# Annual Project Report 2014

# Maximising forage and grassland utilisation through, out wintering in-lamb ewes on swedes

**Summary sheet** (up to two pages)

| | | | |
|---|---|---|---|
| **Project number** | 73205 | | |
| **Start date** | 31/10/2012 | **End date** | 31/01/2015 |

## Project aim and objectives

To demonstrate the practicalities and financial aspects of an outdoor ewe feeding system based on swedes and grass compared to a conventional indoor lambing system with creep feeding on the same farm.

## Key messages emerging from the project

- A crop such as swedes provides a cost-effective alternative to housing sheep, providing that the crop is grown well on relatively free draining ground
- The swede crop will maintain, if not slightly increase, the body condition score of ewes during pregnancy provided that the weather is not too extreme
- The mixture of swedes in mid-pregnancy and grass in the last three to four weeks of pregnancy provides adequate nutrition to the in-lamb ewe provided that lambing is timed to coincide with reliable grass growth
- The forage based system does not seem to have any adverse effects on animal health
- Careful management of worm burdens and grass quality is required to maintain higher growth rates than those seen in the project. Once the quality of the grazed grass was lost during the spring it was impossible to regain. This had a knock on effect in that more lambs were left on the farm at the following tupping time
- Costs of the system are relatively low when compared to a more intensive inside lambing system. This means the number of lambs reared can be substantially lower with the system still providing a profit
- Increasing the scanning percentage and the rearing percentage of the breeding ewes will continue to improve the profitability of the system. Aiming for targets of 140%-150% lambs reared should be possible with a more prolific ewe or through flushing the ewes with supplements during the late autumn

## Summary of results

**Animal performance:** Ewes in the conventional flock were slightly heavier and fitter at tupping and maintained a higher body condition score throughout pregnancy (by 0.2 - 0.4 condition score). These ewes also had a higher scanning % than the outdoor flock and their lambs tended to be heavier at birth.

Ewes in the out-wintered flock were condition scored at 8 weeks post-lambing and at this time average BCS had fallen to a mean of 2.2, a whole score below that at tupping and three-quarters of a score below that in late pregnancy. By weaning these ewes had improved in condition to mean score of 2.6 (similar to the conventional flock).

The conventional lambs were 0.28kg heavier at birth than those from the outside lambing flock. This

difference carried through to weaning with the conventional lambs showing a weaning weight of 31.6 kg compared with 26.3 kg for the out-wintered flock. 48 (22%) of the conventional lambs were sold pre-weaning and a further 155 (70%) before the 21 week weight. In contrast none of the lambs from the outside lambing flock had been sold by weaning although, 10 had been sold by 21 weeks. Growth rate of the outside flock's lambs declined significantly after weaning. It was thought that this was due to a large worm burden as the lambs were being intensively grazed. Being a very dry summer there was no issue with faecal egg counts until three weeks prior to the 21 week weights. Prior to this it rained and egg counts increased rapidly form 250 eggs per gram to 3,000 extremely quickly. Resistance to some of the older classes of wormer is a problem on the farm so Monepantel was used on veterinary advice. However three weeks after worming with Monepantel lambs were found to have a very high egg count. At this point they were wormed with a product containing Derquantel and Abamectin and moved to clean pasture. This hit the growth rate of the lambs very badly and delayed sales until November.

The scanning percentage for the inside lambing ewes was much higher than the outside lambing ewes at 178% compared to 160%. The inside lambing ewes reared 155% with losses of 13% from scanning to sale, while the outside lambing ewes had losses of 15% which equated to a lambs reared figure of 135%.

During the lambing period the inside lambing ewes had fewer prolapses compared to the outside lambing ewes at 1.41% compared to 2.63%, although both were at a manageable level. The death rate of the inside lambing ewes was slightly higher which could be attributed to older ewes on average and the fact that there were more twin and triplet ewes.

The inside lambing ewes received a total of 27kg of an 18% concentrate which was fed from 3 weeks pre lambing up to the 5$^{th}$ of April where grass covers reached 1500-1600 kg DM/ha. At this stage the lambs were started on creep feed and were fed ad lib through the season, with lambs consuming a total of 17.5kg on average.

Fertiliser use was heavier for the inside lambers with 125kg/ha of urea being spread in late winter (February) and a further 250 kg/ha of 25:10:0 in late April, due to the need to move sheep off silage ground and increase the stocking rate on some grazing fields until the silage crop was harvested.

| | |
|---|---|
| **Lead partner** | ADAS UK Ltd |
| **Scientific partners** | |
| **Industry partners** | |
| **Government sponsor** | |

| **Has your project featured in any of the following in the last year?** | |
|---|---|
| ***Events*** | ***Press articles*** |
| | |
| ***Conference presentations, papers or posters*** | ***Scientific papers*** |
| Presentation at EBLEX ewe nutrition workshop – Improving ewe efficiency through better feeding - 2014 BSAS conference held 29 April in Nottingham | |
| ***Other*** | |
| | |

# Annual Project Report 2014

## Full Report

**Q1: Financial reporting –**

| | Yes | No | N/a |
|---|---|---|---|
| Was the project expenditure in line with the agreed budget? | Yes | | |
| Was the agreed split of the project budget between activities appropriate? | Yes | | |
| **If you answered no to any of the questions above please provide further details:** | | | |

**Q2: Milestones – were the agreed milestones completed on time**?

| **Project milestones** | **Proposed completion date** | **Actual completion date** |
|---|---|---|
| Project inception meeting | October 2013 | Oct 2013 |
| Weigh and body condition score ewes on conventional system | October 2013 | 10 Oct 2013 |
| Weigh and body condition score ewes on swede system | November 2013 | 8 Nov 2013 |
| Body condition score ewes and allocate to groups and put on swedes | December 2013 | 24 Dec 2013 |
| Ewes moved onto grass | March 2014 | 4 or 18 Mar 2014 |
| Lambing – EID and weigh lambs | March 2014 | From 28 Feb 2014 |
| Lambing – EID and weigh lambs | April 2014 | From 29 Mar 2014 |
| Lamb weighing (4 occasions) | June, July, August, September 2014 | 18 Jun, 9 Jul, 25 Jul and pre-sale. |
| Final report | 31 January 2015 | 27 February 2015 |
| **If any of the milestones above are incomplete/delayed, please provide further details:** Final report delayed to allow inclusion of pregnancy scanning data for the 2015 lambing season and results of a HCC wormer resistance study. | | |

# Annual Project Report 2014

**Q3: Results – what did the work find?**

## Background

For several years farmers in New Zealand have been utilising forage swedes to out winter in-lamb ewes. This policy has allowed them to reduce fixed costs as there is no requirement for winter housing but more importantly it has allowed them to maintain a high stocking rate in the winter period without using concentrates.

New Zealand farmers have used the swede crop to rest grass in early spring before putting in-lamb ewes out on to this pasture 3-4 weeks pre-lambing where grass covers are around 1,500 kg DM/ha and grass growth is good.

This system fully utilises two of the cheapest feeds available to sheep farmers at a time of year when feed costs are normally high, with swedes costing £62/tonne and grass/clover costing £72/tonne utilised dry matter (Forage Choice Costs & Rotation Report, Kingshay; April 2010).

Although there has been much research carried out in New Zealand, very little has been undertaken in the UK in recent years to assess how climatic differences might affect the system in the UK. There has also been very little research done on the nutritional requirements of sheep as they move off the swedes and onto grass in the spring period. Many farms in the UK are now using brassica crops and swedes as a way to maximise returns from their sheep enterprise while maintaining a low labour, outside lambing system. However recommendations are very vague for such enterprises and very few costings have been made in comparison to standard housed sheep systems.

# Objective

To demonstrate the practicalities and financial aspects of an outdoor ewe feeding system based on swedes and grass compared to a conventional indoor lambing system with creep feeding on the same farm.

# Flock management

The flock management and performance of the two systems is outlined separately below.

## Out-wintered Lleyn flock:

A total of 266 mixed aged performance recorded Lleyn ewes were monitored for the study out of a flock of 400 breeding ewes.

All of the Lleyn ewes were given a selenium, cobalt and iodine bolus and were treated for fluke prior to mating from 5 November. The rams were removed on the 12 December. The sheep were moved onto the swedes on 24 December where they were strip grazed until March. During this time they received a second bolus and also a booster clostridial vaccine.

Ewes scanned as carrying twins were moved to grass from the swedes on 4 March where they were set stocked at 12.5 ewes/hectare at a grass cover of 1,700 kg DM/hectare. The fields were monitored weekly to maintain grass covers at this level. The single bearing ewes were moved onto grass on 18 March and were then stocked at 37 ewes/hectare at grass covers of 1,200 kg DM/hectare. Again covers were monitored with the ewes being tightened to 50 ewes/hectare because some ewes started to have lambing difficulties due to over-sized lambs.

Ewes lambed outside from 29 March 2014 and were not fed any additional supplements over the lambing period. Lambs were weighed and EID tagged shortly after birth and rubber rings were applied to their tails, male lambs were left entire. The lambs received no creep feed.

After completion of lambing (26 April) the ewes and lambs were moved to steeper ground where grass covers had been built up for rotational grazing. Unfortunately due to the good growing conditions of spring 2014 the covers reached 2,900 kg DM/ha and this meant that the sheep were unable to hit residuals of 1,500 kg DM/ha. This reduced both the quality of the grass and the regrowth which resulted in reduced lamb growth rates to 8 weeks of age (live weights were 2 kg lighter compared to 2013). Over this period a total of 400 ewes and their lambs were rotated around five, 3.2 hectare paddocks with a rotation length of 20 days. During this period 150 bulling heifers were brought into the rotation to try and regain the residuals of the grazing fields due to the exceptional growing conditions.

The lambs were weaned on 25 July, and were moved to 8 hectares of grass reseeds where up to 600 lambs were rotationally grazed on five 1.6 ha paddocks up until weighing at 21 weeks of age. Covers of 2,500 kg DM/ha were targeted for lambs to enter paddocks with residuals of 1,500 kg DM/ha.

At the 21 week weighing lambs were split into ewe lambs and tup lambs with the majority of ewe lambs being weighed for selection for breeding replacements with the remaining lambs continuing to be finished on grass until going onto root crops in December.

## Animal and forage assessments

Ewes were weighed at the start of the study (tupping) and at weaning. Their body condition was assessed regularly throughout pregnancy including: at the start (tupping), December (moving to swedes), February (on swedes) and early March (moving off swedes). Lambs were weighed at birth, eight weeks of age, weaning and 21 weeks.

Blood samples were taken for metabolic profiles from eight ewes (five twin-bearing and three single-bearing ewes) on 4 and 18 March corresponding to 4 and 2 weeks pre-lambing. Samples were analysed for BHB (β-hydroxybutyrate) (to assess energy status) and urea and albumin (to assess protein status).

Ewe condition score data for the flock are shown graphically below.

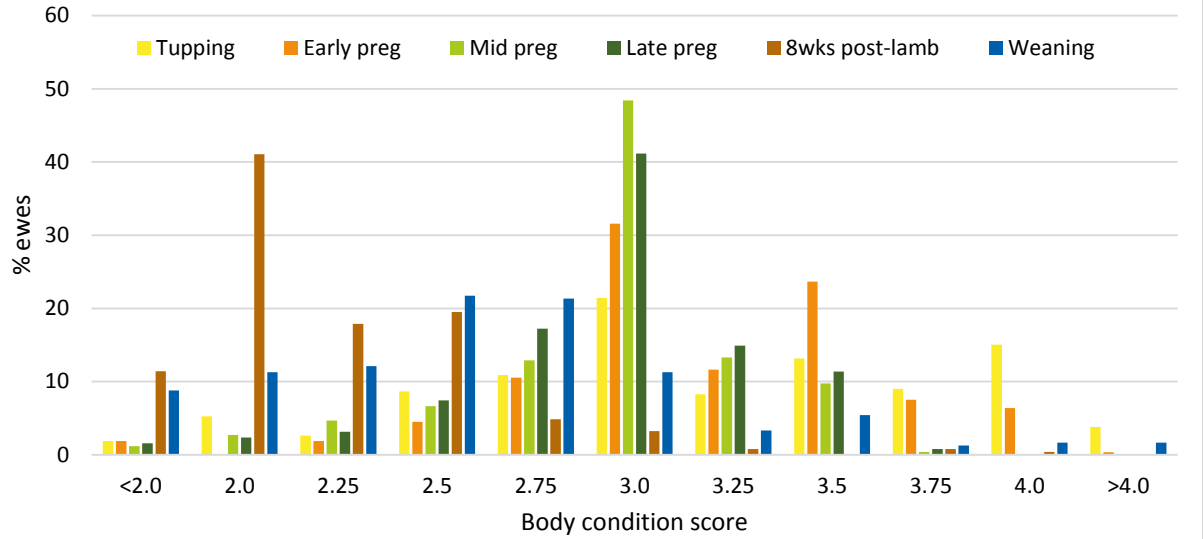


**Figure 1. Distribution of ewe body condition scores – ewes out-wintered on swedes**

*Blood sampling*

Blood samples were taken at approximately four and two weeks pre-lambing and the individual results are shown in Table 1.

At four weeks pre-lambing all ewes were within the reference range for albumin whilst two were below the reference range for urea. In addition one twin-bearing ewe had elevated BHB at four weeks pre-lambing. After moving to grass the BHB level for this ewe two weeks later was found to be within the normal range as were all the others. The move to high quality spring grass for the twin-bearing ewes in early March is reflected in the high urea levels seen two weeks pre-lambing. In contrast urea levels were on average below the reference range for single-bearing ewes that remained on the swedes. In addition albumin levels for two ewes were slightly below the reference range two weeks pre-lambing.

**Table 1 Metabolic profile results for out-wintered ewes**

| | | 4 weeks pre-lambing | | | 2 weeks pre-lambing | | |
|---|---|---|---|---|---|---|---|
| Ewe No | Lambs Scanned | Albumin g/l Range 24-34 | BHB mmol/l Range 0-1.2 | Urea mmol/l Range 2.6-6.6 | Albumin g/l Range 24-34 | BHB mmol/l Range 0-1.2 | Urea mmol/l Range 2.6-6.6 |
| 2182 | 1 | 30 | 0.48 | 3.23 | 30.2 | 0.45 | 2.20 |
| 2399 | 1 | 28.2 | 0.19 | 4.36 | 27.2 | 0.25 | 2.90 |
| 6222 | 1 | 28.1 | 0.33 | 2.27 | 21.3 | 0.19 | 1.28 |
| ***Mean singles*** | | ***28.77*** | ***0.33*** | ***3.29*** | ***26.23*** | ***0.30*** | ***2.13*** |
| 121 | 2 | 27.8 | 1.56 | 4.36 | 25.8 | 0.84 | 7.52 |
| 2230 | 2 | 27.9 | 0.35 | 3.32 | 18.6 | 0.38 | 7.43 |
| 2236 | 2 | 28.8 | 0.45 | 3.06 | 26.8 | 0.69 | 10.42 |
| 2350 | 2 | 28.5 | 0.53 | 2.39 | 25.9 | 0.40 | 9.17 |
| 6260 | 2 | 28.9 | 0.48 | 3.46 | 29.3 | 0.53 | 9.74 |
| ***Mean twins*** | | ***28.38*** | ***0.67*** | ***3.32*** | ***25.28*** | ***0.57*** | ***8.86*** |
| ***Mean all ewes*** | | ***28.53*** | ***0.55*** | ***3.31*** | ***25.64*** | ***0.47*** | ***6.33*** |

## Growing the swede crop

The swedes were direct drilled into sprayed off permanent pasture on 30 May 2013. Table 2 below shows the cost per hectare to grow the crop, indicating a figure of £669.57/ha. This includes all contracting costs, a rental figure and a cost for lime (to increase the soil pH to the recommended pH 6.0). The swedes received an application of 60 kg/ha of a 16:16:16 fertiliser and also received slug pellets at drilling. The seed rate for drilling was 0.7 kg/ha. After the initial drilling and fertiliser spreading no further inputs were applied to the crop.

**Table 2 Swedes growing costs (£/ha)**

| | **Cost per Hectare (£)** |
|---|---|
| Direct drill & slug pellets | 60.12 |
| Swede seed | 83.03 |
| Fertiliser | 118.61 |
| Lime | 119.60 |
| Spray cost | 19.87 |
| Spraying | 9.88 |
| Fertiliser spreading | 10.38 |
| Rent | 247.10 |
| **Total** | **669.57** |

On 20 December the crop dry matter yield was estimated before the ewes started grazing and a sample was taken for analysis. This results are shown in Table 3 and Table 4. The dry matter yield of the crop was estimated to be 10,321 kg/ha, based on the initial 10.3% dry matter content. This gave an estimated cost of 6.49 p/kg DM produced. The farm also received an environmental payment of £334/ha for growing the crop which has not been included in the above costings.

**Table 3. Dry matter yield of swede crop**

| | Fresh Weight Per Square Metre (kg) | Dry Matter% | Dry Matter Yield (kg/ha) |
|---|---|---|---|
| Plot 1 | 7.6 | | |
| Plot 2 | 11.8 | | |
| Plot 3 | 10 | | |
| Plot 4 | 9.9 | | |
| Plot 5 | 10.8 | | |
| **Average** | **10.02** | **10.3%** | **10,320** |

Table 4 below shows the nutritional analysis of the swedes for three dates throughout the grazing period. Throughout this period it is clear that the nutritional value of the crop did not deteriorate. However the dry matter of the crop was slightly lower than expected, this was particularly evident in early February, however this could be associated with the particularly wet winter and the large amount of rainfall during January and February.

**Table 4 Swede analysis**

| | 20/12/2013 | 11/02/2014 | 18/03/2014 |
|---|---|---|---|
| Dry matter (%) * | 10.3 | 7.8 | 11.1 |
| Crude protein (%) | 21.4 | 10.3 | 10.8 |
| Ash (%) | 11.7 | 9.0 | 7.2 |
| Total oil (%) * | <0.3 | <0.3 | <0.3 |
| Sugar as sucrose (%) | 23.0 | 30.3 | 39.1 |
| NCGD (%) | 82.1 | 89.5 | 90.8 |

- Results are reported on a dry matter basis except where marked *

**Grass quality**

Table 5 below shows the grass analysis over the season until weaning. As can be seen the quality of the grass is maintained consistently above 10.7 ME throughout the season with crude protein levels ranging from 18.5 to 22%.

**Table 5. Grass Analysis Results (2014 season)**

| | 18 Mar | 5 Apr | 20 Apr | 6 May | 22 May | 17 Jun | 14 Jul |
|---|---|---|---|---|---|---|---|
| DM (%) | 22.1 | 20.1 | 21.0 | 18.0 | 20.6 | 16.0 | 16.6 |
| Crude Protein (%) | 20.7 | 22.0 | 20.0 | 18.5 | 25.7 | 19.0 | 24.9 |
| D Value | 69 | 70 | 71 | 69 | 72 | 71 | 68 |
| ME (MJ/kg DM) | 10.8 | 11.1 | 11.2 | 10.8 | 11.3 | 11.1 | 10.7 |

## Conventional indoor lambing Texel x ewes

Approximately 140 Texel x ewes (with EID tags) from a total flock of 430 ewes were monitored for the study. The ewes went to the ram on 5 October and also received a trace element bolus before tupping. Ewes were pregnancy scanned on 9 January with twin and triplet ewes being housed immediately and single ewes housed on 29 January.

The sheep were maintained on a conventional system with silage and concentrate supplementation. After lambing the ewes were moved to mothering pens for 24 hours before being moved to a group pen for a further 24 hours. All ewes with triplets had one lamb cross fostered to a single-rearing ewe. The ewe and her lambs were then put out to grass at 7.5 ewes/hectare for twins and 8.75 ewes/hectare for singles. The ewes received concentrates until 5 April when grass covers reached 1500-1600 kg DM and supplementary feed was withdrawn. Creep feed was offered to lambs *ad-lib* from two weeks of age. The sheep continued to be set stocked at these rates until 25 April when the sheep were moved from the silage ground to the steeper parts of the farm. As grass growth had increased, stocking rates were tripled during this late spring period when grass growth was at its maximum. All lambs continued to have *ad lib* creep feed while sheep were maintained at covers of 1,600 kg DM/ha. The first lambs were sold in late May and continued to be sold straight off their mothers until weaning. At weaning lambs were rotationally grazed on silage aftermaths with 15-20 days on each field. Covers of 2,400 kg DM/ha were targeted with residuals of 1,800 kg DM/ha. Post-weaning, lambs continued to be creep fed until sale.

*Animal assessments*

Ewes were weighed at the start of the study (tupping) and at weaning. Their body condition was assessed regularly throughout the study including: the start (tupping), December (mid-pregnancy), February (late pregnancy) and at weaning. Ewe condition score data for the flock are shown graphically below.

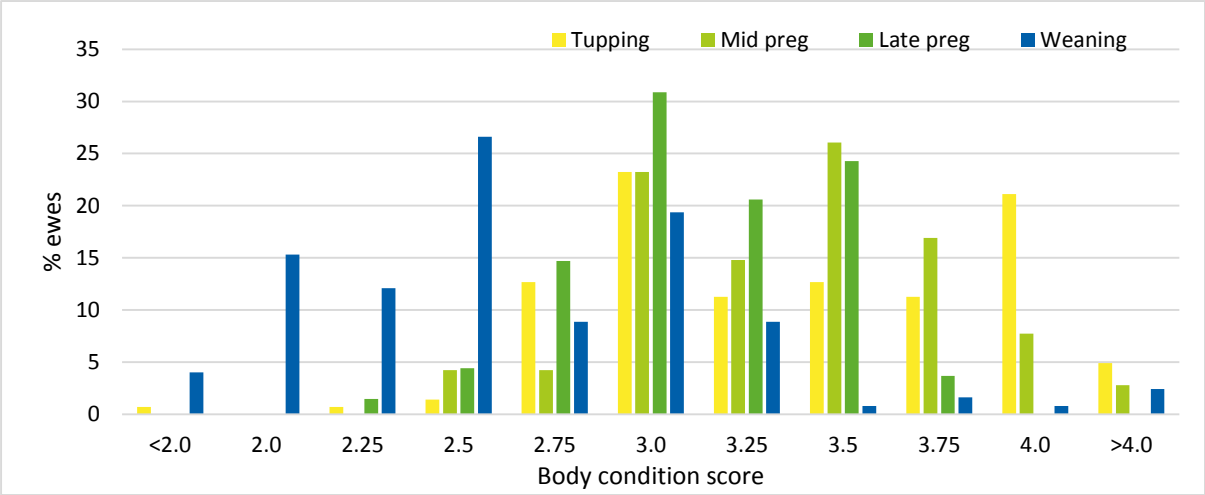


**Figure 2. Distribution of ewe body condition scores - conventional spring lambing flock**

Lambing started on 28 February 2014. Lambs were weighed and EID tagged shortly after birth and tailed using the rubber ring method. Lambs were weighed at birth and at weaning.

# Performance of the two systems

*Animal performance*

Ewes in the conventional flock were slightly heavier and fitter at the start (tupping) and maintained a higher body condition score throughout pregnancy (by 0.2 -0.4 condition score). These ewes also had a higher scanning % than the outdoor flock and their lambs tended to be heavier at birth (see Table 6).

Ewes in the out-wintered flock were condition scored at 8 weeks post-lambing and at this time average BCS had fallen to a mean of 2.2, a whole score below that at tupping and three-quarters of a score below that in late pregnancy. By weaning these ewes had improved in condition to mean score of 2.6 (similar to the conventional flock).

**Table 6. Summary of flock performance**

| | Out-wintered Lleyn flock | | | Conventional Texel x flock | | |
|---|---|---|---|---|---|---|
| | Date | Mean | Range | Date | Mean | Range |
| *Ewe live weight* | | | | | | |
| Start wt (kg) | 8 Nov | 58.6 | 42 – 80 | 10 Oct | 62.8 | 42 - 79 |
| Weaning wt (kg) | 25 Jul | 53.6 | 40 – 80.5 | 9 Jul | 61.4 | 39 - 81 |
| *Body condition* | | | | | | |
| Start | 8 Nov | 3.19 | 1.5 – 4.5 | 10 Oct | 3.40 | 1.5 – 4.5 |
| Early preg | 30 Dec | 3.19 | 1.75 – 4.25 | Not assessed | | |
| Mid preg | 12 Feb | 2.94 | 1.75 – 3.75 | 30 Dec | 3.38 | 2.5 – 4.5 |
| Late preg | 13 Mar | 2.95 | 1.5 – 3.75 | 12 Feb | 3.13 | 2.25 – 3.75 |
| 8 wks post-lamb | 18 Jun | 2.20 | 1.25 – 4.0 | | | |
| Weaning | 25 Jul | 2.60 | 1.25 – 4.5 | 9 Jul | 2.62 | 1.5 – 4.5 |
| *Lambing data* | | | | | | |
| Scanning % | | 160 % | | | 179 % | |
| Lambing date | | 10 Apr | 29/03 – 5/05 | | 17 Mar | 28/02 – 20/04 |
| Birth wt (kg) (mean all lambs) | | 4.76 | 2.6 – 7.2 | | 5.04 | 2.7 - 7.2 |
| Single (kg) | | 5.45 | | | 5.63 | |
| Twin (kg) | | 4.64 | | | 5.00 | |
| Triplet (kg) | | 3.93 | | | 4.58 | |

*Lamb Performance*

Lamb performance is shown in Table 7 below. The conventional lambs were 0.28kg heavier at birth than those from the outside lambing flock. This difference carried through to weaning with the conventional lambs showing a weaning weight of 31.6 kg compared with 26.3 kg for the out-wintered flock. 48 (22%) of the conventional lambs were sold pre-weaning and a further 155 (70%) before the 21 week weight. In contrast none of the lambs from the outside lambing flock had been sold by weaning although, 10 had been sold by 21 weeks. Growth rate of the outside flock's lambs declined significantly after weaning. It was thought that this was due to a large worm burden as the lambs were being intensively grazed. Being a very dry summer there was no issue with faecal egg counts until three weeks prior to the 21 week weights. Prior to this it rained and egg counts increased rapidly form 250 eggs per gram to 3,000 extremely quickly. Resistance to some of the older classes of wormer is a problem on the farm so

Monepantel was used on veterinary advice. However three weeks after worming with Monepantel lambs were found to have a very high egg count. At this point they were wormed with a dual product containing Derquantel and Abamectin and moved to clean pasture. This hit the growth rate of the lambs very badly and delayed sales until November.

**Table 7. Summary of Lamb Weights and Performance**

| | Birth Weight (kg) | 8 Week Weight | Weaning Weight | 21 Week Weight |
|---|---|---|---|---|
| Conventional | 5.04 | | 31.64 | |
| Gain | | | 0.24 | |
| Out Wintered | 4.76 | 20.65 | 26.34 | 31.85 |
| Gain | | 0.23 | 0.15 | 0.11 |

## Physical Performance – comparison of the two flocks

Table 8 shows the physical performance for the two flocks. The scanning percentage for the inside lambing ewes was much higher than the outside lambing ewes at 178% compared to 160%. The inside lambing ewes reared 155% which indicated losses of 13% from scanning to sale, while the outside lambing ewes had losses of 15% which equated to a lambs reared figure of 135%.

During the lambing period the inside lambing ewes also had fewer prolapses compared to the outside lambing ewes at 1.41% compared to 2.63%, although both were at a manageable level. The death rate of the inside lambing ewes was slightly higher which could be attributed to older ewes on average and the fact that there were more twin and triplet ewes.

In terms of feed rate the inside lambing ewes received a total of 27kg of an 18% concentrate which was fed from three weeks pre lambing up to the 5$^{th}$ of April where grass covers reached 1500 – 1600 kg DM/ha. At this stage the lambs were started on creep feed and were fed ad libitum through the season, with lambs consuming a total of 17.5kg on average.

Fertiliser use was heavier for the inside lambers with 125kg/ha of urea being spread in the late winter (February) and a further 250 kg/ha of 25:10:0 being spread in late April, due to the need to move the sheep off silage ground and to increase the stocking rate on some grazing ground until the silage crop was harvested.

**Table 8 – Physical Parameters of the Two Flocks**

| | In wintered | | Out wintered | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Scanning % | 253 | 178 | 425 | 160 |
| Lambs Reared | 220 | 155 | 360 | 135 |
| Lamb Losses – scanning to rearing | 33 | 13 | 65 | 15 |
| Prolapse % | 2 | 1.41 | 7 | 2.63 |
| Deaths | 6 | 4.20 | 5 | 1.90 |
| | | | | |
| Yearlings Purchased | 38 | 27 | | |
| Ewe Lambs Retained | | | 55 | 21 |
| Sheep Concentrates kg @ £251/tonne | 27 | | | |
| Lamb Concentrates kg @ £257/tonne | 17.5 | | | |
| Ewe to Ram Ratio | 50:1 | | 90:1 | |
| | | | | |
| Fertiliser Use | 125 kg/ha urea | | 125 kg/ha urea | |
| | 250 kg/ha 25:10:0 | | | |
| Lamb Carcass Weight | 18.8 kg | | 19.5 kg * | |
| Average Lamb Price | £73.05 | | £74.10* | |

* based on the total number of finished lambs sold in total. The costings in Appendix 1 however have assumed a store price for lambs sold outside of the costings 12 month period.

# Costings of the sheep enterprises

The financial performance of the two sheep enterprises is summarised below – for full details please see Appendices 1 & 2.

**Output**

Total output from the outside lambing flock came to £94.28/ewe compared to £89.58/ewe for the inside lambing flock. The overall output from the outside lambing flock was slightly higher due to the retention of ewe lambs as breeding replacements compared to purchasing yearling ewes for the conventional flock. This meant the replacement rate of the outdoor flock was reduced to 21% compared to 28% for the inside lambing flock and replacement costs of £80 for ewe lambs vs. £140 for yearling ewe replacements. If the outside lambing system changed its replacement policy to one which purchased yearling ewes total replacement costs would be increased by £17.67 per ewe. This combined with slightly lower costs due to a higher stocking rate would leave a margin per ewe of £22.76 or £227.67 per ha.

Lamb output from the inside lambing flock however was considerably higher due to a higher number of lambs reared and also a higher proportion being sold within the year (82% compared to 42.5%). Any lambs still on farm at the following mating season have been valued as stores at £60/head. The lamb output for the outside flock includes the sale of 35 lambs (£60/head) from the 55 retained ewe lambs that were put to the ram.

Output per hectare however was slightly lower for the outside lambing flock (£886/ha) due to a reduced

stocking rate of 9.4 ewes/ha compared to 12.2 ewes/ha for the inside lambing flock (£1,092/ha). This is partly due to the extra feed requirement of retaining ewe lambs but also due to the need to take an extra field out to grow the swede crop.

**Variable Costs**

Total variable costs for the outside lambing ewes amounted to £23.32/ewe, this was around a third lower than the inside lambing flock which was £33.65/ewe. The biggest difference was the feed costs which amounted to £13.74/ewe compared to £1.29/ewe. This was due to the outside lambing flock just receiving mineral boluses and the inside lambing flock receiving 27 kg per ewe of sheep concentrates and 17.5 kg of creep per lamb. Other variable costs were fairly similar apart from Vet & Med costs which were slightly higher for the outside lambing flock due to the extra costs associated with retaining ewe lambs.

**Forage Costs and Forage Contracting Costs**

Total costs for the forage and forage contracting costs amounted to £16.38/ewe for the outside lambing flock and £27.95/ewe for the inside lambing flock. The main reduction in costs was associated with the establishment of the swede crop compared to producing silage for the inside lambing flock. These costs totalled £4.70/ewe for the outside lambing flock and £12.15/ewe for the inside lambing flock. The reduction was mostly due to the swede crop requiring a much smaller area to obtain a similar dry matter yield.

Fertiliser costs were also greater for the inside lambing flock as fertiliser was applied earlier (mid-February as urea) to get early growth as the ewes would require higher intakes at an earlier time of the year but also due to silage fields being shut up. Stocking rate had to be increased dramatically on other grazing ground, therefore another application of fertiliser was required unlike the outside lambing flock.

**Fixed Costs**

The fixed costs of the outside lambing system are again reduced when compared to the inside lambing flock at £14.81/ewe compared to £22.21/ewe. This is due to the outside flock having a much reduced need for power and machinery as the system is reliant on contractors with the most used machine being the quad bike. The opposite is the case for the inside lambing system which is reliant on a tractor and a feeder wagon/straw chopper to feed the sheep during the winter period. Costs on machinery were £6.25/ewe compared to £9.27/ewe.

There is also more reliance on general costs for the inside intensive system as there are many more insurances and other general costs. Costs for the inside lambing flock came to £8.72/ewe compared to £4.55/ewe for the outside flock.

**Total Costs & Profitability**

The total costs for the outside lambing system amount to £54.80 per ewe or £512 per hectare compared to £83.70 per ewe and £1,020 per hectare. On a per hectare basis costs for the inside flock are nearly double the outside lambing costs.

Overall profitability for the outside lambing flock stands at £39.79 per ewe or £374 per hectare while the inside lambing flock stands at £5.88 per ewe or £72 per hectare.

Although the outside lambing flock did have a lower output than the inside lambing flock it is clear the costs of production of the system are far lower than the inside lambing system. This allowed the

enterprise enough money to cover both finance and rent, while the inside lambing system would struggle to cover these extra costs. In addition unpaid labour costs for the out wintered flock were lower than for the inside system, largely as a result of reduced labour requirement over the winter period and through lambing (approximately 20% and 30% of the inside flock labour respectively). Over the whole year comparing two flocks of 500 ewes on each system (requiring 0.4 of a full time labour unit in total) it was estimated that 58% of the labour requirement would be allocated to the inside lambing flock and 42% to the outside lambing system.

## Changes to management of the outdoor flock for 2015 lambing season

The outside lambing flock has in recent years consistently achieved below target scanning percentages (160%). Body condition score targets for the flock were being achieved at tupping time and ewes were flushed through the use of rotational grazing from three weeks prior to tupping through to the end of tupping.

There are several factors which can contribute to reduced fertility levels after all animal husbandry has been optimised. This includes a slightly lower scanning percentage due to the later lambing season, a reduction in energy intakes due to the lower dry matter of grass during November and finally the use of genetics with lower EBVs for litter size.

Therefore as the timing of lambing could not be changed as it optimises grass growth for lambing, other options are required to lift fertility levels.

During the 2014 mating season the sheep were again rotationally grazed around the farm with the aim of flushing the ewes but 20 tonnes (fresh weight) of fodder beet was also spread on the rotationally grazed fields for the ewes to consume. Fodder beet was available from three weeks pre-tupping for a six week period (40kg/head).

As a longer term goal newly purchased rams with a high EBV for litter size (+0.15) were also used on the flock in 2014. This in the longer term will give the daughters of the rams 7.5% improved fertility.

The outside lambing flock was scanned on the 7$^{th}$ of January 2015 and achieved a higher scanning percentage of 170%.

**Wormer Resistance**

The outside lambing flock was involved in a Hybu Cig Cymru resistance trial in January 2015. The farm was chosen after initial basic faecal egg count reduction tests conducted by Camlas Vets suggested that resistance could be an issue on the farm. Table 9 below shows the wormer efficacy found on farm.

Table 9 - Wormer Efficacy Levels

| Wormer | Wormer Kill |
|---|---|
| White Drench (BZ) | 70% |
| Yellow Drench (Levamasole) | 44% |
| Clear Drench (Ivermectin) | 90% |
| Cydectin (Moxydectin) | 99% |

There had been concern about the new wormers containing Monepantel and Derquantel/Abamectin and the fact that they may have resistance but the short duration of their effect was attributed to high worm burdens on the sward which the lambs were grazing.

## Appendix 1. Enterprise costings – sheep outwintered on swedes

| | Number | £ Per Ewe | £ Per Hectare |
|---|---|---|---|
| **Output** | | | |
| Breeding ewe lambs | 143 | 43.01 | 404 |
| Lamb sales | 217 | 49.54 | 466 |
| Ewe lamb, lamb sales | 35 | 7.89 | 74 |
| Cull ewes | 49 | 9.66 | 91 |
| Wool | | 3.35 | 31 |
| Purchases | | | |
| Ewe lambs | 55 | 16.54 | 155 |
| Rams | 1 | 2.63 | 25 |
| | | | |
| **TOTAL OUTPUT** | | **94.28** | **886** |
| | | | |
| **Variable Costs** | | | |
| Feed | | 1.29 | 12 |
| Vet & medicine | | 11.01 | 104 |
| Sundries | | 6.70 | 63 |
| Market fees | | 4.30 | 40 |
| **TOTAL** | | **23.31** | **219** |
| | | | |
| **Forage Costs** | | | |
| Swedes | | 3.80 | 36 |
| Fertiliser | | 3.51 | 33 |
| Reseed | | 3.18 | 30 |
| **TOTAL** | | **10.49** | **99** |
| | | | |
| **Associated Forage Contracting** | | | |
| Spreading fertiliser | | 1.17 | 11 |
| Topping | | 1.26 | 12 |
| Swedes contracting | | 0.90 | 8 |
| Reseed contracting | | 2.56 | 24 |
| **TOTAL** | | **5.89** | **55** |
| | | | |
| **Fixed Costs** | | | |
| Labour | | 0.91 | 9 |
| Fencing/repairs | | 3.1 | 29 |
| Power/machinery & depreciation | | 6.25 | 59 |
| General farm costs | | 4.55 | 43 |
| **TOTAL** | | **14.81** | **139** |
| | | | |
| **TOTAL COSTS** | | **54.50** | **512** |
| | | | |
| **Profit/loss before rent/finance** | | **39.79** | **374** |

## Appendix 2. Enterprise costings - indoor lambing sheep

| | Number | £ Per Ewe | £ Per Hectare |
|---|---|---|---|
| **Output** | | | |
| Lamb sales | 180 | 92.60 | 1129 |
| Lambs left | 40 | 16.90 | 206 |
| Cull ewes | 32 | 14.20 | 173 |
| Wool | | 3.35 | 41 |
| | | | |
| Yearlings | 38 | 37.46 | 457 |
| Rams | 1 | 3.52 | 43 |
| | | | |
| **TOTAL OUTPUT** | | **89.58** | **1092** |
| | | | |
| **Variable Costs** | | | |
| Feed | | 13.74 | 167 |
| Vet & medicine | | 9.13 | 111 |
| Sundries | | 6.50 | 79 |
| Market fees | | 4.28 | 52 |
| **TOTAL** | | **33.65** | **410** |
| | | | |
| **Forage Costs** | | | |
| Silage fertiliser | | 5.15 | 63 |
| Grazing fertiliser | | 8.77 | 107 |
| Reseed | | 2.30 | 28 |
| **TOTAL** | | **16.22** | **198** |
| | | | |
| **Associated Forage Contracting** | | | |
| Spreading fertiliser | | 2.88 | 35 |
| Silage contracting | | 7.00 | 85 |
| Reseed contracting | | 1.85 | 22 |
| **TOTAL** | | **11.73** | **143** |
| | | | |
| **Fixed Costs** | | | |
| Labour | | 0.91 | 11 |
| Fencing/repairs | | 3.21 | 39 |
| Power/Machinery & Depreciation | | 9.27 | 113 |
| General farm costs | | 8.72 | 106 |
| **TOTAL** | | **22.11** | **270** |
| | | | |
| **TOTAL COSTS** | | **83.70** | **1020** |
| | | | |
| **Profit/loss before rent/finance** | | **5.88** | **72** |

## Q4: Discussion – what do the results mean for levy payers?

- A crop such as swedes provides a cost effective alternative to housing sheep, providing that the crop is grown well on relatively free draining ground
- The swede crop will maintain, if not slightly increase, the body condition score of ewes during pregnancy provided that the weather is not too extreme
- The mixture of swedes in mid pregnancy and grass in the last three to four weeks of pregnancy provides adequate nutrition to the in-lamb ewe provided that lambing is timed later to coincide with reliable grass growth
- The forage based system does not seem to have any adverse effects on animal health
- Careful management of worm burdens and grass quality is required to maintain higher growth rates than those seen in the project. Once the quality of the grazed grass was lost during the spring it was impossible to regain. This had a knock on effect in that more lambs were left on the farm at the following tupping time
- Costs of the system are relatively low when compared to a more intensive inside lambing system. This means the number of lambs reared can be substantially lower with the system still providing a profit
- Increasing the scanning percentage and the rearing percentage of the breeding ewes will continue to improve the profitability of the system. Aiming for targets of 140%-150% lambs reared should be possible with a more prolific ewe or through flushing the ewes with supplements during the late autumn
- In this study the use of a high energy supplement (fodder beet) during tupping was a cost effective way of increasing lambing percentage

## Q5: New knowledge – what key bit of new knowledge that has come out of this project?

- This project has provided physical and financial data on the performance of a swede and grass based system on a farm in Wales and has confirmed that the system can operate successfully under UK conditions
- The nutritional requirements of ewes can be met up to and through lambing with a combination of swedes and grass without the use of concentrates. Blood sampling of ewes in late pregnancy confirmed the need to move to grass pre-lambing with some urea and albumin levels below the reference range in single bearing ewes on swedes two weeks pre-lambing

## Q6: Gaps in knowledge – what gaps in knowledge did this project identify?

- RB209 recommendations for forage crops – are these correct to maximise crop yield when aiming to graze in situ as nutrients are generally recycled within the system. Often large amounts of phosphate

and potash are suggested, but are these necessary?

- Fodder Beet could offer a more profitable alternative to swedes. Whilst fodder beet is more expensive to establish, crop yields can be 50 - 100% higher than swedes meaning less land is required to grow the crop and potentially allowing a higher overall stocking rate across the enterprise
- When is the optimum time to move ewes from the low protein swede crop onto higher protein spring grass in late pregnancy?
- One of the issues faced in this project was a high parasite burden in lambs despite using a new generation wormer (Monepantel). The ability to estimate pasture contamination through practical techniques/technologies could help inform the decision of when to remove lambs and replace with other stock
- From a practical perspective the favourable grass growing season of 2014 meant it was difficult to achieve high grassland utilisation and lamb growth rates. Some additional guidance for farmers on optimising grass utilisation to maximise lamb growth rates in these situations may be helpful

**Q7: Cost:benefit – what is value of this project?**

- The project offers an alternative sheep system to conventional inside lambing systems in the UK. The system is reliant on grass and swedes so should be more sustainable in the long term
- In this study feed costs were £12.45/ewe less and overall costs £29.20/ewe less than for the conventional inside flock
    - If the outside lambing system changed its replacement policy to one which purchased yearling ewes total replacement costs would be increased by £17.67 per ewe. This combined with slightly lower costs due to a higher stocking rate would leave a margin per ewe of £22.76 compare to £5.88 per ewe for indoor system
- The out-wintered system offers new entrants a cheaper way of entering the industry with lower fixed costs

**Q8: Additional deliverables – what activity is planned with the results from this project?**

| Activity | What is planned? | When likely to happen? |
|---|---|---|
| Events | | |
| Press articles | Articles in Grazing Club | Spring and winter |
| Conference presentations, papers or posters | | |
| Scientific papers | | |