**Realising the potential of grassland management in England (Farmax project)**

**FINAL REPORT**

**January 2013**

## SUMMARY

EBLEX, Silver Fern Farms and Marks and Spencer joined forces to investigate if New Zealand approaches to feed planning and grazing management could be implemented in England to drive further improvements. The project was also an opportunity to compare English and NZ systems in terms of efficiency.

Farmax is a tool that was developed in NZ for "planning and controlling how you can most effectively convert pasture into profit" (www.farmax.co.nz). The tool is based around predicting supply through grass growth forecasts (with help from regional grass growth curves) and calculating demand through dry matter requirements of stock (based on liveweight and stock growth rates). Each farm involved in the trial had a Farmax file established, which meant the efficiency measures that Farmax generates could be analysed and compared.

Eight English producers and nine NZ producers were selected to be involved in the trial, which ran from May 2011 and September 2012. The English element on the project included six visits by Farmax representatives or NZ consultants to train and support the producers involved in the trial. All producers were expected to collect and input their own data every month.

The results were surprisingly similar, especially in relation to pasture production and lamb and calf growth rates. The main factor that stands out is the different in bodyweight between NZ and English ewes and cows. There is a percentage difference in weight of 14% between the average English ewe and their NZ counterpart; for cows the difference is 40%. This is what is driving both ewe and cow efficiency to be lower for the English farms, even though performance (fertility and growth rates) is higher or the same.

The data highlighted that the use of sheds with the UK is supported by the average grass growth curve, i.e. low rates during the winter and an explosion in the spring. The use of sheds allows the grass demand to increase rapidly to fit that grass explosion as the gates are opened and stock are turned out.

The trial was successful in demonstrating that the NZ system of feed planning could be used in England with minor tweaks. The English results suggest further efficiency gains can be made by monitoring feed supply and demand.

## INTRODUCTION

EBLEX has focussed a significant amount of activity on grassland management and forage choice to improve the efficiency of the beef and sheep sectors. EBLEX, Silver Fern Farms (SFF) and Marks and Spencer (M&S) joined forces to investigate if New Zealand approaches to feed planning and grazing management could be implemented in England to drive further improvements. The project was also an opportunity to compare English and NZ systems in terms of efficiency.

Farmax is a tool that was developed in NZ for "planning and controlling how you can most effectively convert pasture into profit" (www.farmax.co.nz). All the project partners had experienced the potential benefits of using Farmax. The tool is based around predicting supply through grass growth forecasts (with help from regional grass growth curves) and calculating demand through dry matter requirements of stock (based on liveweight and stock growth rates). Each farm involved in the trial had a Farmax file established, which meant the efficiency measures that Farmax generates could be analysed and compared.

## METHODS

- **Producers involved**

Eight English producers and nine NZ producers were selected to be involved in the trial, which ran from May 2011 and September 2012.

Liz Genever of EBLEX managed the English producers (see table 1), and they were selected on various factors – geographic spread, range of systems and range of knowledge. None of the English producers had any experience of feed planning prior to this trial. Their Farmax files were set-up in May 2011.

Renee Hogg of SFF managed the NZ producers (see table 2) with a few of them being experienced Farmax users while the others were aware of Farmax but wanted to try it. The Farmax files that needed to be established were completed by October 2011.

*Table 1: Brief details of the English Farmax producers (see appendix A)*

| **Name** | **Location** | **Stock** |
|---|---|---|
| Simon Bainbridge | Northumberland | Beef and sheep |
| Edward Dean | Cumbria | Beef and sheep |
| Mike Powley | Yorkshire | Beef |
| David Prince | Nottinghamshire | Beef |
| Robyn Hulme | Shropshire | Beef and sheep |
| Ed Higgins | Shropshire | Sheep |
| Hefin Llwyd | Devon | Sheep |
| Ed Williams | Devon | Beef |

*Table 2: Brief details of the NZ Farmax producers (see appendix A)*

| **Name** | **Location** | **Stock** |
|---|---|---|
| Blair and Anna Nelson | King Country, NI | Beef and sheep |
| Miles and Ruth Abernethy | Taihape, NI | Beef and sheep |
| Richard Coop | N Hawkes Bay, NI | Beef and sheep |
| Sam and Hannah Morrah | Hawkes Bay, NI | Beef and sheep |
| Matt and Lynley Wyeth | Masterton, NI | Beef and sheep |
| Warren and Andrea Leslie | South Canterbury, SI | Beef and sheep |
| Mike Elliot | Balcutha, SI | Beef |
| Deon and Nick White | Southland, SI | Beef and sheep |
| Edward Pinckney* | Western Southland, SI | Beef and sheep |

**did not complete the trial*

- **Visits to England**

There were six visits to England by NZ consultants and Farmax representatives throughout the trial.

  - First visit

Graeme Ogle from Farmax came over from the 16th of May until the 1st of June 2011, with the main function of setting up the files for all the English producers. Liz Genever or Renee Hogg was present at all the file set-ups at each of the producer's farm. There was also a project meeting held at SFF office near Newmarket on the 16th where the project team established the objectives for the next 16 months.

- Second visit

Steven Howarth from Farmax visited between the 26th of June and the 1st of July 2011 to train the producers on Farmtools. We held three training sessions – one near Exeter, one near Shrewsbury and another at Scotch Corner to cover the geographical spread. Steven also ran a Farmax Pro training session for Liz Genever and Renee Hogg at Stoneleigh.

EBLEX organised an Uplands Conference on the 30th of June at Penrith, and Liz Genever spoke about the Farmax project and used Simon Bainbridge's data as an example.

- Third visit

John Cannon from Challenge Consultancy visited between the 21st and 30th of August 2011 to check the files and to provide guidance to the producers. Liz Genever or Renee Hogg accompanied John on his visits to all eight producers' farms.

At this stage there were concerns about the amount of data that was being collected, and the producers were encouraged to enter more weight data.

- Fourth visit

Graeme Ogle (now an independent consultant) and Gavin McEwen from Farmax came over from the 31st of October to the 4th of November 2011. Two training days were organised for the producers – one near Bristol and the other near Northallerton. The morning session was for the Farmax producers were Graeme ran through the results so far, how feed planning is used in NZ and answered any questions. The afternoon session was used to provide details on the Farmax project to interested parties – representatives from processors, consultants and other producers. Graeme ran a Farmax Pro training session for Liz Genever and Renee Hogg at Stoneleigh, focussing on file set-up.

- Fifth visit

Steven Howarth from Farmax visited between the 22nd and 28th of January 2012 to see each producer and update their files. Steven also wanted to

understand the English wintering system, and to ensure producers were collecting winter feeding requirements.

Around this time, a group of English producers visited NZ. The trip was partially funded by Landskills East (rural development programme for England) and organised and led by Renee Hogg (see Appendix B). Three of the eleven were involved in the Farmax trial. They left on the 27th of January and returned on the 11th of February.

- Sixth visit

Gavin McEwen from Farmax came over for the final summing-up meeting which was held near Coventry on the 28th of June 2012. Not all English producers could make it – Robyn Hulme, Ed Higgins, Ed Williams and Julie Harvey attended with Mike Powley attending the meal the night before. The presentation focussed on the comparison between the NZ and English files. Andrew Cooke from Rezare was also there for the summing-up meeting.

The sixth visit coincided with a visit from nine NZ producers that represented six of the Farmax trial farms. They met or visited all of the English producers involved, plus attended the summing-up meeting and the Sheep Event (the biggest sheep technical event in Europe) (see appendix C).

- **NZ activity**

Renee Hogg visited NZ in October and set up the NZ project farms files. Steve Howarth and Gavin McEwen visited NZ Farmax producers for a technical review and model development of their files from the 1st to the 14th December 2011. There was a further technical review of NZ files in April 2012, with the final files being reviewed in September 2012.

It is worth mentioning that Renee Hogg who was responsible for managing the NZ element of this project left her role at SFF in May 2012 before the project had ended. This lead to some lack of details on the NZ side of the project.

See appendices B and C for details of the NZ and England visits.

- **Data collection by producers**

Each month the producers were expect to update their files with actual information. When the file was established, a model was developed based on what may happen every month, based on previous experience and estimates. The original file covered stock information, cropping, e.g. the amount of area shut up for silage for how long or the area of brassicas being grown, and supplements being fed. So each month the predictions need to be checked and updated with actual information, e.g. number of calves or lambs weaned, or amended, e.g. 120 lambs at 19.7 kg average carcase weight were sold rather than 100 at 20 kg that were predicted. The producers used Farmtools for this (see figure 1). They also entered an average farm cover, which represented a monthly measurement from at least 50% of their fields. They used a Farmax sward stick that was a calibrated to convert compressed sward height to kg DM per ha. The collection of data and updating of the files probably took around ½ day per month.

The files were then checked by their allocated consultant, who ensured the data was completed and suggested areas that need more data, e.g. more liveweight records for growing stock or better understanding of winter feed.

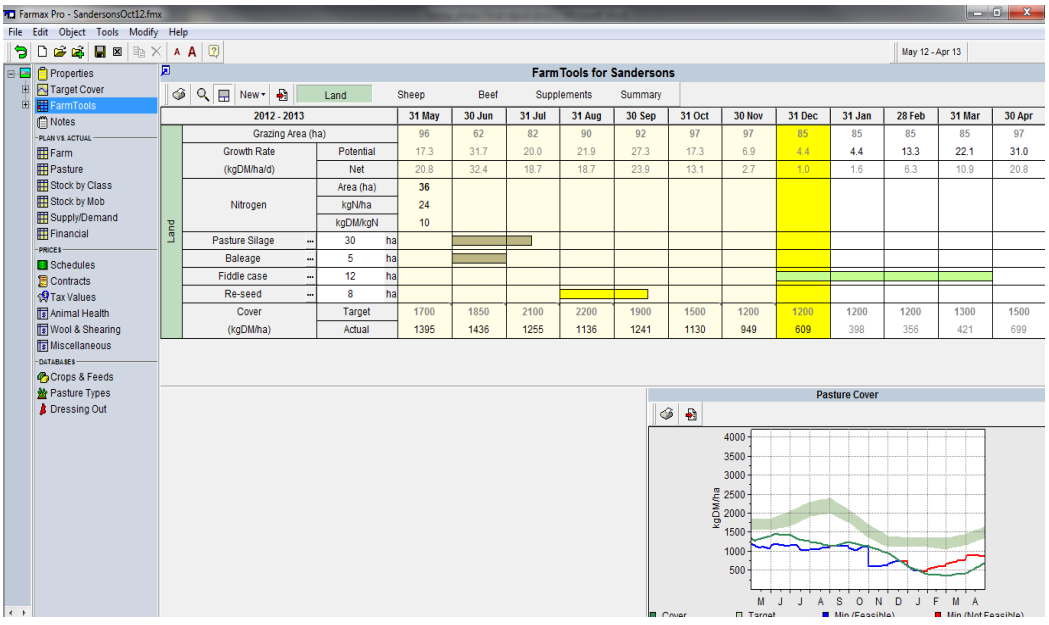



*Figure 1: A screen shot of the Farmtools screen that producers would use to enter data*

It is worth noting that some producers were better than others at collecting data, and this will have an impact on the quality of the results.

- **Knowledge transfer**

Bimonthly newsletters were produced by Renee Hogg and circulated amongst the group.

Liz Genever wrote two articles on the Farmax project for EBLEX's Better Returns Programme bulletin. One for November 2011 (see appendix D) and another went into the May 2012 bulletin (see appendix E).

Liz has used the project and its findings in various presentations to producers, consultants and vets through 2012, including presentations at South Sheep, Beef South West and Sheep Veterinary Society conference. Abstracts on feed planning in England have been accepted for the International Sheep Veterinary Congress 2013 and the British Grassland Society and British Society of Animal Science conference 2013 - 'Profitable and Sustainable Grazing Systems - Moving Forward with Science'.

## RESULTS

- **Understanding how to implement feed planning**

One of the objectives of this project was to understand if the NZ technique of feed planning, applied through Farmax, was appropriate for English systems. There were some issues, including dealing with the housed period, cattle and sheep with larger bodyweights, and possible forage substitution when being fed cereals especially when housed. Most of the issues identified were dealt with by tweaking how the data was inputted into Farmax, e.g. pretending that the ewes are being fed high levels of supplements when at grass to reduce the demand form grass, when they are actually in a shed.

Some of the English producers struggled with the type of data that was needed, e.g. liveweights at tupping and bulling or winter feed fed per month, as they are not use to collecting it.

Five of the eight English Farmax producers wanted to continue after the trial. Most of them realised that more data was needed before its full value was seen. The ones that did not want to continue generally felt that it was not representing their system well enough. It could be argued that not enough support was given to the producers to make more use of the data, but it is difficult until more background data is collected as neither 2011 nor 2012 were "normal" years with them being very dry and very wet respectively.

Farmax generates some very useful graphs that had not been produced for English systems before. Figure 2 shows the supply (in green) and demand (in red) for a sheep system. The supply includes creep feed during the spring and summer, and the demand takes into account that the most of the ewes are moved off the farm during the winter.

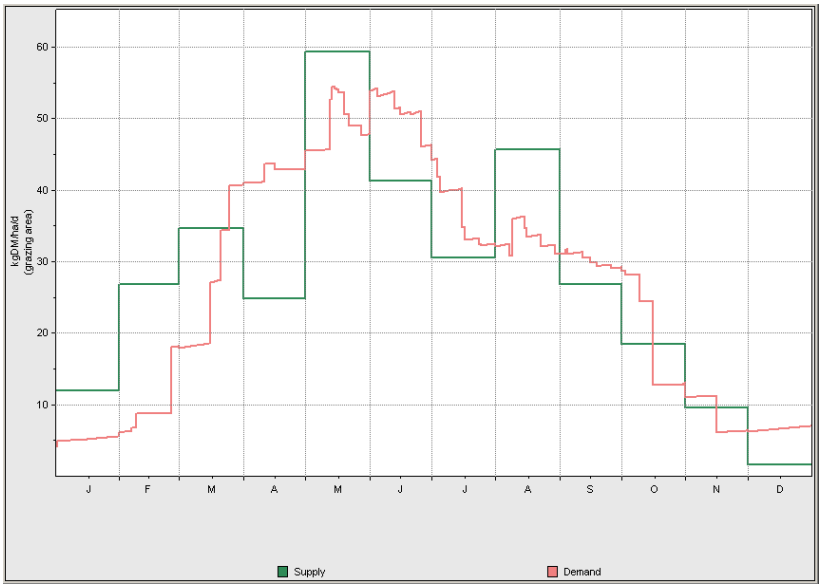



*Figure 2: An example supply and demand curve generated by Farmax*

Figure 3 demonstrates farm cover monitoring with the green line being the available farm cover (measured in kg DM per ha), the blue line being the minimum required to meet targets, the blue line turns reds if targets are not being met. The shaded green area is where the green should be. It helped producers understand the impact of their decisions for the next few months, e.g. nitrogen application, stock sales or purchases.

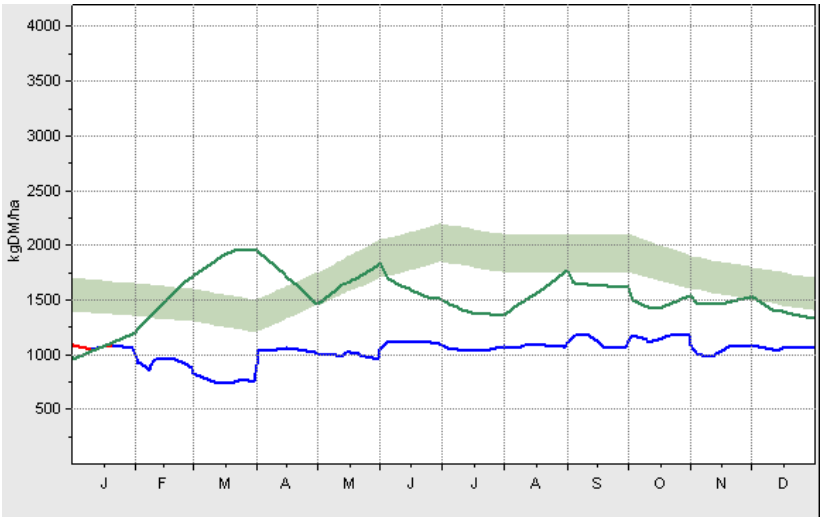



*Figure 3: The farm cover monitoring graph generated by Farmax*

- **Efficiency measures**

Due to the amount of information that has to be entered to get an understanding of demand and supply, Farmax can generate some very useful efficiency measures. Part of this project was to compare and contrast English and NZ systems to see what can be learnt from one another.

When considering the supply, unsurprisingly the NZ farms were bigger than the English farms (see table 3). It was interesting to see that the net pasture production was around 0.5 tonnes DM per ha higher for the English farms even though the potential pasture production was lower. This was due to less pasture being lost through decay or poor management; but remember that the summer, autumn and winter of 2011 when most of the English data was collected was dry so utilisation was likely to be better. The English farmers tended to use more nitrogen, illustrated by the nitrogen boost, which represents the dry matter grown as a consequence of nitrogen application. More feed was conserved in the English systems.

*Table 3: Comparison between England and NZ for supply*

| | England<br>Average (min-max) | NZ<br>Average (min-max) |
|---|---|---|
| Area (ha) | **162** (68-575) | **667** (72-1340) |
| Potential Pasture Production (tDM/ha) | **7.1** (4.6-8.8) | **8.1** (4.8-14.1) |
| Nitrogen Boost (tDM/ha) | **0.8** (0-1.9) | **0.3** (0-1.1) |
| Pasture Losses (tDM/ha) | **1.6** (1.0-2.5) | **2.1** (0.9-5.5) |
| % Losses | **15.6** (3.3-21.4) | **28.4** (8.6-59.7) |
| Net Pasture Production (tDM/ha) | **6.2** (3.7-8.1) | **5.7** (2.3-7.0) |
| Feed Conserved (tDM/ha) | **1.6** (0-5.0) | **0.6** (0-6.0) |

The patterns of grass growth for England and NZ are different (see figure 4). There is the obvious different in terms of seasons, but the English curve tended to have a higher peak and a lower and longer dip. It is also worth noting for the English curve the rapid increase in grass growth in the spring (March to May), which needs careful management. This means that grass monitoring is extremely important in the English systems due to the fluctuations in growth seen.

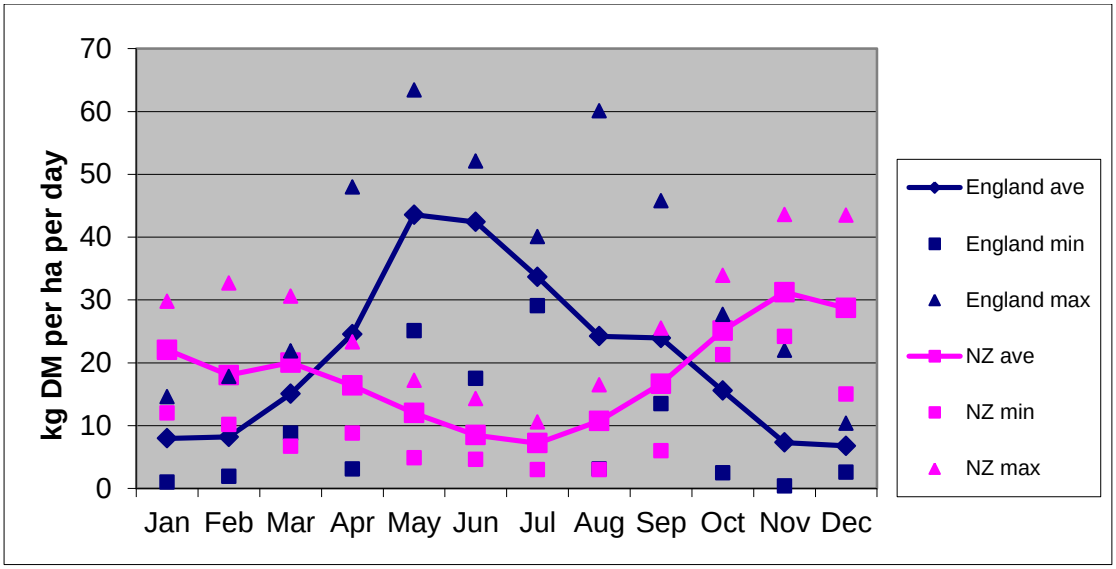



*Figure 4: The average grass growth (kg DM per ha) with minimums and maximums for England and NZ farms*

Farmax generates a standardised stocking rate, which is based on one SU being a 55 kg ewe rearing 1.2 lamb, and the average is the same for the England and NZ files, which is 11 ewes per ha (see table 4). The English farms were generally lowland type farms, so it should be expected that the stocking rate should be higher than the NZ farms.

*Table 4: Comparison between England and NZ for utilising supply*

| | England<br>Average (min-max) | NZ<br>Average (min-max) |
|---|---|---|
| Standardised Stocking Rate (SU/ha) | **11.1** (4.6-16.0) | **11.1** (4.8-14.7) |
| Total Feed Eaten (tDM/ha) | **6.5** (2.6-9.6) | **6.2** (2.6-8.1) |
| Demand from Supplements (%) | **26.3** (7.3-45.3) | **13.6** (0-32.2) |
| Net Product (kg/ha) | **239.6** (119-457) | **263.2** (72-388) |
| Feed Conversion Efficiency | **28.5** (19.2-38.0) | **24.8** (19.3-36.8) |
| Sheep:Beef:Deer Ratio | **36:64:0** (0-100) | **61:37:2** (0-100) |

Total feed eaten (tonnes DM per ha) is calculated from the demand and is similar for both countries. The demand from supplements, which includes all feeds except grass, is higher in the English files, which is not surprising due to the extensive use of sheds.

Net product (kg per ha) is calculated from the liveweight and wool sold, and takes into consideration the weight lost or gained from animals on the farm

plus what is purchased. It is a measure of efficiency per unit of area. It is higher for the English files and could be a factor of the type of land farmed or the higher weights that are maintained and sold. In NZ the targets would be 200 kg per ha for hard hills, 250-300 kg for hills and 400-500 kg for land capable of growing 10-13 tonnes DM.

Feed conversion efficiency is the amount of kg DM needed to produce a kg of product. The results suggested that the farms in the NZ sample are more efficient at converting dry matter into product.

The sheep:beef:deer ratio is the proportion of the demand that comes from the different enterprise. NZ tends to think that 60:40 sheep:beef is optimum for their systems. Out of the nine English farms, three were beef only and two sheep only which may have impacts on robustness to market changes and the ability to maintain feed quality. The perception of suckler cows in NZ is to maintain feed quality for the sheep, as it tends to be the more profitable enterprise.

Farmax collects financial data, which is used to calculate a partial gross margin (forage and feed costs, nitrogen, off farm grazing costs and vet and med costs). The information for the English files was entered in NZ dollars so comparisons are easier. The gross margin per kg dry matter eaten (cents per kg DM) is a way of comparing between enterprises. In NZ generally sheep have a higher GM/DM eaten than beef, which can be seen in table 5. The English data shows that the beef and sheep enterprises are more similar. It is worth noting that the financials look positive for the English files, but it is likely that the English farms have higher fixed costs so when taken to net margin level it would not look so favourable.

It can also be seen from table 5 that the English farms tended to get paid more per kg of product, which is why the gross margin per product (cent per kg) was higher, especially for sheep.

To take the feed conversion efficiency shown in table 4 to the next step, the conversion is shown for the sheep and beef enterprises as kg DM eaten per kg product, and illustrates that for the NZ files the sheep were more efficient than the beef enterprise, while the relationship was reversed for the English files. In NZ, the targets would be 20-24 for trading stock and 24-28 for breeding stock.

*Table 5: Comparison between England and NZ for financial data*

| | | England<br>Average (min-max) | NZ<br>Average (min-max) |
|---|---|---|---|
| Sheep | GM / DM Eaten (c/kg) | **19.9** (-10.6-46.6) | **18.2** (-12.2-52.2) |
| | GM / Product (c/kg) | **649.4** (-312.2-1,576.7) | **363.4** (-291.1-832.9) |
| | kg DM Eaten / kg Product | **28.1** (19.2-34.0) | **21.1** (15.9-24.38) |
| | % of feed eaten | **39.2** (13.2-100.0) | **38.8** (3.7-79.4) |
| Beef | GM / DM Eaten (c/kg) | **20.1** (1.7-44.9) | **11.4** (-6.4-22.2) |
| | GM / Product (c/kg) | **445.5** (43.4-629.0) | **356.7** (61.4-783.8) |
| | kg DM Eaten / kg Product | **26.9** (13.9-41.3) | **32.3** (18.6-85.3) |
| | % of feed eaten | **53.9** (12.5-100.0) | **20.4** (0.3-100) |

- Focus on sheep

It can be seen from table 6 that there are some obvious difference between the English and NZ farms, such as number of ewes, tupping bodyweight and ewe efficiency. There are some similar results, such as weaning percentage for ewes, 90 day weaning weight and average growth rate to weaning. Generally, the NZ farms tended to have higher fertility but had more losses, especially from scanning to tailing, which led to similar weaning percentages.

*Table 6: The comparison between England and NZ for ewe performance*

| | England<br>Average (min-max) | NZ<br>Average (min-max) |
|---|---|---|
| Number of ewes | **404** (55-1019) | **2869** (138-6448) |
| Tupping Body Wt (ewes) (kg) | **71.7** (55.0-109.9) | **62.7** (57.9-69.0) |
| Scanning % (ewes) | **172** (130-208) | **191.2** (169-212) |
| Scanning Index | **2.6** (1.6-3.4) | **3.1** (2.5-3.4) |
| Losses (Scanning-Tailing) | **11.0** (4.6-21.2) | **19.2** (8.7-26.5) |
| Losses (Tailing-Weaning) | **2.4** (0-6.1) | **1.6** (0-4.2) |
| Weaning % - Ewes | **154** (117-198) | **150** (130-173) |
| Weaning % - Hogget | **100** (87-113) | **83** (61-113) |
| Survival (Scanning-Weaning) | **87.2** (77.5-94.1) | **84.4** (79.5-90.8) |
| 90 Day Weaning Wt | **30.5** (18.8-41.6) | **30.0** (27.7-32.0) |
| Avg. Growth to Weaning (g/d) | **284** (168-403) | **279** (256-302) |
| Ewe Efficiency | **66.4** (53.4-81.3) | **72.3** (64.0-84.1) |

One of the key performance indicators (KPIs) that Farmax generates is Scanning Index which is calculated by dividing the scanning percentage by the average ewe weight at tupping (minus wool). For example, 180% divided by 75kg equals 2.4. It basically is a measure of the number of lambs scanned per kg of bodyweight, and is linked to the more weight a ewe is carrying at tupping the more fertile she will be. In NZ the target would be 3 or greater. The challenge of this measure in an English situation is the range of breeds with a range of bodyweights, so the relationship will not be as simple.

Figure 5 shows the Scanning Index for the flocks involved in the trial. The black line is the NZ average of 3.1 and the red line is the English average of 2.63. See Appendix F for explanation of codes. The variation tends to be greater in the English farms, which is likely due to the greater range of systems adopted, e.g. lambing dates, breed choice.

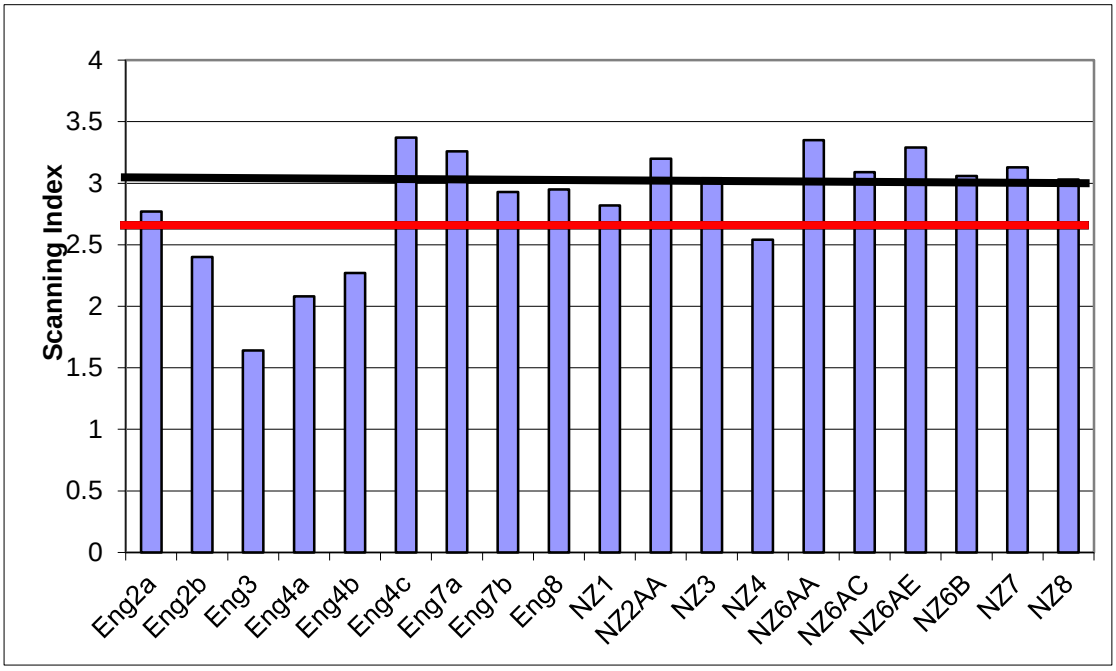



*Figure 5: The Scanning Index for all the flocks involved in the Farmax trial*

Figure 6 shows the average lamb growth rate to weaning for the flocks involved in the trial. The black line is the NZ average of 279g per day and the red line is the English average of 284g. See Appendix F for explanation of codes. The variation tends to be greater in the English farms, which is likely due to the greater range of systems adopted, e.g. whether creep feed is used, breed choice and priority for different groups of animals.

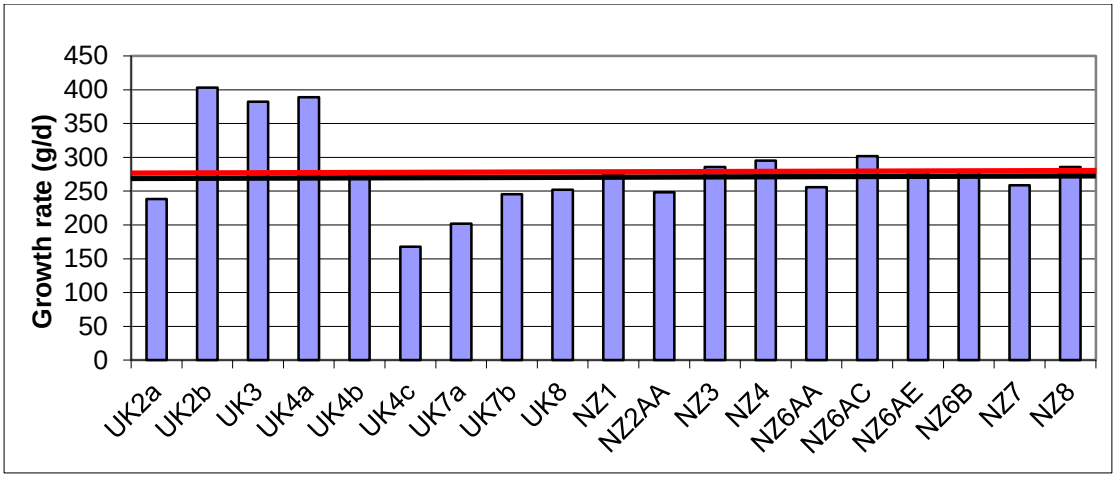



*Figure 6: The average lamb growth rate to weaning for all the flocks involved in the Farmax trial*

Ewe efficiency is calculated by multiplying the average 90 day weaning weight (kg) by the weaning percentage, and dividing it by the average ewe weight at tupping (kg). For example, 30 kg weaning weight x 1.6 lambs weaned per ewe put to the tup divided by 75 kg ewe weight equals 64%. It is a measure of the kg of weight she weans for every kg of her weight. In NZ, the target would be 70% or above. In Northern Ireland it has been suggested to take off 1 kg off the weaning weight for every 5 kg of concentrates fed to adjust for creep feeding, but this was not done in this trial.

Figure 7 shows ewe efficiency for the flocks involved in the trial. The black line is the NZ average of 72.3 and the red line is the English average of 66.4. See Appendix F for explanation of codes. The variation tends to be greater in the English farms and the average is lower which relates to heavier ewes used in England.

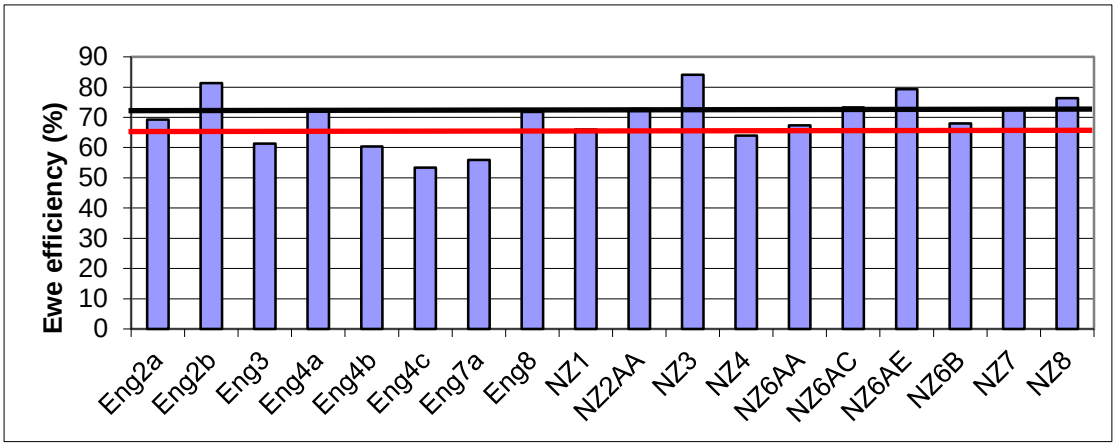



*Figure 7: Ewe efficiency for all the flocks involved in the Farmax trial*

- Focus on beef

It can be seen from table 7 that there are some obvious difference between the English and NZ farms, such as number of cows, bulling weight and cow efficiency. There are some similar results, such as 200 day weaning and average growth rate to weaning. Generally, the NZ farms tended to have lower fertility with higher losses, especially from birth to weaning, which lead to a lower weaning percentage.

*Table 7: The comparison between England and NZ for cow performance*

| | England<br>Average (min-max) | NZ<br>Average (min-max) |
|---|---|---|
| Number of cows | **82** (37-119) | **173** (51-307) |
| Bulling Wt (kg) | **660.5** (581.2-696.6) | **476.2** (458.8-502.7) |
| Scan/Preg % | **96.9** (92.3-100.8) | **93.8** (76.9-100.0) |
| Weaning % | **92.7** (92.3-100.3) | **83.6** (76.9-100) |
| Losses (Scan-Marking) | **5.6** (2.5-15.3) | **7.2** (0-13.3) |
| Losses (Preg-Wean) | **0.8** (0-2.6) | **2.1** (0-22.9) |
| 200 Day Wean Wt. | **255.4** (187.3-324.1) | **258.1** (229-347) |
| Avg. Growth to Weaning | **1127.2** (783-1474) | **1143.5** (1007-1596) |
| Cow Efficiency | **34.8** (28.4-43.8) | **43.0** (35.1-54.1) |

Figure 8 shows the average calf growth rate to weaning for the herds involved in the trial. The black line is the NZ average of 1.14 kg per day and the red line is the English average of 1.13 kg. See Appendix F for explanation of codes. The variation tends to be greater in the English farms, which is likely due to the greater range of systems adopted, e.g. whether creep feed is used and breed choice.

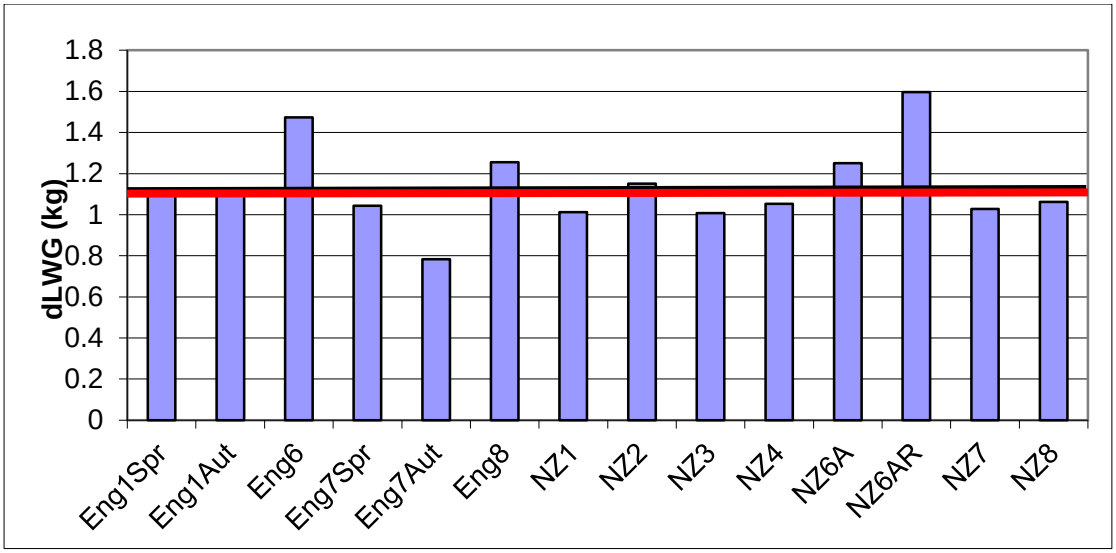



*Figure 8: Average calf growth rate to weaning for all the herds involved in the Farmax trial*

Cow efficiency is calculated by multiplying the average 200 day weaning weight (kg) by the weaning percentage, and dividing it by the average cow weight at bulling (kg). For example, 280 kg weaning weight x 0.94 calves weaned per cow bulled divided by 680 kg cow weight equals 39%. It is a measure of the kg of weight she weans for every kg of her weight. In NZ, the target would be 45% or above.

Figure 9 shows cow efficiency for the herds involved in the trial. The black line is the NZ average of 43.0 and the red line is the English average of 34.8 See Appendix F for explanation of codes. The variation was higher across all farms; however the average is lower in England and that is being driven by the higher cow weight.

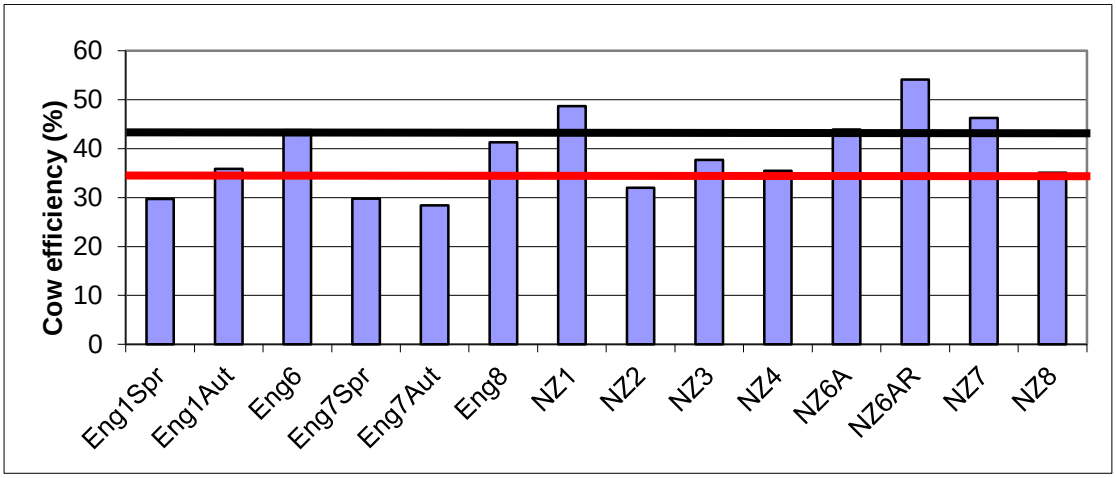



*Figure 9: Cow efficiency for all the herds involved in the Farmax trial*

## Discussion

The results were surprisingly similar, especially in relation to pasture production and lamb and calf growth rates. It is likely that this was surprisingly for the English producers as they thought they were worse than the NZ producers, while some of the NZ consultants were convinced that there was untapped potential within the English systems. An important finding is that EBLEX and others need to provide resources to English producers to get an understanding of their "numbers" to boost their confidence in their abilities.

The main factor that stands out is the different in bodyweight between NZ and English ewes and cows. There is a percentage difference in weight of 14% between the average English ewe and their NZ counterpart; for cows the difference is 40%. This is what is driving both ewe and cow efficiency to be lower for the English farms, even though performance (fertility and growth rates) is higher or the same. NZ producers have tried to reduce mature size as they are more aware of how it affects dry matter intake and the cost of keeping that animal over the winter. English producers generally want bigger maternal animals as they will produce bigger offspring, which will sell for more, but are less aware of the costs of maintaining those bigger animals. The main problem is that selecting for high growth rates generally selects for animals that have higher mature size, and it can be difficult to separate those genetic traits without good use of records and estimated breeding values.

The data highlighted that the use of sheds with the UK is supported by the average grass growth curve, i.e. low rates during the winter and an explosion in the spring. The use of sheds allows the grass demand to increase rapidly to fit that grass explosion as the gates are opened and stock are turned out. This does not mean more cost-effective wintering options, e.g. all grass wintering, deferred grazing, brassicas or earlier turnout, do not need to be explored. The need for conserved feed for the wintering period can drive producers to prioritise silage production over grazing management. It is well known that once grass has been cut and conserved the costs per kg DM have doubled.

The variation amongst the English farms when the KPIs were presented for each farm (see figures 3-7) was encouraging as it illustrated that potential improvement could be made. For example, Farm 4 had three flocks with significant differences in performance, so focusing on the good elements of each flock and trying to implement them across the others would be an interesting exercise to do. It does raise the question about whether a

blueprint for English lamb production could be generated to take the variation out, but systems do need to evolve from the resources available on each farm.

It was clear, especially from the NZ producers that visited in June/July 2012 that NZ are trying to drive up ewe fertility. For example, one of the NZ producers was planning to house 200 triplet bearing ewes to improve lamb survival. They found it difficult to understand why English producers were aiming to cap scanning at around 180% for an outdoor lambing system. The English producers had previously tried to push up scanning percentages but felt that due to poor growth rates and higher mortality due to higher numbers of triplets there was limited benefits. The NZ producers were actively looking for ways to maintain triplet-bearing ewes pre- and post-lambing.

For the English producers, there was an increase in knowledge over the 16 months of the trial, but they did start at a low base. It highlighted that more information was needed at the beginning to allow them to understand the importance of the data they were being asked to collect. EBLEX are planning to develop resources, including a new manual on grazing strategies in Spring 2013, to help producers understand feed planning.

Overall, the trial was successful with five of the eight English producers wishing to continue. It was extremely helpful to have the support of the Farmax representatives and NZ consultants as they challenged all the producers when they came over.

This trial identified a few issues:

- More trained users are needed - there are currently very few advisers in the UK able to talk to producers about feed planning, even less are able to generate a feed budget
- Farmax struggled initially to deal with the housed period
- More English data, especially weight data and grass growth from a range of years, is required to make the files more meaningful
- There is a need to develop supportive material to help collect the data from English farmers, as some of the information required may not be normally collected
- There is a need to select producers with good historical data and history of record keeping
- Some of the efficiency measures that Farmax generates need to be validated for UK systems (this is a target of a separate project)

- A means to maintain the link with NZ farmers would be very useful to provide comparisons and facilitate further knowledge exchange.

**Next steps**

EBLEX are funding phase II of this project to address some of the issues. Phase II includes the addition of some new producers on to Farmax, plus the training of consultants to run Farmax files and to talk about feed planning to wider groups of producers. EBLEX are also funding a project with Nottingham University and Lesley Stubbings to validate KPIs for English sheep systems, e.g. is scanning index appropriate for English systems and what are our targets for ewe efficiency. Liz Genever continues to use the results from this trial is her presentations to a wider group of producers, plus has led to the BRP campaign on feed planning and record keeping during 2013.

Liz Genever is visiting NZ in February 2013 to research how to communicate feed planning to producers, which will be develop into workshops held in 2013 and 2014.

# APPENDICES

## APPENDIX A

See Appendix A.pdf

## APPENDIX B

See Appendix B.pdf

## APPENDIX C

See Appendix C.pdf

## APPENDIX D

Article for EBLEX Better Returns Programme Bulletin, November 2011

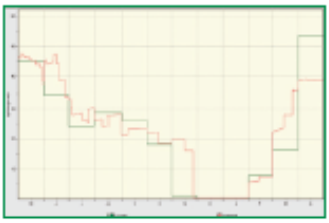
### Grass budgeting

**EBLEX livestock scientist Dr Liz Genever investigates what farmers here can learn from producers in New Zealand, and what they can learn from us.**

EBLEX is funding a project with Marks & Spencer to assess how computer programs can be used to improve grassland management on livestock farms across the world.

The project runs until June 2012 and involves eight beef and sheep farms in England and ten in New Zealand.

All the farmers will use the Farmax farm management software, which has been developed in New Zealand over the past 20 years. This will help them monitor how changes in farm and grassland management practice can influence productivity and profitability.



*Graph 1: Grass supply and animal demand on one English farm in 2011.*

#### Grass budgeting

The principle behind grass budgeting is simple - supply and demand. What is the supply of grass and what is the demand for grass from the animals?

When the demand is higher than the supply, supplements are required. When supply is higher than demand, areas can be shut up for silage or stocking rate can be increased. However there is a big gap between the theory and translating it into practice. The project sets out to see if the Farmax program can help do this in a way that is relevant to beef and sheep producers in this country.

The English farmers are collecting measurements to calculate grass growth as well as information on any other feeds being fed. This is used to calculate the supply.

They are also keeping details on the number of animals being grazed and their weights, along with animal performance data such as pregnancy rates and sale weights and prices. These are used to calculate demand for grass.

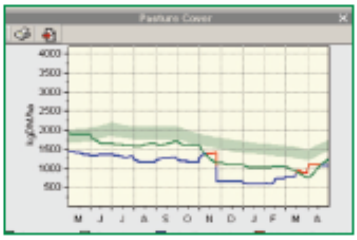
Graph 1 illustrates the annual supply of grass (in green) and the demand from grass (in red) on one of the English farms. It shows a good fit, with some possible lack of supply around November and March. However this may change if there is better than forecasted autumn and winter grass growth.

Graph 2 illustrates what is happening to the amount of grass or 'grass cover' on the farm, measured in kg DM/ha. Declining grass cover means demand is out-stripping supply. The green shaded line is the target for grass cover. The summer has been dry so grass growth has been lower than hoped.

The green line is the predicted grass cover – better or worse grass growth will change this. The blue line is the bare minimum grass cover that is required to support the animals and their predicted performance. The red areas suggest when extra feed may have to be brought in.

More data is needed over the next few months, especially in relation to ewe and cow weights, but by the end, the project should produce useful information about how grass management can be improved.

Due to the common language and data capture through Farmax, there is an opportunity to run comparisons and benchmarking between farm businesses in England and New Zealand. There is potential to gain real insights into what is driving profit and productivity in both countries, and share the findings for the good of both.




*Graph 2: The Farmax program highlights when grass growth will be insufficient to support current stock levels.*

### How efficient are your animals?

One of the many indicators coming out of the Farmax project is cow and ewe efficiency.

**Cow efficiency =**

$$\frac{\text{Average 200 day weaning weight (kg) x weaning \%}}{\text{Average cow weight at bulling (kg)}}$$

Example:

$$\frac{280\text{kg} \times (94/100)}{680} = 39\%$$

This basically gives an indicator of the proportion of bodyweight a cow is weaning. The target for cow efficiency is 40% or greater. It is very difficult for cow efficiency to be over 45% at a herd level. The Farmax farmers range from 27-47%.

**Ewe efficiency =**

$$\frac{\text{Average 90 day weaning weight (kg) x weaning \%}}{\text{Average ewe weight at tupping (kg)}}$$

Example:

$$\frac{30\text{kg} \times (160/100)}{75} = 64\%$$

The target for ewe efficiency is 60% or greater. It is possible to get to over 75% at a flock level. The Farmax farmers range from 60-98%.

**APPENDIX E**

Article for EBLEX Better Returns Programme Bulletin, May 2012

# Grass and forage

## What is your feed demand?

By Dr Liz Genever, EBLEX Senior Livestock Scientist

EBLEX along with M&S and Silver Fern Farms (a New Zealand farmer co-operative), has been running a trial of feed budgeting computer software (Farmax) since last May. The project is nearly finished and is producing some interesting results.

Eight farmers across England have been collecting information on stock numbers, weights, sales, purchases and deaths, feeds fed and monthly grass covers. This allows them to reach an understanding of the feed supply (from grass, silage, concentrates, or brassicas), and feed demand for the number of animals on the farm and their level of performance.

For example, Simon Bainbridge who farms near Cambo in Northumberland, runs around 575 ha (1,400 acres). He has around 650 hill and 650 in-bye ewes with nearly 100 spring-calving cows.

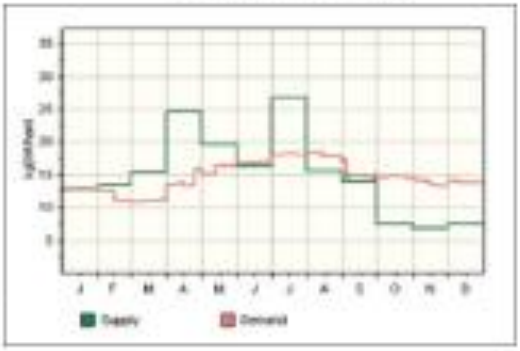
Through the project he now knows he is growing around 4.3 t of DM per ha per year. Graph 4 shows how it is spread across the year.

**Graph 4: Grass growth curve for Simon Bainbridge's farm.**

The data collected also provides a picture of supply versus demand, highlighting any pinch points or times of excess grass growth. Simon's demand (the red line) is very flat, which is very common when cattle are in the system.

There is an over-supply of grass in the spring and summer, but this could be utilised in the autumn as deferred grazing. The advantage of having sheep is that their demand follows the grass growth curve better – lambing at the spring peak and selling lambs as grass growth dips in the autumn.

**Graph 5: Annual feed supply and feed demand for Simon Bainbridge.**




Feed demand is calculated by knowing that animals eat around 2-3% of their bodyweight in dry matter per day. This varies according to what stage they are in – eg lactation, dry, or growing – but it is a good rule of thumb.

The weight and number of animals grazing and area currently available for grazing is fed into the Farmax computer program, which produces a daily demand per ha. For example in June and July for Simon it is around 16kg DM per ha per day. Once this number is known it is easy to see how close it is to grass growth, and whether grass needs to be shut up because there is too much grass or more supplements fed.

It may be over-simplistic, but if supply from grass is low due to low rainfall, grass demand per ha must be reduced. This can be done by decreasing stock numbers (selling stores, culling cows/ewes), increasing area available for grazing (renting in land, making less silage/hay), feeding (concentrates, straw, silage) or a combination of all three.

The difficulty is knowing which is going to cost you the less. Back in New Zealand, Farmax is used by consultants to help answer that particular question.

EBLEX is planning to do more work on grazing strategies and feed budgeting later this year and into 2013.

**APPENDIX F**

Explanation of farm codes

| Code | Farm |
|---|---|
| Eng1Spr | Spring calvers, Narracombe |
| Eng1Aut | Autumn calvers, Narracombe |
| Eng2a | Pedigree sheep, Taw Barton |
| Eng2b | Sheep expansion, Taw Barton |
| Eng3 | Frodesley |
| Eng4a | Suffolks, Pikesend |
| Eng4b | Recipents, Pikesend |
| Eng4c | Welsh ewes, Pikesend |
| Eng5 | Wood Farm |
| Eng6 | Elm House |
| Eng7a | Hill sheep, Donkin Rigg |
| Eng7b | In bye ewes, Donkin Rigg |
| Eng7Spr | Spring calvers, Donkin Rigg |
| Eng7Aut | Autumn calvers, Donkin Rigg |
| Eng8 | Kirkhouse |
| NZ1 | Ohinemuri |
| NZ2AA | Breeding ewes, Okepuha |
| NZ2 | Breeding cows, Okepuha |
| NZ3 | Greenhill |
| NZ4 | White |
| NZ5 | Raeburn |
| NZ6AA | Ewes, Spring Valley |
| NZ6AC | Ratanui ewes, Spring Valley |
| NZ6AE | Brookely ewes, Spring Valley |
| NZ6A | Breeding cows, Spring Valley |
| NZ6AR | Ratanui breeding cows, Spring Valley |
| NZ7 | Ngapuke |
| NZ8 | Nelson |