many different publications.

3. PROJECT DESCRIPTION

Background

Dairy farming in Scotland faces many challenges including low profit margins, volatility in prices, isolation, and problems in staff recruitment. This indicates that there is a need to explore novel dairy production models that bring greater returns to the farmer and are more attractive to potential staff and new entrants to dairying. Additionally, there is increasing concern from some members of the public about the ethical nature of some livestock farming practices. ‘The Ethical Dairy’ is an enterprise run within the Rainton Farm portfolio. The farm practices a ‘cow-with-calf' (CwC) system in which the dairy calves are kept with their dams for five months before weaning. In conventional dairy systems, calves are typically separated with 24h of birth. Male calves and excess female calves are reared on the farm and sold for beef, with premium prices gained for the ‘rosy veal’ product.

This model of farming presents new opportunities for producing and selling milk and meat that appeal to ethically minded consumers. However, for potential new entrants to the system, there are significant unknowns and knowledge gaps surrounding the uptake of the system. The aim of this project was to use Rainton Farm as a model to provide information on the economic, environmental and animal health and welfare aspects of the CwC system. The project also used a social science approach and interviewed potential new entrants and farmers currently operating the system to identify challenges and benefits of the system. In addition, a market analysis was performed to determine how CwC product might be sold.

Project management

The project had an operational group which consisted of the owners/managers of Rainton Farm, other farmers operating a CwC system, and members representing National Farmers

Union of Scotland (NFUS), Nourish Scotland, SRUC and SAC Consulting, James Hutton Institute, FAI Farms, Swedish Agricultural University, University of Glasgow, University of Edinburgh, University of Newcastle and the Soil Association Scotland. The project management group met quarterly to discuss progress.

A Project Co-ordinator was appointed (Dr Holly Ferguson), who was responsible for organisation of the project activities and monitoring progress, in collaboration with the Project Lead (Prof Marie Haskell).

Various sub-groups met throughout the project (approximately once per month) to coordinate the activities associated with each objective. The sub-groups consisted of the operational group members involved in each activity as well as the Project Coordinator.

Project activities
The Cow with Calf Project ran from December 2019 to February 2021 (funding for one year and a 3-month grace period to write the final report). The activities in this project followed the Objectives (set out below). These included establishing a network and a website, assessing farmer views on the barriers to uptake of the system using interviews, carrying out an economic analysis of the CwC system, using a farm audit to establish how the CwC system performs in terms of animal, human, environmental and economic health and assessing business models for the sale of CwC products. A number of student projects contributed to the data collected. A prospectus for potential new entrants and other stakeholders was produced and results presented at a farming conference. Each activity was led by one of the Operational Group and pulled in expertise from other members as necessary.

4. FINANCE

4.1 Sum awarded £60,412.50

4.2 Detail of spend: Not all invoices and time-recording have been submitted at the time of submission of this Final Report. However, the spend is expected to be very close to the sum awarded. The project was 100% funded by SG/EU and was one year in duration (plus 3-month grace period to deliver final report).

4.3 Noting any underspend and explain why: no significant underspend.

5. PROJECT AIMS/OBJECTIVES

5.1 Linking what was set out in the application
Objective 1. Establish a Scotland-wide CwC network, aimed at farmers, industry stakeholders, the wider dairy sector (e.g. co-ops, processors, vets) and supporters.
Objective 2. Create a webpage and create initial content by reviewing current knowledge in the area.
Objective 3. We will ask a group of farmers for their views on the barriers to uptake of the CwC system before, during and after implementation. Qualitative interviews will also be done to explore the social aspects of changing the system.
Objective 4. Carry out economic analyses of the CwC system at farm level, highlighting potential gains and losses, costs and returns.
Objective 5. Use a farm audit/benchmarking tool to establish how the CwC system performs in terms of human, animal, environmental and financial health. The exercise would be particularly important to characterise the system inputs and outputs peculiar to this system, such as enhanced welfare, calf growth, social and environmental sustainability. This framework follows a whole farm approach, using a 'EEE' 'Economic, Environmental and

Ethical' model (based on the Three Pillars of Sustainability) which ensures that people, animals and the environment are all incorporated when undertaking assessments of sustainability.
Objective 6. Analyse business models/marketing options for CwC milk and dairy products that are viable and likely to maintain product differentiation/added value to producers.
Objective 7. Run student projects to assess key components of the CwC system in depth, such as aspects of cow and calf health, building requirements, milk production, animal welfare and product quality. Short-term student projects would enable quality, value for money detailed study and give students training in research techniques and a wider understanding of food and farming systems as an outcome of this project application.
Objective 8. Produce a prospectus of the CwC dairy model, highlighting results of the data gathered during the project and farmer case studies, aimed at farmers considering conversion, the wider dairy industry, and supporters.
Objective 9. Run a Showcase Event to present the outcomes at the end of the project

6. PROJECT OUTCOMES

6.1 How aims/objectives were achieved

Objective 1: Establishing a Scotland-wide CwC network
Many of the activities in the project involved establishing contact with farmers, consultants, veterinarians, milk processors and buyers. This allowed the CwC to be discussed widely across a broad range of stakeholders, raising the profile of the CwC system and creating a network that can be capitalised on in the future.

Objective 2: Establishing the website
A website was established that contained information on the project and the results of the different aspects of the study. The prospectus (Objective 8) was also added as a webpage. The website attracted over 1900 views from 31 different countries and 32 people signed up for a newsletter and project outputs.

Objective 3: Qualitative interviews with farmers for their views on barriers to uptake and social aspects of changing the system.
The purpose of the social sciences research was to investigate the experiences of dairy farmers who have tried a cow-with-calf system, and the views of farmers who are interested in trying the system. As there are very few farmers in Scotland operating a cow-with-calf system, interviews were carried out with 7 farmers across England, Wales and Scotland who operate or have operated a cow-with-calf system. In addition, a survey was designed and run for people interested in operating a cow-with-calf system. There were 18 respondents to this survey as it was limited to only those farmers considering a cow-with-calf system.

According to the interviewees, the challenges of the system are:

- **Lack of information** about how to operate a cow-with-calf system.
- **Adapting facilities** to allow cows and calve to be safely housed together and separated easily.
- **Management challenges** of adopting an under-researched production system.
- **Weaning and cow-calf separation** led to **animal health and welfare challenges** and the resulting emotional strain on the farmer.
- **Economic challenges** because less milk is produced, and so costs are higher.
- **Economic challenges** in finding a market for the milk-fattened calves.
- Some respondents reported **reputational challenges** from farmers and actors in the dairy sector who were hostile to the system, which caused social and emotional strain for the farmers.

According to interviewees, the advantages were:

- **Labour saving** from once-a-day milking and reduced calf feeding.
- **A ready market** for cow-with-calf dairy produce with consumers who were willing to pay more.
- **A positive relationship with consumers** who were passionate about the cow-with-calf system.
- **A new relationship between farmers and their cows and calves,** where they learned from each other how to best operate the system.
- Potential **animal welfare and health benefits** of operating a more 'natural' system with cow-calf contact that meets cows' emotional and physical needs.

Survey results:

- The main motivations for respondents of the survey to operate the system were, in decreasing order of importance, **animal welfare, public perception and market opportunities**.
- The main factors currently stopping respondents were **economic risks, facilities on the farm and uncertainty about markets**.
- The factors that would most help respondents try the system were **on-farm visits, an instruction manual and professional advisory support.**

Objective 4: Carry out economic analyses of the CwC system at farm level, highlighting potential gains and losses, costs and returns.

A major barrier to the uptake of a cow-with-calf system is the reduction in saleable milk, as it is consumed by the calves. However, there are reduced costs associated with a cow-with calf system, as milk replacer is not used and milking only occurs once per day. Additionally, the calves achieve a higher growth rate and become a valuable product for sale.

To investigate the economic consequences of keeping cow and calf together, a partial budgeting approach was used to compare data from Rainton Farm with two example farms that use early calf separation: one organic and one conventional. The analysis covered one year (2019 was our reference year). All farms were assumed to have 100 lactating cows in and a total of 120 cows. Data for the CwC modelling for calf weights, feed and labour costs, sales data and veterinary treatment costs were taken from records at Rainton Farm and elsewhere as required. Similar data for organic and conventional farms were taken from the SAC Consulting/FAS Farm Management Handbook, data from previous SRUC and SAC Consulting studies and databases.

The analysis showed that the Rainton model was the least profitable, and the conventional farm was the most profitable. The cow-with calf system had lower higher revenue from sale of youngstock for beef than either of the other farmers which sold excess calves. As expected, there was lower income on milk in the Rainton model, and no costs associated with purchase of milk replacer.

The model also able to calculate the milk price that milk from a cow-with-calf system would need to reach in order to match the profitability of an equivalent organic farm. The model suggests that milk must be sold at ~40 pence per litre and all calves must be sold at the premium prices for beef. This is a very interesting outcome and provides a suggestive price for future milk sales.

Objective 5: Use a farm audit/benchmarking tool to establish how the CwC system performs in terms of human, animal, environmental and financial health.

The purpose of this objective was to capture the domains of ethics (animal and human), environment and economics in a systems-based evaluation of Rainton Farm. When evaluating a Cow with Calf (CwC) system, the most obvious domains for consideration are the animal welfare aspects (for cow and calf), the economic implications of loss of saleable milk, and the potential for improvements in human work-place enjoyment in association with the mimicking of a more natural livestock social structure. However, given the holistic mindset that the use of a CwC system promotes, a consideration of environmental aspects is also warranted.

Animal health and antibiotic usage.
For the purposes of this study, antibiotic sales data supplied by the veterinary practice for 2015 to 2019 inclusive were summarised to report metrics as suggested by the Cattle Health and Welfare Group in 2019 (CHAWG 2019), reproduced in the RUMA Targets Task Force Report (2020). Although antibiotic sales may over-estimate the amount used on the farm (some may expire for example), the amount of antibiotic used on Rainton Farm (as mg/population correction unit) was shown to be lower than the target levels stated by RUMA (Rainton Farm = 13-17 mg/PCU vs. RUMA target of 21.5 mg/kg). None of the critically important antibiotics were used at Rainton and low usage rates for intra-mammary tubes were also observed on this farm (0.04-0.26 courses/cow) in line with RUMA recommendations.

Calf growth
Calves on the cow-with-calf systems achieve good growth rates. At 120-150 days of age, calves are achieving growth rates of 1.1.5-1.30 kg/day (Figure 1).

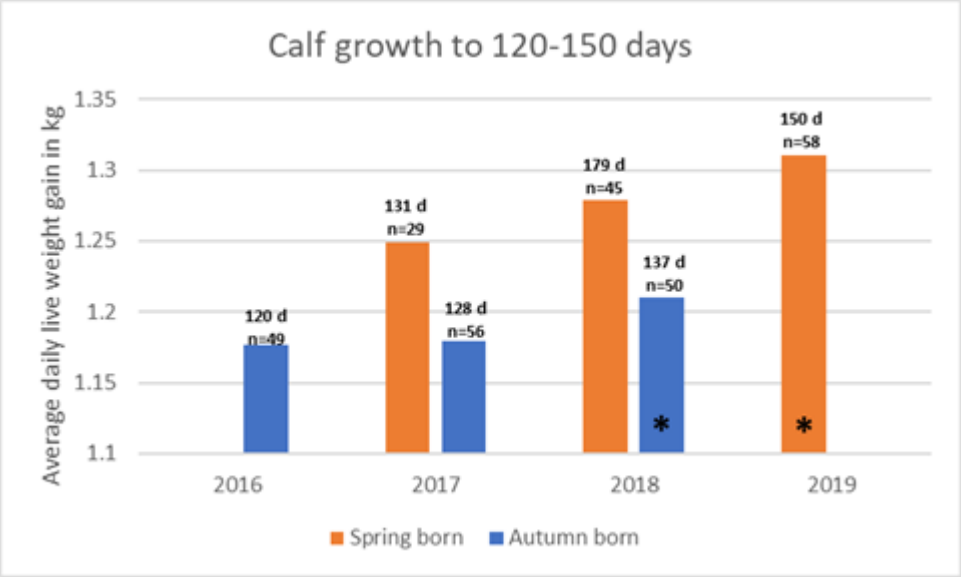


Figure 1. Calf growth rates (average daily lwt gains (kg)). Data for spring and autumn born calves are shown.

Carbon metrics and soil health
AgRECalc (SAC Consulting) was used to calculate emissions per unit output from each enterprise on the farm. Data from the sheep and dairy enterprises at Rainton for May 2019 to May 2020 were entered into the online calculator. As the cow-with-calf production system does not align with the definition of a dairying or mixed-farming enterprise imbedded in the AgRECalc system, with the inherent reduction in saleable milk, but with 'output' of older calves for sale, calculation emissions per kg of output calculated were not really applicable. As such, it is our intent to discuss with SAC how Cow with Calf operations might be better accommodated moving forwards. However, the exercise did provide some baseline figures to allow future comparisons of this and other cow-with-calf enterprises. A calculation of soil organic matter combined with on-site observations based on the SoilMentor app

(vidacycle.com) were used to assess soil health. In general, the derived organic matter levels were high (8-16%) but this was a snapshot of the farm and should be treated with caution.

In conclusion, it was apparent that many of the standard metrics were not applicable to this novel farming system. Discussion with the metric regulators should be promoted. However, if caveats associated with different data sources and metrics are considered, it can be concluded that the farm has low antibiotic use and high soil health which aligns with the holistic aims of the overall farming system.

Objective 6. Analyse business models/marketing options for CwC milk and dairy products

The Cow with Calf model is a fairly new concept in Scotland, although it is a growing market in other countries such as Germany. In Scotland at present, public understanding of dairy systems has not created a large demand for cow-with-calf product to the extent where it is a main-stream product available in the supermarket. On the supply side, farmers are not encouraged to move into the new dairying system, due to many of the barriers outlined in the study for Objective 1. Currently, farmers consider the health and welfare of their animals, but they are conditioned to produce more from less inputs, and altering this mind-set is necessary to embrace the cow-with-calf system.

Those farmers that have entered the cow-with-calf dairy product market have made use of the persuasive 'narrative' around the high levels of positive animal welfare inherent in this system, allowing for the development of a niche market and the creation of their own brand. Branding is hugely important in the food and drink sector and provides farmers and primary producers with the opportunity to add value to their products, tell their own unique story, and encourage consumers to 'buy-in' to their values. Communicating brand values is important and most effective if a farm or producer has complete control of their own marketing activities. Likewise, niche marketing focuses on communicating a product's specific benefits or values to fulfil consumers' specific needs and wants. Having a clear point of difference from products in a similar category is needed to attract customers and allow for a premium price to be charged. Thus, most of the farmers using a cow-with-calf system are following these marketing principles and are marketing and selling their own products. They are typically using direct sales methods, such as the use of vending machines for milk or door-step sales of bottled milk. Making a product, such as cheese, has also secured the premium prices required to successfully operate a cow-with-calf system.

Achieving a wider market would require both a larger demand from the consumer and a corresponding increase in production. Market research would help to establish consumer demand for cow-with-calf products.

Objective 7. Run student projects

Two MSc projects and 2 BSc student projects were run within the lifetime of this project.

MSc Project 1. How does a cow-with-calf system affect the dams' milk yield and milk composition and calf growth?

University of Edinburgh, Thűnen Institute of Organic Farming, SRUC

The aim of this study was to compare milk yield, milk composition and calf growth between a group of cows in a standard early calf-separation system and a group of cows in a cow-with-calf system. The growth of the calves and aspects of udder health were also assessed.

The data came from the Thűnen Institute of Organic Farming, Germany. This institute has been running the cow-with calf system on an experimental basis for over 10 years to support

the growing interest in this system from German consumers and farmers. For the purposes of the study, 108 primiparous dairy cows of two different breeds (German Holstein and German Red Pied) were allocated to two different study groups: a calf-suckling and a conventionally managed group. Both groups of cows were housed in cubicle barns during the winter and allowed outdoors in the spring and summer from April or May.

Cows in the conventionally managed group produced more milk than those in the calf-suckling group. The milk of the conventionally managed cows also had a higher fat context, but there was no difference between the two groups in the protein content of the milk. However, somatic cell scores were lower in the calf-suckled group than in the conventionally managed group. The results also showed that the calves in the calf-suckling group had higher daily weight gains than the calves on the conventionally managed system.

MSc Project 2. Why do some cows give more milk in the parlour in a cow-with-calf system? Investigating effects of cow age and sex of her calf on behaviour and milk production. University of Edinburgh, Rainton Farm and SRUC.

It has been observed at Rainton Farm and in other studies that there is a large variation between cows in the amount of milk that is harvested in the parlour when cow and calves are kept together. Some cows give the parlour as little as a few litres per day and some as much as 15l. There could be a number of reasons for this. Firstly, there is a range of ages of cow at Rainton Farm, which is known to affect milk production. Interestingly, the sex of the calf is also a factor that may affect milk production. This phenomenon is known as differential 'maternal investment'.

To assess effect of age and maternal investment on milk harvested through the parlour, milk yield data from the first month after calving for the 2019 autumn calving group and the 2020 spring calving group (a total of 111 cows) were analysed. The analysis confirmed that there was a large variation in yield, with average daily yield recorded in the parlour ranging from 1 to 23 litres of milk for different cows. The results showed that cows with a heifer calf at foot gave over 2 litres/day more in the parlour than cows which had a bull calf at foot. As expected, the results showed that older cows gave more milk.
To assess behavioural investment in heifer and bull calves, observations of the cows were made for 3 hours per day for 5 days per week for 5 weeks, from the start of calving onwards. The number of suckling bouts between cows and calves, and behaviours directed towards the calf, such as licking and nuzzling, were counted. The results showed that cows with bull calves licked their calves more than cows with heifer calves Bull calves were observed to suckle from their dams slightly more frequently than heifer calves, which may explain the lower levels of milk harvested in the milking parlour.

BSc Project 1: University of Glasgow
This project ran at the beginning of the overall project, so a first task was to establish which key data were available, and highlighted the need to have data and records stored in a format that allows for systematic study of the system. This led to data being transcribed and downloaded from a number of farm and commercial databases. Various datasets were investigated including individual cow somatic cell count data, cow milk and protein content data, Johne's testing data, calf health and welfare records and medicines use on farm. The project established that there was a very high level of staff engagement and job satisfaction in the cow-with-calf system. Calf growth rates were very good and there was no evidence of significant udder health issues in the cows, nor a high prevalence of Johne's test positive cows in the herd. Issues that were identified by both the staff and the records were the increased risk of respiratory disease in the calves that were born in the autumn; most likely as they are

housed with the adults and this is changing the dynamics of microorganism transfer in the system.

BSc Project 2: University of Newcastle
A group of dairy cows were kept with their calves until weaning and separation at 8 weeks. Though the study stopped early due to Covid-19, it was possible to analyse a number of different parameters.
Calf and dam vocalisations: vocalisations by the cow and calf are an indicator of distress and their frequency could be used to assess stress at weaning, which is an issue in CwC systems that requires investigation. In traditional auditory recordings, vocalisations are manually recorded during specific time slots (meaning behaviours may be missed) or constant video footage is scanned for vocalisations (laborious and time consuming). Using precision technology and specific auditory software, the trial was used as a pilot study to determine if precision techniques could be used to count vocalisation occurrences more efficiently. The study showed that techniques are needed to filter background sound from the recordings to allow animal vocalisations to be detected.
Calf growth: Calves were noted to have excellent growth rates, health and vigour when kept with their dams up to the point of weaning.
Dam behaviour (measure of welfare and production): New precision farming technologies, such as Allflex Sensehub collars, were used to monitor behaviour, welfare and production. These collars used are intended to produce activity alerts relating to heat detection and can be used to monitor health and welfare issues. The study showed that these technologies were capable of monitoring cow behaviour. Their potential to detect welfare issues is the subject of further study.

Objective 8. Produce a prospectus of the CwC dairy model

A prospectus was produced for the study. It consists of a series of one-page summaries of the main issues addressed in the project: opportunities, challenges, economics, cow and calf health, animal welfare, housing and marketing and sales (See Annex 1). The prospectus will be added to the website and will be available in a printed version if required.

Objective 9. Run a Showcase Event

Unfortunately, due to COVID-19 restrictions, we were not able to run the Showcase Event. However, we ran a dedicated session on cow-with-calf systems at the Northern Real Farming Conference, October, 2020. Two of the farmers involved with the project presented their farm management systems and the results of some of the objectives were presented.

6.2 Milestones

1. Month 1: Operational group and Steering Group established. Co-ordinator appointed and kick-off meeting for the project: completed Jan 2020
2. Month 2: Establish wider stakeholder group and establish webpage for the project. Started December 2020 and continued throughout the project.
3. Months 3-6: Farmer interviews to assess barriers and challenges, and potential benefits. Completed August 2020 (delays due to COVID-19 restrictions)
4. Months 3-6: Carry out audit/benchmarking exercise. Completed October 2020 (delays due to COVID-19 restrictions). **Carry out economic analyses.** Completed February 2021 (delays in collection of farm data due to COVID-19 restrictions) .
5. Months 6-9: Business/market analysis. Completed December 2020
6. Months 3-12: Run student projects. Completed August 2020

7. Months 10-12: Showcase Event. Was not possible to run a Showcase Event due to COVID-19 restrictions. Presented project results at Northern Real Farming Conference which was held on-line.
8. Month 12: Produce prospectus, write and submit final reports. Completed February 2021.

7. LESSONS LEARNED

7.1 Issues/Challenges

This project ran from December 2019 to November 2020, with the final report submitted in February, 2021. Thus, the timing significantly overlapped with the global COVID-19 pandemic. This severely disrupted our ability to hold meetings in person, and we were not able to hold a 'Showcase Event' to present the results as we had hoped. However, the team adapted quickly to on-line meetings, and were able to meet regularly. In periods when restrictions allowed, on-farm data collection at Rainton Farm was carried out. Instead of hosting a conference, the project was given a session at the Northern Real Farming Conference, 2019, which allowed us to present some of the results. We also applied to present at the Oxford Real Farming Conference and may be given the opportunity in 2022.

One of the main lessons learned from the project was on the depth of negative feeling toward the cow-with-calf system. It appears that many farmers running the conventional early calf separation system are concerned that a cow-with-calf system highlights to the consumers and public the fact that calves are removed from their dams soon after birth. While there are management and health factors that may be benefited by early separation, public acceptance of current systems is key. This is an issue that needs to be dealt with carefully to avoid undermining public confidence in Scottish and UK dairy farming. Those introducing CwC systems need to be mindful of this factor.

Availability of data on commercial farms to facilitate benchmarking/auditing and comparisons with other systems is a challenge. Rainton Farm has the benefit of excellent record-keeping, however, as a commercial farming enterprise, not all the data required for the full farm auditing was available. To facilitate future studies, funding for data collection may be required.

Cow-with-calf systems do not fit with the underlying 'farm model' assumptions of some of tools used to benchmark farms. For instance, AgReCalc was not able to fully account for the unique nature of the Rainton Farming system, which meant that the environment footprint calculated was not a good representation of the farming system. Discussion will be had with some of the providers.

7.2 Impacts

- The project website (www.keepingcowwithcalf.com) was set up in May 2020 and to date has had over 1900 individual visits to the site from 31 different countries. From the website, we have had 32 individuals sign up to the mailing list for project updates and outputs, as well as direct contact with farmers through the contact page on the site, requesting information or involvement in the project. The website and the mailing list will be utilised to disseminate the project outputs effectively, and to keep a legacy of the project after its end.

- As part of Objective 6, processor opinion was sought on the possibility of larger scale processing of CwC milk. Contact was made with McQueen's Dairies, Arla and First Milk. Following initial interest, follow up discussions were had with a representative

from McQueens. The possibility of processing CwC milk separately from standard milk at their new dairy processing plant was discussed and the idea taken to their board. Whilst they ultimately decided that it was not feasible currently, due to their ongoing expansion with existing lines, it was made clear that it was something they would be happy to discuss again in the future.

- The project had successful engagement with farmers outside of the project team itself. We had contact with farmers through the Scottish Dairy Hub, through the website, through Northern Real Farming Conference and through survey and interviews during objective 3. One new entrant to CwC approached the project through Scottish Dairy Hub and subsequently became involved in the project, presenting as part of the cow with calf session at NRFC. Other farmers have sought specific information, such as the economics of veal calves, through the project, or helped to shape the prospectus through their feedback in objective 3.

- The project identified knowledge gaps and issues with standard farm recording where data was needed to enable quantification of effects. Identifying these gaps and the level of recording needed is essential for the success of future projects evaluating CwC systems. As well as impacting research, identifying these issues had a positive effect for the farm, showing them the benefits to collecting more information from their system.

8. COMMUNICATION & ENGAGEMENT

8.1 Detail throughout the project's lifetime

Engagement activity	No.	Details
Internal meetings	10+	Over 10 internal meetings were held during the project, ranging from full project group meetings and project updates, to objective specific meetings. Group members were kept updated with meeting minutes and using an email group, ensuring feedback from members was considered throughout the project.
Conferences attended	1 (2)	- Project outputs were presented during a specific session at the Northern Real Farming Conference, October 2020. - Youtube link to session available: (http://bit.ly/NRFC2020). - The project has been invited to participate in future Oxford Real Farming Conferences.
Hits on the website	1900	Over 1900 visits have been made to the project website (www.keepingcowwithcalf.com) from 31 different countries. Website visits were a mix of different traffic sources: - 45% direct - 37% socials - 11% referral (press releases and PR) - 6% search - 1% email referral
No. signed up for newsletters	32	- 32 individuals have signed up for newsletters and project output updates through the project website.

Milk buyers/processors engaged	3	- McQueen's Dairies, Arla and First Milk contacted to discuss the potential for sales of CwC products. - Follow up discussions with McQueen's Dairies about the feasibility of this system for their business in the future.
Presentations to farmers	1	- As part of NRFC, the session audience included farmers, the public and industry bodies.
Presentations to consultants	2	- Presentations were made to the internal SRUC Consultancy Dairy group (9 consultants), discussing the project as a whole and outputs. - Presentation will be made to next meeting of the SAC Consulting oversight group (ie we should present this to Beef, Sheep, Dairy group).
Press releases	3	- A press release was issued by SRUC at the start of the project - A press release was issued by SRUC and The James Hutton Institute to launch the farmer survey. This press release was picked up by over 18 outlets - See press page of the website for links to some of the articles: (https://www.keepingcowwithcalf.com/press)
Television	2	- The project has been approached for potential filming in spring 2021 for Landward. - The project will potentially feature on an episode of FAS TV (Farm Advisory Service's new online TV channel).

Press Engagement

Source	Title
The Scotsman	Ethical Farming in Scotland Gets Finance Boost to Keep Calves and Cows Together
Scottish Government	Supporting Innovation in Farming
Press and Journal	Study into Cow-With-Calf Innovative Dairy System
European Commission	Keeping Cow with Calf: Bringing Innovation to Dairying in Scotland
Innovative Farmers	Funding for Cow with Calf RISS Project
Grampian Online	Fund Supports Investment in Farming
The World News	Ethical Farming in Scotland Gets Finance Boost to Keep Calves and Cows Together
SRUC	SRUC Projects Receive Innovation Funding
CIEL Livestock	SRUC Projects Receive Innovation Funding
MRCVS Online	Survey Seeks Views on Keeping Cows with Calves
Vet Times	Survey to Look at Cow-With-Calf Concept
Farming UK	Survey Probes Farmers' Attitudes to Cow-With-Calf System
SRUC	Keeping Cows with Calves

Farm Business	Wanted: Dairy Farmers View's on Cow-With-Calf Production System
James Hutton Institute	Wanted: Dairy Farmers View's on Cow-With-Calf Production System
The Scottish Farmer	Dairy Farmers Views Sought on Cow-With-Calf Systems
Food and Farming Futures	Wanted: Dairy Farmers' Views on Cow-With-Calf Production System
D&G What's Going On	SRUC Launch 'Keeping Cows with Calves' Survey for Dairy Farmers

8.2 FAS Engagement (if applicable):

FAS has created a new initiative, due to be launched this year, entitled FAS TV. This initiative features an online TV programme, focussing on different topics throughout the year and intended to be informative and interesting for farmers. The Cow-with-Calf project was not chosen for the first round of FAS TV filming, however FAS have indicated that they may include this subject in the next round.

8.3 EIP-AGRI Engagement (if applicable) Not applicable to this subject.

9. KEY FINDINGS & RECOMMENDATIONS

- The project showed that there was a keen interest from the farming community and the public around the idea of cow-with-calf farming systems. However, it also highlighted the depth of negative feeling toward the cow-with-calf system from farmers using the current early calf separation system and showed that alternative systems, such as cow-with-calf need to be presented carefully to avoid undermining public confidence in Scottish and UK dairy farming

- The project highlighted that more in-depth on-farm data collection is needed to allow full interpretation of the effects of the cow with calf system on all aspects of the farm

- Farmers starting with a cow-with-calf system face challenges of lack of information available on management and housing. There are economic challenges associated with lower levels of saleable milk and the need to find a market for the milk and fattened calves

- The benefits of the system were perceived to be the labour saving due to once-a-day milking and no need to feed calves. Staff morale can be high in this system due to reduced time pressure and where there is buy-in to this system

- There can be a good relationship with consumers who may be willing to pay high prices. Human-animal interactions can be very good when cows become accustomed to the system

- A carbon foot-printing tool which is suitable for use with cow-with-calf systems needs to be developed. Current tools, such as AgReCalc, cannot model the system accurately due to the variations in inputs in comparison to a conventional dairy or beef system

- The prospectus created, using data collected from the study farm and data collected from other farmers in the UK carrying out a cow-with-calf system, highlights some of

the key advantages and challenges for someone switching to this system. It focuses on the issues brought up as key for new entrants following discussions with farmers already running the system – economics, changes to existing infrastructure, animal health and welfare and more

- A milk price of at least 36ppL, ideally closer to 40-45ppL, and sale of beef calves at premium prices, is needed to allow cow-with-calf to be considered as profitable as a conventional organic system, allowing for losses in milk volume from calf suckling, and considering additional income streams from calves

- Cow udder health is generally good in cow-with-calf systems, with low somatic cell counts and rates of mastitis. The results suggest that antibiotic use is low on this farm

- Calf health can be an issue. Good housing, care and management and use of vaccines and other appropriate treatments are required. However, calf growth rates can be very good. Keeping calves with cows is seen as a key element of positive welfare

- Currently, farmers with cow-with-calf system in Scotland are creating their own brands, using the attractive narrative around the system. They are using direct selling methods, such as using vending machines or doorstep deliveries, or on-line sales of product such as cheese. In the future, if there is increased demand, supply will grow and the milk processors can be involved.

10. CONCLUSION

The project was successful, meeting the milestones set out and resulting in the creation of a prospectus for cow-with-calf systems in Scotland. Despite initial negative feedback around the project, the engagement throughout was high, with high numbers of people visiting the website and interacting directly with the project. The project outputs were well received at the Northern Real Farming Conference and by internal consultancy colleagues.

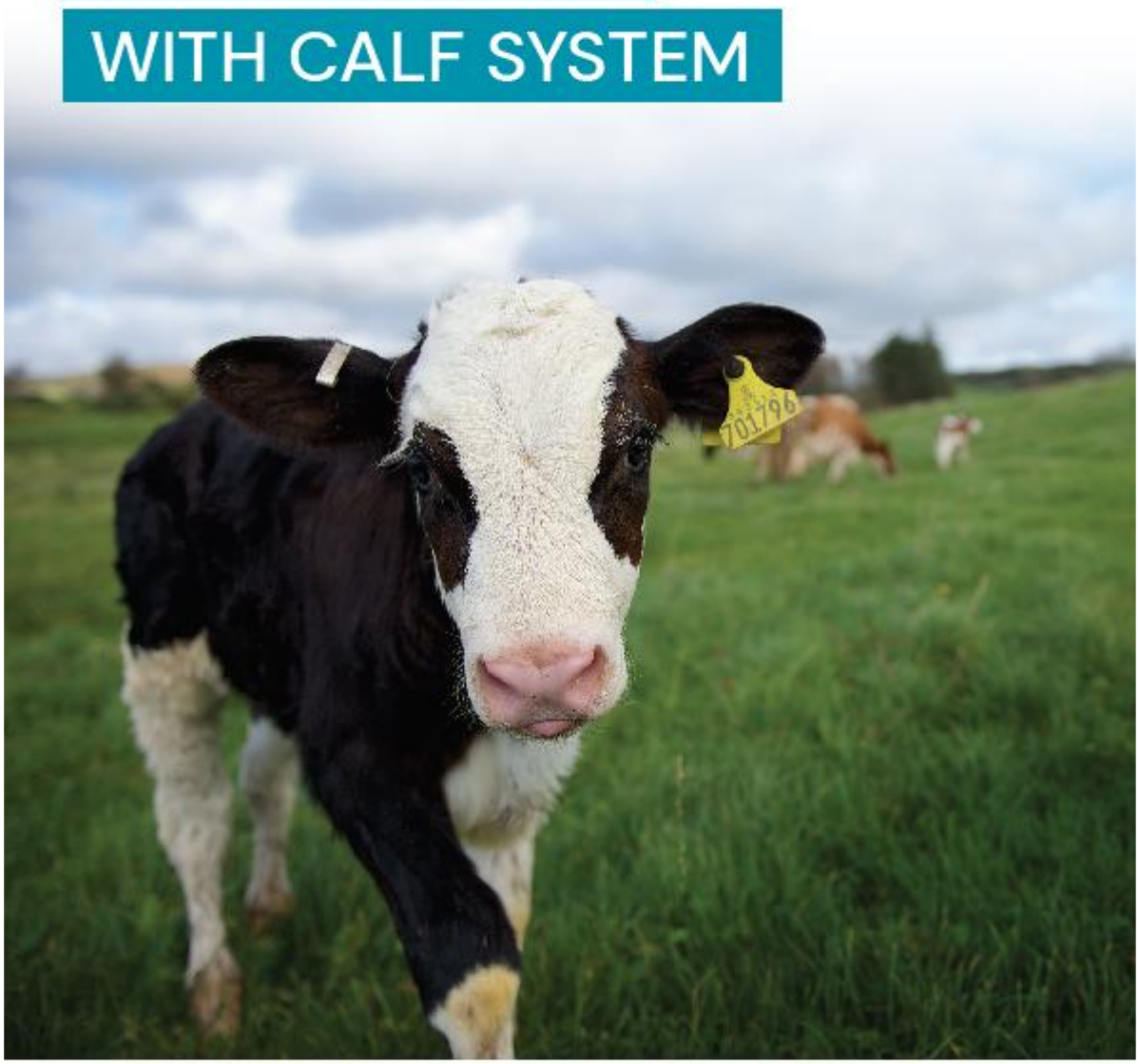
Although the project highlighted issues with data collection on farm, the data which was collected was used to create a clear picture of the positives and challenges of running a cow-with-calf dairying system. The high levels of engagement with the website and on social media are expected to ensure that the prospectus created reaches the largest number of people possible.

Overall, the project has shown that the cow-with-calf system is a viable dairying option. Alterations may be necessary to the housing to accommodate the calves in the cow group. Calf health must be managed carefully, but cow udder health in particularly, is good. Positive animal welfare is promoted by this system. A premium for the products must be achieved for the milk and beef sales to achieve profitability, but experience from the farmers running this system suggest that consumers are prepared to pay high prices for products from this system

11. ANNEXES

Annex 1. Propectus (embedded below)

A PROSPECTUS FOR A SCOTTISH COW WITH CALF SYSTEM



The Ethical Dairy (Finlay Farms), Scotland's Rural College, FAI Farms, James Hutton Institute, University of Glasgow, Nourish Scotland, NFUS, Soil Association Scotland, University of Newcastle, University of Edinburgh.

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