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# **Beef** – improvements in technical efficiencies

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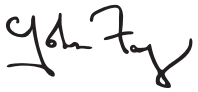
# **Foreword** – John Fay, Director CAFRE

On behalf of CAFRE, I would like to extend a very warm welcome to all in attendance at the Beef Seminar. Events have been ongoing all year to mark Greenmount's Centenary. Our Beef Seminars, in conjunction with the Agri Food and Biosciences Institute (AFBI), are part of these celebrations. We plan, through the seminar, to raise awareness of technical issues within the suckler beef sector, which will have a positive impact on the profitability of your enterprise.

The Beef Seminar topics discussed are all management issues, which you, the farmer, has some degree of control over and include; the use of genetic evaluation tools to select breeding stock, research results into 24 month calving, health and fertility issues plus managing soils and grassland to utilise more grass in the diet, in a bid to maximise performance.

The take home message for suckler beef producers must be to utilise all research, technology and management tools available and incorporate them into your farming system. It is only through improved technical efficiency that suckler beef production can have a future.

Finally, I would like to thank our local and visiting farmer speakers, technologists and AFBI researchers for their input into what I'm sure will be a highly informative and stimulating Seminar.



John Fay

# Contents

# Sourcing and managing replacement heifers

**Replacement heifers are the lifeblood of the herd and represent an opportunity to improve genetics and productivity in the longer term. These animals deserve considerable attention to ensure they reach their potential productivity.**

## Numbers of heifers required?

The number of replacement heifers required annually is determined by cow longevity and/or culling intensity. Fewer heifers are required as cows last longer. The average lifetime number of calves produced from a suckler cow in Ireland is only 4.1, giving a replacement rate of 24%. The long term average replacement rate for the CAFRE Hill Farm herd is 19%.

There is a simple relationship between replacement cost and number of calves, as shown in Figure 1. In this example the difference between the cost of a replacement heifer and the value of a cull cow sale is £200. Clearly the most expensive calves are the first two, with a difference of £100 between calf 1 and calf 2. At the other end of the scale there is only a difference of £2/calf going from calf 9 to calf 10. The key lesson here is to avoid situations where a replacement heifer only produces 1 or 2 calves.

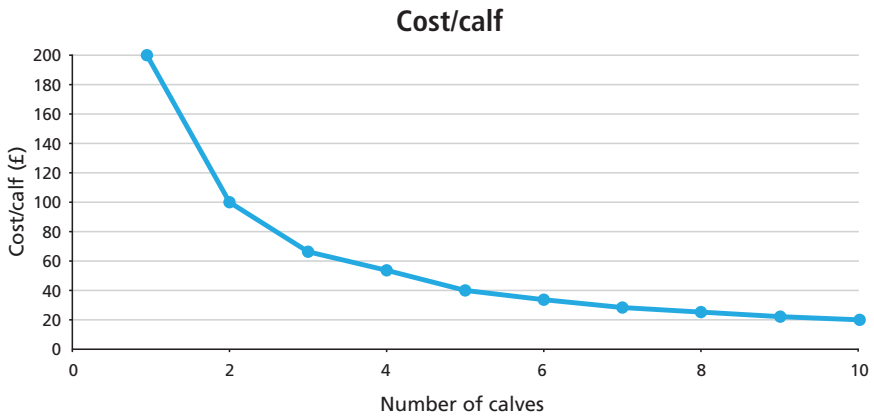



Figure 1: The effect of increasing the number of calves produced by a cow on calf cost when replacement heifers cost £200 more than a cull cow sale.




## Sourcing replacement heifers
### – should they be bought or reared?

Buying in heifers is a very simple system to operate as all cows are bred to a terminal sire and all progeny sold at maximum value, either as stores or as finished beef. There is also considerable choice in the market and the farmer only buys the animals he deems suitable for his business. On the other hand, the purchaser must pay the current market price, which may be significantly above the rearing cost. There may be little or no knowledge of the genetics, previous management or health status of the herd/heifer and diseases may be inadvertently purchased along with the heifer.

Rearing heifers means all aspects of the heifer can be managed so that they can be bred by specific bulls, selected from specific cows and reared according to a protocol with nothing left to chance or guesswork. A farm-specific health protocol can be implemented and no need to buy in heifers significantly reduces the risk of importing diseases. However, 50% of calves produced will be male, and these may not be valued as highly as terminal sired animals. A number of different bulls may be required to produce heifers and subsequently to mate with them, resulting in the necessity for AI or extra bull power and separate paddocks for different mating groups. Obviously there are advantages and disadvantages with both systems and each producer must weigh these up.

## Parent stock for replacement heifers
– what is important?

The ideal suckler cow should be: a crossbred as a result of a planned crossbreeding programme to maximise hybrid vigour; have a placid temperament; have sufficient milk to rear a calf; calve down easily, early and frequently; produce a calf to meet market specification; produce at least 5-6 calves in her lifetime; gain condition easily at grass and lose it during winter; require minimal human intervention and have a high health status. Having these objectives clearly in mind will make replacement heifer breeding and selection simple.

At the CAFRE Hill Farm, Glenwherry, heifers are only selected from cows that calve in the first 6 weeks (the bull only runs for 9 weeks) of the calving period. All cows are teat and udder scored at calving and heifers are rejected from any cows with poor scores. All cows and calves are weighed at weaning and a further screen is conducted based on calf weight gain (a reflection of cow milk yield) with all extreme calves (both large and small) rejected. At this stage remaining heifers must pass an assessment for structural soundness and temperament.

Sourcing a bull to breed replacements is more critical than sourcing a terminal sire, as the effects of getting it wrong may be felt for generations of cows. The bull should be a different breed from the cow to maximise hybrid vigour (a two breed criss-crossing programme is simplest to manage in practice in a self-contained herd). Important EBVs include milk, calving ease daughters and mature cow weight where available. Other traits should also be included, such as calving ease direct, growth rate, eye muscle area and fat depth.



## When to calve heifers for the first time?

The most efficient time to calve heifers for the first time is at two years of age. To make this happen, heifers need to be managed carefully from birth as they face more challenges than a mature cow does, such as the first calving and lactation, getting pregnant again and continuing to grow towards mature weight.

Typical milestones for the CAFRE heifers are shown in Table 1 below.

| Event | Age (months) | Average Daily Gain (kg/d) | Weight (kg) |
|---|---|---|---|
| **Born (May)** | | | 40 |
| | | 1.0 | |
| **Weaned (Nov)** | 6 | | 220 |
| | | 0.8 | |
| **Turnout (Apr)** | 11 | | 340 |
| | | 0.8 | |
| **Bulling (Aug)** | 15 | | 440 |
| | | 0.8 | |
| **Housing (Nov)** | 18 | | 500 |
| | | 0.3 | |
| **Calving (May)** | 24 | | 550 |
| | | 0.3 | |
| **Weaning (Nov)** | 30 | | 600 |

Table 1: Weight targets for 2 year old CAFRE heifers calving in May from birth to weaning first calf.

A heifer must reach puberty before the breeding season commences and body weight is a major factor in the onset of puberty. In fact, fertility increases until the third oestrus after puberty so heifers should have had two cycles before the start of the breeding season. Achieving the weights in Table 1 ensures that heifers reach 65% of their mature weight at bulling and at least 95% of heifers will have had 2 cycles by then.

Since the majority of calving problems in a herd occur when calving first-calf heifers, it seems only logical to synchronize and AI heifers to proven easy calving bulls. At CAFRE heifers are synchronised so that all heifers are AI'd once in a 9 day period. Any heifers that

do not hold to this service will only get one more AI opportunity as they are entering a compact (9 week) calving herd. A well proven AI sire that is a trait leader for calving ease direct, (short) gestation length and (low) birth weight is used.

A further misconception is that calving heifers at 2 years old will stunt their growth and adversely affect cull value. However, data from the CAFRE Hill farm has shown that 2 year old calving heifers reach maturity at a similar body weight to heifers that calved at 3 years old for the first time but produce an extra calf in the same time. More than 95% of these heifers went on to successfully calve for the second time at 3 years old.

## Summary

- Assess current management strategy if annual culling rate is 25% or more.
- Implement a meaningful health plan and stick to it – don't take risks if buying in heifers.
- Consider condition scoring cows and manage extremes carefully.
- Only select heifers from parents with desirable and important traits (fertile, trouble free, EBVs for calving ease direct and daughters, growth, milk, muscle and fat).
- Calve at two years old for maximum efficiency.
- Manage heifers to be at 65% of their mature weight at bulling and use a proven easy calving AI sire.



# The Bovine Information System – BovIS

**The rising cost of production and competition from cheaper imports in the Northern Ireland beef market led to the creation of the Red Meat Industry Task Force (RMITF), which was established to develop a five to ten year strategy for beef and sheep meat production.**

In 2007, the RMITF released its report with a key recommendation being to make better use of industry and APHIS data through the creation of an integrated database. This recommendation led to a DARD and AgriSearch funded initiative to develop such a system. AFBI have made the first steps in developing the database under the banner of the Bovine Information System (BovIS). With the cooperation of a number of Northern Ireland meat processors (Figure 1) and the assistance of CAFRE, AFBI have developed a database which captures kill information from the abattoirs and combines this with animal data held within APHIS. The far reaching benefits of this new collaboration between industry, research and government will be felt at all levels of the beef industry.

1. Foyle Omagh
2. Foyle Campsie
3. Dunbia
4. Linden Foods
5. WD Meats
6. ABP Newry
7. ABP Lurgan

Figure 1: Current abattoirs submitting information to the BovIS database.

## How does BovIS work?

Seven major Northern Ireland abattoirs, which account for around 90% of the annual Northern Ireland kill, submit information to the BovIS database. Every night, the carcase information is downloaded from each abattoir and cross-referenced with animal data downloaded from APHIS. The information is assimilated and held centrally at AFBI, with data protection agreements in place to protect personal information.

## Opportunities presented by BovIS
### Industry benefits

Information is available on dam and sire breed, gender, age, carcase weight, movements, fat class and conformation grade and their interactions on growth and carcase characteristics. Annual analysis of the entire dataset from BovIS enables trends within the industry to be monitored and the impact of potential policy changes to be modelled.

| Conformation | % of Cattle | Carcase weight (kg) | Av. carcase weight minus 10kg (% cattle) | Av. carcase weight plus 10kg (% cattle) |
|---|---|---|---|---|
| E | 0.4 | 440 | 0.4 | 1.8 |
| U | 17.1 | 384 | 15.6 | 20.8 |
| R | 42.7 | 344 | 38.7 | 40.6 |
| O+ | 16.0 | 314 | 18.1 | 14.8 |
| O= | 9.4 | 302 | 10.7 | 9.0 |
| O- | 7.5 | 292 | 7.8 | 7.4 |
| P | 7.0 | 273 | 8.7 | 5.4 |

Table 1: Conformation grade and relationship with carcase weight.

An example of the powerful modelling capabilities available is demonstrated by Table 1, which shows that if carcase weight increased by 10kg across the board in Northern Ireland, the percentage of E, U, R, and O+ grades would increase from 76.2% to 78.0%. Obviously increasing carcase weights by 10kg across the board would put many cattle out of the in spec weight range but the table highlights the power BovIS has to model the impact of change. In addition, analysis of the information available from offspring of individual sires allows the genetic merit of individuals to be determined, leading to the development of future genetic improvement programmes. In essence, the combined information can be used to identify breeding and management strategies to meet market specifications with maximum production efficiency.

## Producer benefits and benchmarking

At producer level, key benchmarking data can be generated relating to reproductive performance of beef cows, and the growth and carcase quality of cattle (both dairy and suckler bred). An online carcase monitoring tool has been launched and is currently available through DARD online services. This easy to use system enables each producer to view information such as tag number, carcase weight, fat class, conformation and carcase growth rates from animals they have recently had killed within one of the seven participating BovIS meat plants. Aside from being able to track the performance of offspring from different dams and sires, each producer will be able to benchmark the performance of their cattle against producers rearing similar animals.

An example of the capabilities of the benchmarking tool is demonstrated in Figure 2, a sample benchmarking report showing the performance data of 77 dairy bred steers slaughtered between 1 May 2011 and 31 May 2012. The 'Summary of your performance' table gives an opportunity for the producer to examine the weight, conformation grade and fat class of the animals they have produced and also see how many of those animals achieved the ideal market specification. Individual animal data as well as the dam and sire information can be viewed, sorted and analysed. This valuable information can be used by the producer to evaluate their breeding, management and production system.

An exciting component of the application is the ability of producers to compare how their cattle have performed against similar cattle slaughtered in Northern Ireland during the same time period. In the example shown in Figure 2, the performance of the 77 steers is compared with not only the average producer of dairy bred steers, but also the top 10% of producers, based on daily carcase gain. This information, combined with a knowledge of the production system being used on the farm, can help pin point areas for improvement and closer examination. Finally, the system not only allows producers to compare the performance of breed types or breeds, but also compare animal performance during different time frames. In the

example, the producer has compared how their dairy bred steers have performed against their continental X dairy steers, and also their dairy bred steers, slaughtered the previous year.

Very positive and encouraging feedback has been received from farmers who have used the system, with comments including; "very useful system and easy to use", "brilliant to have this information without having to input anything", "this will help improve my business by providing me with the information to make informed decisions". Over the coming months CAFRE will be providing training to ensure farmers get the most from the system but the system is now live and available for all producers registered for DARD online services to use.


Figure 2: A sample benchmarking report showing the performance of dairy bred steers.

"This will help improve my business by providing me with the information to make informed decisions"

— Comment from Pilot Farmer



## Growth monitoring program

The AFBI growth check tool is an intuitive web-based programme which enables commercial farmers to easily compare the weight of their cattle at a certain age to industry best practice targets. The programme is freely available within DARD online services, allowing the farmer exclusive access to his/her own farm information. The simple to use program returns a list of available animals within the user's herd that meet the date of birth range and animal category selected. For each animal category, AFBI have created best practice growth curves based on local and international research and current market specification requirements. These curves are adjustable based on the user requirements.

For example, in the case of dairy or suckler herd replacements, the farmer will input the mature cow weight (Figure 3) which will adjust the expected weight at calving and the target weights for any given month of age. The growth check is currently available for dairy and suckler herd replacements and dairy bred steers, bulls and heifers. Once the producer inputs the relevant weights the summary table and growth charts are produced (Figure 4). From these the producer can clearly see how the individual or group of animals are performing against target and make an informed decision on how to best achieve the next target.


Figure 3: The simple user interface provides an easily operated program; this image shows where the farmer enters the mature weight for a group of cattle and then can enter the individual weights for each individual animal.

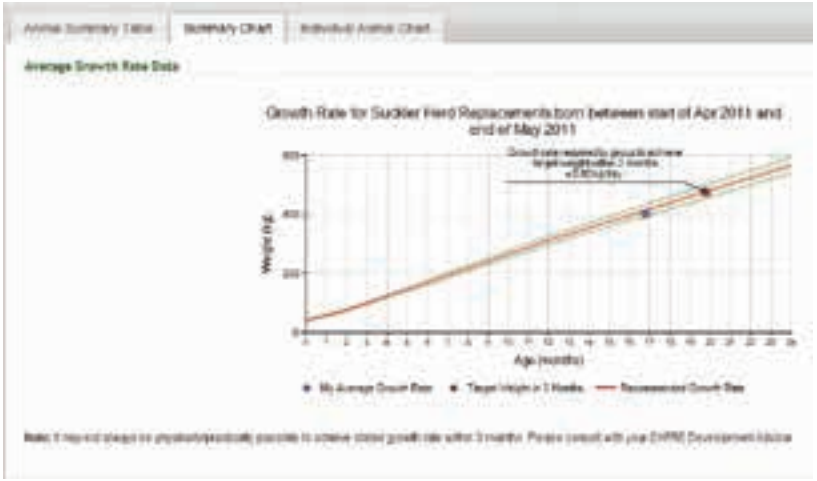


Figure 4: An example growth curve generated by the programme. The recommended growth rate is shown with the limits ±5%. In this example the group does not achieve target weight, and the target growth required for the next three months is shown.

A more comprehensive analysis is available in the animal summary table (Figure 5), which states the detailed information on each animal and their individual targets and daily live weight gain. Customised growth plans will help the farmer achieve best practice targets and increase production efficiency.

Figure 5: A tabular breakdown of the individual weights and targets for each animal, so if need be, the farmer can split groups by performance and tailor rationing to individual animal needs.



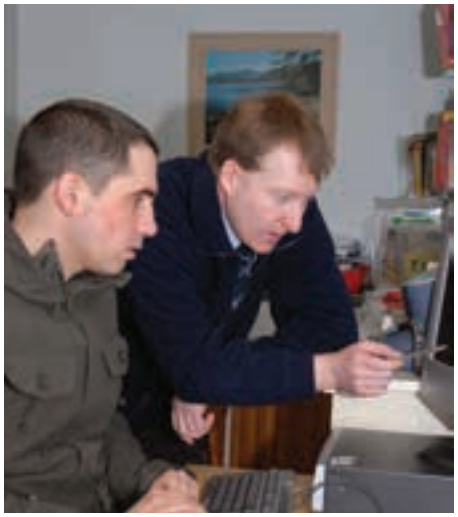
## Growth monitoring in action

The development of the online BovIS Growth Check program emanated from both dairy and beef on-farm research conducted by AFBI and funded by DARD and AgriSearch. Both projects were based on the principle of regularly monitoring animal growth and adjusting diets based on actual animal performance.

Within the beef project, eleven commercial beef farms participated in the study with the aim of improving production efficiency through either meeting target slaughter weights at the correct age with minimal concentrate input, or calving suckler herd replacements at 24 months of age at the optimum weight. AFBI staff visited each farm at 2-3 month intervals during the project, recording animal live weight and diet information. Feedback for each visit was compiled manually by AFBI staff and forwarded to the farmer within one week. This included detailed information on each animal and growth curves for both the group and individual animals. Tailored rationing advice was provided based on current animal performance and growth required to achieve next target weight.

**How successful was the simple 'monitoring to manage' concept?**

All producers commented that through monitoring cattle performance against targets they had more confidence to make management decisions, which was highlighted by the age at first calving being reduced by an average of 3.3 months. This one-to-one tailored growth monitoring and guidance is now available through the BovIS Growth Check online tool with exciting additions to the application planned for the future.




**Summary**

BovIS development has only started but already we have a ground-breaking suite of applications available, which enable producers to view and benchmark the performance of slaughtered animals, compare the performance of progeny from different dams or sires, and receive tailored growth monitoring reports.

Other exciting developments are planned, all aimed to assist producers in improving production efficiency leading to financial and environmental benefits. At industry level, alongside the valuable information already available from the Livestock and Meat Commission, the development of BovIS enables the Northern Ireland beef Industry to monitor and evaluate production/fertility trends accurately and creates the possibility of developing industry tools to forecast the outcome of changes in market requirements.

For more information on the BovIS Growth Check tool and BovIS Carcase benchmarking application, please contact your local CAFRE Beef and Sheep Development Adviser.




# Winter feeding

**The adverse weather conditions this year have caused major difficulties on many livestock farms across Northern Ireland. Heavy rain has resulted in waterlogged fields, which has reduced grass growth, created very difficult grazing conditions and delayed silage cutting on many farms. Consequently, many farmers are faced with low quality silage this winter, and in some cases fodder shortages.**

At the outset, it is important to stress that whilst there are no simple answers to these problems, access to the latest research findings may help to identify the best options for the way ahead. Furthermore, assessing the situation now, at the start of the winter, and planning a winter feeding strategy will be the key to minimising the financial consequences for the farm business this winter.

Assessing both silage quantity and quality is an essential element of any winter feeding plan and is particularly important this year. AFBI provide a commercial service which evaluates silage quality called the Hillsborough Feeding Information Service (HFIS). The service uses the latest technology to evaluate both the intake potential and energy and protein value of silages. This information is then used, in conjunction with other research data, to predict performance of growing cattle, suckler cows, dairy cows, breeding sheep and growing lambs. For request forms and sample bags, please contact Kyla or Louise on 028 9268 1589.

When the dry matter content of the silage is known from the analysis, the silos can be measured, and the tonnage of silage dry matter calculated. This will indicate if silage stocks are adequate, or alternatively, quantify the amount of shortfall for the coming winter, therefore allowing a feed budget to be devised. Full details on assessing winter feed stocks and calculating winter feed requirements are available on the Rural NI website (http://eservices.ruralni.gov.uk/onlineservices/Tools/Beef/silovol.asp).

## Relative value of feeds

If feeding a lower quality silage than normal, a higher level of concentrate supplementation will be required to sustain animal performance. Alternatively, offering a higher level of concentrate will reduce silage consumption where there are silage shortages. However, this year concentrate feed prices have increased markedly, so careful consideration needs to be given to the composition of the concentrate.

## Relative value of straights

Concentrate feedstuffs are generally evaluated in terms of their chemical analyses, such as oil, protein, fibre and ash contents. However, when offered to cattle as supplements to silage, individual feedstuffs have very different effects on the digestion of the silage in the diet. Consequently, individual feedstuffs may have either higher or lower feeding values as supplements to grass silages than their chemical analyses would suggest. A range of studies undertaken at AFBI Hillsborough has determined the value of feedstuffs in terms of levels of performance sustained in beef cattle.

The results are presented in Table 1 and demonstrate the relative value of a range of feedstuffs in terms of their ability to sustain animal performance relative to barley and soyabean meal as energy and protein sources. If feedstuffs can be purchased for less than the value shown in Table 1, then they represent good value for money. The data presented assumes rolled barley (14% moisture content) at £224/tonne and soyabean meal at £441/tonne but this can be re-calculated using current barley and soyabean meal prices at http://eservices.ruralni.gov.uk/onlineservices/Tools/Beef/relativeprog.asp. When evaluating by-product feeds, consideration needs to be given to the fact that composition can be variable, therefore it is useful to have a representative sample analysed prior to purchase. Also the physical composition of by-product feeds can vary between batches, which can affect intake and performance.



| | Relative feed value (£) | ME (MJ/kg fresh weight) | Protein (% fresh) |
|---|---|---|---|
| **Rolled Barley** (14% MC) | **224** | **11.4** | **9.5** |
| **Moist barley** (18% MC) | 219 | 11.2 | 9 |
| **Wheat** (14% MC) | 224 | 11.4 | 11 |
| **Maize meal** (high silage diet) | 258 | 13.2 | 8 |
| **Maize meal** (high concentrate diet) | 280 | 14.7 | 8 |
| **Maize gluten** (growing cattle) | 267 | 10.9 | 18 |
| **Maize gluten** (finishing cattle) | 248 | 9.6 | 18 |
| **Citrus pulp** | 192 | 10.6 | 6 |
| **Molasses** | 142 | 8.0 | 4 |
| **Molassed sugar beet pulp** | 210 | 10.6 | 9 |
| **Soyabean** | **441** | **11.6** | **46** |
| **Rapeseed** | 371 | 10.8 | 36 |
| **Maize distillers** | 324 | 11.6 | 26 |

Table 1: Relative feed value of straights compared with barley and soyabean meal (assuming rolled barley @ £224/tonne and soyabean meal @ £441/tonne, September 2012).

## Options for processing cereals

Traditionally cereals are harvested at a moisture concentration lower than 20% and either treated with propionic acid (Propcorn) or dried prior to storage for subsequent rolling or milling prior to feeding. Alternative systems of storing and processing grain are currently available. These enable the grain to be harvested at a higher moisture concentration. Two such methods are, (1) crimping and treating with an additive prior to ensiling, and (2) whole grain treated with urea. Both these methods, which involve harvesting the grain at a moisture concentration of approximately 30% followed by treatment and ensiling, leave the grain in storage ready for feeding, which consequently reduces the labour requirement at feeding compared with the traditional methods. Research at AFBI compared the performance of finishing beef cattle offered grain processed by these alternative methods with the traditional propionic method.

Relative to the propionic treatment, urea treatment increased forage DM intake by 14% but tended to decrease carcase gain by 8% due to increased grain loss in the faeces and consequently, a reduction in the metabolisable (ME) concentration in the diet (Table 2). Crimping grain did not alter feed intake or carcase gain and thus this treatment provides a biologically equally effective alternative to the traditional propionic method to store and process the grain. The crimping method could be particularly useful in wet seasons that are challenging for getting the crop harvested.

| | Processing method | | |
|---|---|---|---|
| | Propionic | Urea | Crimped |
| Feed intake (kg DM per day)† | | | |
| Forage | 4.2 | 4.7 | 4.4 |
| Total | 8.9 | 9.4 | 9.0 |
| Animal performance | | | |
| Final live weight (kg) | 625 | 618 | 625 |
| Liveweight gain (kg/day) | 1.04 | 0.98 | 1.04 |
| Carcase gain (kg/day) | 0.60 | 0.55 | 0.61 |
| Carcase weight (kg) | 338 | 333 | 341 |

Table 2: The effect of grain processing method on feed intake and animal performance (Keady et al., 2008).
† Concentrate consisted of 85% wheat and 15% citrus pulp on a dry matter basis.

## Relative value of forages

In cases of fodder shortages, consideration needs to be given whether to purchase additional conserved forage or to consider feeding systems based on limited forage with additional supplementary feedstuffs offered. Prior to purchasing additional conserved forage, the silage analysis is essential to calculate its relative value to other feedstuffs.

**The relative value of forages can be calculated online:**
http://eservices.ruralni.gov.uk/onlineservices/Tools/Beef/relativeprog.asp
(go to enter your own feedstuff), however the ME and protein content needs to be converted to a fresh weight basis (multiply by dry matter then divide by 100).

For example, if the silage dry matter is 20% then:
If protein is 12.0% DM this converts to 2.4% fresh wt [(12x20)/100 = 2.4].
If ME is 10.9MJ/kg DM this converts to 2.18MJ/kg fresh wt [(10.9x20)/100 = 2.18].

## Feeding weanling sucklers

Weanling sucklers are often stored over the expensive winter feeding period, which enables the cattle to obtain compensatory growth on good grazing during the following spring and summer. Target live weight gain during this period should be 0.7kg/day for continental steers and 0.6kg/day for continental heifers. A lower quality silage can be compensated for by offering a higher level of concentrate. Appropriate levels of concentrate feeding to achieve the target rates of gain in weanling stores using different qualities of silage are shown in Table 3. Research has indicated a protein content in the concentrate of around 17% for cattle on this type of grass silage diets with low levels of concentrate feeding. Minerals and vitamins must also be included.

| | Silage quality | | |
|---|---|---|---|
| | High (ME 11.5MJ/kg DM) | Medium (ME 10.5MJ/kg DM) | Low (ME 9.5MJ/kg DM) |
| Continental steers (target gain 0.7kg/day) | 0.7 | 2.0 | 3.0 |
| Continental heifers (target gain 0.6kg/day) | 0.6 | 1.7 | 2.6 |

Table 3: Concentrate requirements for weanling store calves (kg/day) (Steen 2004).

In a season where silage quality is medium to low quality and concentrate is very expensive, consideration could be given to lowering the performance than indicated in Table 3 to 0.3kg/day. However, to ensure lifetime performance is not reduced it is critical that subsequent nutrition is maintained at a high level by having an early turnout to pasture, good grassland management and ad libitum concentrate finishing (Table 4). The economics of such systems should be evaluated carefully before embarking on them. The economics of various beef production systems can be calculated using the online business tools on the rural portal (http://eservices.ruralni.gov.uk/onlineservices/Tools/Beef/spring2.asp).

| | Intake and performance data | | | |
|---|---|---|---|---|
| **First winter growth phase concentrate inputs (kg/day)** | **0.5** | **0.5** | **2.0** | **2.0** |
| **Second winter finishing phase concentrate input (kg/day)** | **4** | **Ad libitum** | **4** | **Ad libitum** |
| Total concentrate inputs (t/head) | 0.56 | 1.29 | 0.73 | 1.42 |
| Total silage inputs (t DM/head) | 1.19 | 0.70 | 1.19 | 0.66 |
| First winter live weight gain (kg/day) | 0.33 | 0.27 | 0.68 | 0.66 |
| Second winter live weight gain (kg/day) | 0.82 | 1.25 | 0.86 | 1.13 |
| Carcase weight (kg) | 343 | 377 | 354 | 377 |

Table 4: Effect of plane of nutrition throughout the lifecycle of a beef steer (24 month system) on feed intake and animal performance (Lively et al., 2009).



## Feeding finishing cattle

As with weanling stores, lower quality grass silage can be compensated for by offering a higher level of concentrate. However, the optimal levels of concentrate feeding are also affected by the gender and growth potential of the animal. Appropriate rates of concentrate feeding to produce adequate levels of finish in steers and heifers are shown in Table 5. These daily quantities are based on a typical finishing period of 150 days. A change in silage quality from high to medium will require 290kg additional concentrates/head over a 150 day finishing period, and a further 150kg/head on moving from medium to low quality.

As silage quality declines, both the protein content and the digestibility of protein also decline. Research at AFBI on protein levels for finishing cattle on silage-based diets indicates that a protein level of around 13% in dry matter of the total diet is adequate for finishing steers and heifers, but that a level of approximately 15 to 16% in dry matter in the total diet is appropriate for finishing bulls on silage-based diets. When grass silage has reasonable digestibility, e.g. 10.5 ME (MJ/kg DM) and 14% protein in dry matter, rolled barley on its own (plus minerals and vitamins) contains adequate protein for finishing steers and heifers. When silage has a low protein content, e.g. 10% protein in dry matter, a concentrate with just under 14% protein (fresh basis) will provide adequate protein for finishing steers and heifers. Straight feeds can often provide greater financial value than purchased beef finisher rations, however mineral/vitamin supplements will be required within the mix.

| | | Silage quality | | |
|---|---|---|---|---|
| | **Target live weight gain (kg/day)** | **High (ME 11.5MJ/kg DM)** | **Medium (ME 10.5MJ/kg DM)** | **Low (ME 9.5MJ/kg DM)** |
| Young continental bulls | 1.3 | 5.5 | 7.5 | 9.0 |
| Continental steers | 1.1 | 4.5 | 6.4 | 7.5 |
| Continental heifers | 0.85 | 2.7 | 4.3 | 5.6 |

Table 5: Concentrate requirements for finishing cattle (kg/day) (Steen 2004).

## Alternative forages for finishing beef cattle

Although grass silage remains the predominant basal forage for beef cattle in Northern Ireland during the winter feeding period, there has been increased interest in recent years in a number of alternative forage crops, such as forage maize, whole crop wheat and legume/cereal mixtures.

### (1) Forage maize

The development of early maturing maize varieties, coupled with the development of the complete cover plastic mulch system of maize production, has resulted in the potential yield of forage maize increasing from 4-5t DM/ha in the 1960's to 12t DM/ha in the late 1990's. Furthermore, the production cost of maize silage can be competitive with that of grass silage provided a yield greater than 15t DM/ha can be obtained. Research studies undertaken at AFBI, Hillsborough with finishing continental steers have consistently shown maize silage inclusion in the diet (either partial or total replacement of grass silage) has resulted in higher feed intakes and higher animal performance relative to grass silage (Table 6). However, the economics of growing forage maize is very dependent on land location and type and unless a good yield (>15t DM/ha) can be obtained should not be considered.

| | Maize: grass ratio | | |
|---|---|---|---|
| | 0:100 | 50:50 | 100:0 |
| **Feed intake (kg DM/day)** | | | |
| Forage intake | 4.9 | 5.8 | 6.4 |
| **Animal performance** | | | |
| Live weight gain (kg/day) | 0.74 | 0.88 | 1.03 |
| Carcase gain (kg/day) | 0.48 | 0.56 | 0.63 |
| Carcase weight (kg) | 351 | 364 | 373 |
| Fat classification | 3.0 | 3.5 | 3.3 |

Table 6: Comparison of the performance of finishing beef cattle offered maize silage as the sole forage or in combination with grass silage (Keady and Gordon 2006).



### (2) Whole crop wheat silage

AFBI research has shown that offering finishing beef cattle a mixture of whole crop wheat silage (32% DM and 21% starch) and grass silage at a ratio of 40:60 on a DM basis relative to good quality grass silage as the sole forage, increased forage DM intake by 15% and liveweight gain by 17%, but did not increase carcase gain.

| | Forage | |
|---|---|---|
| | Grass silage | Grass silage plus whole crop wheat silage |
| **Feed intake** | | |
| Forage intake (kg DM/day) | 5.1 | 5.8 |
| **Animal performance** | | |
| Liveweight gain (kg/day) | 0.86 | 1.01 |
| Carcase gain (kg/day) | 0.51 | 0.50 |
| Kill out percentage (%) | 54.3 | 52.8 |
| Carcase weight (kg) | 326 | 325 |

Table 7: The effect of including whole crop wheat on beef cattle performance (Keady et al., 2007).

### (3) Legume/cereal whole crop silage

Increasing costs associated with finishing beef cattle have lead to an increased interest in legume/cereal wholecrop silages. The legume component of the wholecrop mixture fixes atmospheric nitrogen into nitrogen in the soil which adds to soil fertility thereby reducing the fertiliser nitrogen requirement. However, due to their low water soluble carbohydrate and dry matter contents, ensiling legumes leads to problems with effluent production and fermentation. To overcome these problems, establishing a cereal crop along with a legume crop increases dry matter and water soluble carbohydrate concentrations, thereby reducing effluent and improving fermentation. AFBI, Hillsborough has undertaken three studies to evaluate the role of legume/cereal wholecrop silage mixtures in the diet of finishing beef cattle.

The legume/cereal silages evaluated were lupins/triticale, lupins/wheat, vetch/barley, and peas/oats. These mixtures were spring sown and harvested in late summer when the cereal grain was around 20-25% moisture. This was at a later stage than would be normal for wholecrop cereal (i.e. between the wholecrop and combine stage) to allow the legumes to ripen to increase protein content. Results presented in Table 8 demonstrate that the dry matter yield per hectare achieved from the various legume/cereal wholecrop forages were much lower than that obtained from a 3-cut grass silage system, which consequently lead to a higher production cost per tonne of legume/cereal wholecrop mixture silage despite the legume/cereal forage having a lower fertiliser nitrogen requirement.

The protein content of the legume/cereal wholecrop silages containing the lupins and vetches were 3% higher than that of typical good quality grass silage (15.7 versus 12.6%). When fed to beef cattle, legume/cereal wholecrop silages offered either as the sole forage or in addition to grass silage reduced liveweight gain by 10% relative to good quality grass silage (D value = 69) (Table 8). These results demonstrate that for beef producers to optimise performance they should place increased emphasis on making good quality grass silage rather than considering legume/cereal wholecrop silages.

| Silage type | Yield (t DM/ha) | Protein content (%) | Forage intake (kg/day) | Live weight gain (kg/day) |
|---|---|---|---|---|
| Grass (3 cut) | 13.8 | 12.6 | 5.9 | 0.89 |
| Lupins/triticale wholecrop‡ | 7.4 | 14.1 | 6.2 | 0.74 |
| Lupins/wheat wholecrop | 8.9 | 18.2 | 6.7 | 0.89 |
| Vetch/barley wholecrop | 6.6 | 14.7 | 6.0 | 0.64 |
| Peas/oat wholecrop | 7.3 | 10.2 | 6.0 | 0.95 |
| **Wholecrop vs grass silage** | **-6.3t DM/ha** | **+1.7%** | **+0.3kg/day** | **-0.09kg/day** |

Table 8: Yield and protein content of the legume/cereal whole crop silages relative to grass silage and impact on animal performance (Lively et al., 2009).
‡ Based on the average yield from 3 crops.



## Conclusions

- Assess fodder quality and quantity to plan winter feeding programme.
- Calculate relative feed values prior to purchasing feed using http://eservices.ruralni.gov.uk/onlineservices/Tools/Beef/relativeprog.asp.
- Harvesting cereal at 30% moisture, crimping and treating with an additive prior to ensiling is an equally effective alternative to the traditional propionic method to store and process grain.
- Aim to grow weanlings at 0.7 and 0.6kg/day for steers and heifers respectively during their first winter.
- Aim for growth rates of 1.3, 1.1 and 0.85kg/day during the finishing period for continental bulls, steers and heifers respectively.
- Maize silage is the only alternative forage that can enhance animal performance relative to good quality grass silage. However, it is only economical if a good yield (>15t DM/ha) can be grown.
- Producing high quality grass silage is the key to improving animal performance with minimal concentrate requirement.

## Acknowledgement

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## References

Keady, T.W.J. and Kilpatrick, D.J. (2006) The effect of forage: concentrate ratio on the performance of bulls slaughtered at a range of live weights. Proceeding of the British Society of Animal Science, p. 50.
Keady, T.W.J., Lively, F.O., Kilpatrick, D.J. and Moss, B.W. (2008) The effects of grain treatment, grain feed level and grass silage feed value on the performance of, and meat quality from, finishing beef cattle. Animal, 2.1: 149-159.
Lively, F.O., Kennedy, P.C. and Dawson, L.E.R. (2009) Legume/cereal whole crop silages for finishing suckler origin beef cattle. Proceeding of International Suckler Cow Workers Meeting, p. 34-41.
Steen, R.W.J. (2004) Using research to reduce the costs of producing beef and lamb. AgriSearch Review.

# Improving technical efficiency through better grassland management

Grazed grass and high quality grass silage remain vital components within profitable beef production systems. To maximise the potential from grass a high level of management is required to not only grow the grass but to ensure the grass is well utilised to achieve higher liveweight gains.

To achieve high levels of stock performance at grass it is important to monitor your performance and set realistic targets for your farm. Figure 1 shows the link between beef produced from forage and gross margin per cow. Each 100kg of beef from forage is worth an extra £100 gross margin per cow.

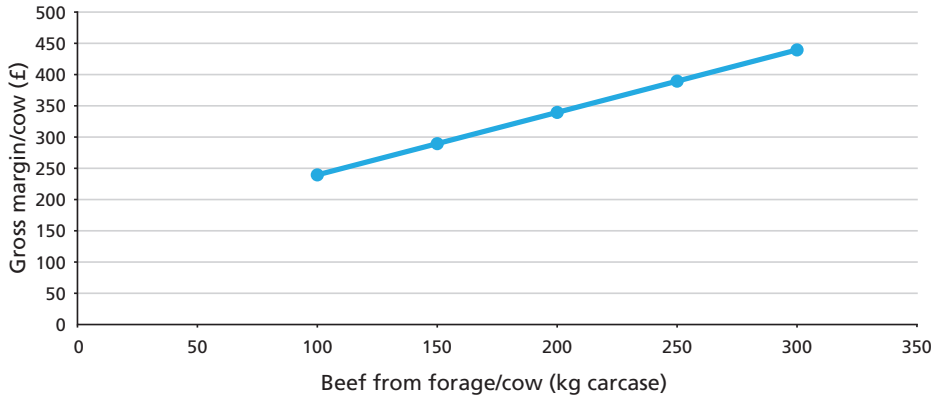


Figure 1: Beef produced from forage and grass margin per cow. (source: CAFRE Benchmarking).

Targets will depend principally on soil type and location. For example, steers grazing good grass leys on free draining soils should gain at least 200kg live weight during a minimum 6 month grazing period. Unfortunately, due to poor grazing management, many steers only gain in the region of 100kg during the grazing period.

Good grazing management is achieved through balancing the grass supply with demand irrespective of which grazing system is used.



## Key components of efficient grassland utilisation

### Turn out cattle early

There is research to show the economic benefits from the early turn-out of cattle. Work at AFBI, Hillsborough, has found that turning out continental-sired forward steers (>425kg) in mid-March (destined for slaughter in August), rather than early May resulted in the early group producing 23kg more carcase weight per head.

The successful early turnout of cattle requires planning, which may include the grazing of a proportion of the area to be harvested for silage. Where this is the case, the silage area should be grazed no later than the first week in April and grazed down no further than 1800kg DM/ha.

If these guidelines are followed any reduction in silage yield should be less than 10%. Such a reduction in the yield of first cut silage is offset by the lower requirement for silage due to the earlier cattle turnout.

### Cattle stocking rates should start low at turnout, peak quickly in April/May and gradually reduce into the autumn

A well managed grazing system is dependent on a combination of good planning and accurate grass cover measurements. Table 1 provides a guide to potential stocking rates during the grazing season. This information can be used to determine the approximate area required for grazing when making grassland and grazing management plans.

| Stock carried/ha | March | April-June | June-August | September-October |
|---|---|---|---|---|
| Suckler cow plus calf | 2 | 3.5 | 3 | 2 |
| 400kg store | 2 | 5 | 3 | 2 |
| 320kg store | 3 | 6 | 4 | 2 |
| 250kg store | 4 | 8 | 5 | 3 |

Table 1: The approximate number of cattle grazed over the season on a productive grass sward receiving 200kg N/ha.

To facilitate an early turnout:

- Keep group size small.
- During wet weather subdivide the grazing paddocks into smaller blocks and move cattle daily to avoid poaching.

Beef cattle should be offered blocks of grass on a daily basis when ground conditions are difficult.

## Grazing systems

### Rotational grazing systems

Rotational grazing is the most suitable grazing system for matching grass supply with animal demand.

### Benefits

- More grass is produced and potentially more live weight gain is achieved per hectare.
- It can lead to savings in fertiliser.
- It is easier to match grass supply to demand.
- Areas of surplus grass can be identified and removed as silage.*
- It is less likely to allow unpalatable grazing areas to develop.
- A leader follower system is easily integrated with rotational grazing.

*Note surplus silage can be fed back if grass supply falls or cattle have to be housed during wet weather.

Although rotational grazing systems are more expensive to set up than a continuous stocking system, they are easier to manage. Grass cover targets (Table 2) lead to more precise control of grazed grass in rotational systems. In turn, it is possible to use grass covers to determine the supply of grass and by estimating the demand of the cattle (2.5% of live weight), a grass budget can be calculated to determine more precisely if grass supply is outstripping demand.

Work at CAFRE, Greenmount Campus, found that well managed rotational grazing systems can lead to steer gains of up to 1.2kg/head/day.

| Grazing period | Grass cover (kg/DM/ha) |
|---|---|
| Entry to paddock in March/April at: | 3000 |
| Remove paddock and cut for silage when: | >4000 |
| Up to end of July graze down and exit at: | 1600 |
| August onwards graze down and exit at:* | 1700 |

Table 2: The grass covers relating to the management of a rotational grazing system for growing/finishing cattle (kg DM/ha).

* To encourage a faster spring regrowth do not graze below 1600kg DM/ha in the autumn.

## Continuous Stocking System

This is a low-cost, low-labour system and is ideal at the start and end of the grazing season when grass growth is low. However, in the absence of a grass buffer and regular grass cover assessments, an over-supply of grass may occur which can result in poor quality grass later in the season.

A grass buffer is where approximately 1/3 of the grazing area is closed off at turnout. This may be one or two entire fields, which can either be cut for silage or grazed, depending on grass growth. This approach gives good grass control up to first cut, after which the grazing area is extended to include silage aftermaths.

This approach to set stocking, known as Block Buffer Grazing (BBG), does mean that the majority of the area must be suitable for silage making. Grass cover targets for a continuous stocking system are shown in Table 3.

| Grazing period | Sward height (cms) | Average grass cover (kg DM/ha) |
|---|---|---|
| Turnout* | 5 | 2000 |
| Up to July | 6 | 2100 |
| Mid August – Mid September | 10 | 3100 |
| Late October – Mid November | 6 | 2100 |

Table 3: Target grass covers over the season for beef cattle grazing on a continuous stocking system.

* Includes grazing and accessible silage areas.

Whilst it is more difficult to effectively manage a continuous stocking system than a rotational system, it can, when well managed, produce high individual animal performance and high live weight gains per hectare.



## Feeding concentrates to cattle at pasture

Research shows that there is no response in terms of stock performance to concentrate supplementation over the main grazing season if cattle are grazed on well managed grass swards.

However, it has been shown that there is a benefit of feeding 3kg of concentrates/head/day to cattle from late August until slaughter, if they have the potential to finish at grass thus saving expensive housing and winter feeding.

The level of concentrate fed will depend on grass quality, grass availability and the breed, fat cover and sex of the cattle in relation to the target finishing date.

During prolonged periods of wet weather, when grass DM intakes are reduced, stock may require concentrate supplementation to maintain target daily liveweight gains.

## Grazing suckler cows

Spring-calving suckler cows lose condition after calving and it is important that they have adequate grazing over the summer to ensure they reach a target condition score of 3 before weaning in the autumn. However, it is important to achieve a balance between maximising calf performance and ensuring that cows maintain optimum body condition.

### To ensure high levels of cow and calf performance grass covers of 2600-2900kg DM/ha should be maintained.

The results presented in Figure 2 demonstrate that maintaining a sward around 8-9cm in height (cover of 2600-2900kg DM/ha) ensures that high levels of cow and calf performance can be obtained.

When sward height is reduced to 5-6cm in height (1900kg DM/ha to 2100kg DM/ha), calf performance will suffer unless calves have access to additional grazing or creep feed.

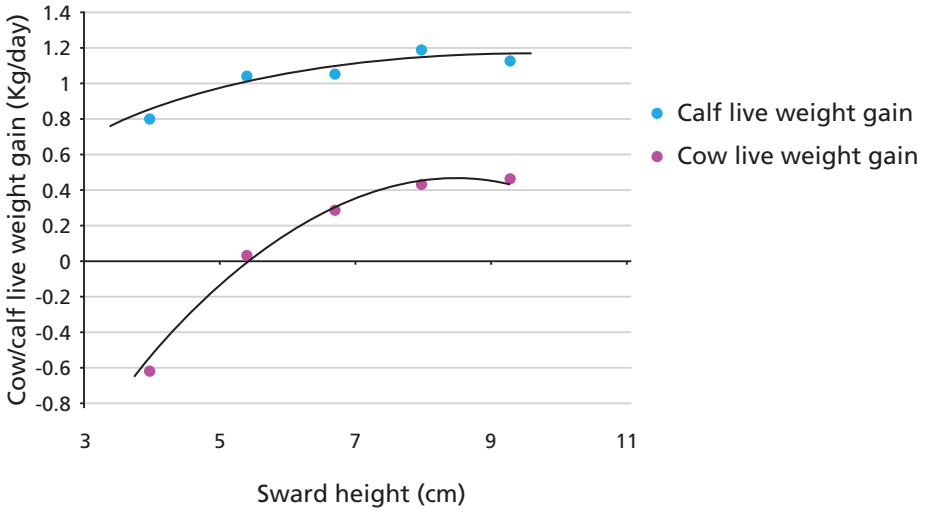


Figure 2: Effect of sward height (cm) on performance of suckler cows and their calves.

## Mixed grazing of cattle and sheep

In several experiments, grazing cattle and sheep together has resulted in better individual animal performance, higher output of live-weight gain per hectare and better utilisation of swards. Performance benefits of up to 15% have been observed in the growth rate of cattle and up to 45% in the growth rate of suckling lambs. Consequently, grazing cattle and sheep together rather than separately tends to increase total live weight gain/hectare by about 10%. There are a number of additional benefits to mixed grazing including:

- Reduced poaching during wet weather, because even though the overall stocking rate is the same, the number of cattle grazing/hectare is lower than when cattle are grazed alone.
- Reduced burden of parasitic worm larvae on the pasture because the number of either sheep or cattle grazed/hectare is lower than if they are grazed separately.

This year twelve grass/clover monitor farm groups were established to facilate discussion by local farmers on improving livestock performance from grazed grass. To get involved with future groups contact your local CAFRE Beef and Sheep Development Adviser.



# Managing soils to maximise performance

Soil conditions on beef farms directly influence how well grass and forage crops grow, and the quality of feed they produce. As soil plays such an integral part on the farm, it is important to assess and monitor its chemical and physical properties.

## Soil Analysis

Soil analysis is the starting point for determining the soil nutrient requirements for optimum grass and crop production. An up-to-date soil analysis will provide details of the quantity of lime required to correct the lime status for grass and crops. It will also provide the information needed to predict the P and K crop requirements.

The annual cost of completing a soil analysis of your fields every four years is only 26p/acre. This is small compared to present day fertiliser costs and, if the information is used correctly, will ensure the long term productivity of your farm.

## Lime

pH is a measure of soil acidity. The target pH for mineral soils is 6.0 for grass and 6.5 for arable crops. Your soil analysis will give a lime requirement which will last for 4 years.

Last year, 63% of soils sampled in Northern Ireland through CAFRE's Development Service, had a pH of 5.9 or lower and required lime. Correcting soil pH levels by liming will increase the availability of soil nutrients (Table1), help promote biological activity in the soil and improve the soil structure.

**Liming increases fertiliser performance as shown in Table 1**

| | N | P | K |
|---|---|---|---|
| pH 5.0 (very strong acidic) | 53% | 34% | 52% |
| pH 5.5 (strong acidic) | 77% | 48% | 77% |
| pH 6.0 (medium acidic) | 89% | 52% | 100% |

Table 1: Percent nutrients available to plants at a range of pH values.

### Available nutrients

The soil analysis report lists the available amounts of Phosphorus (P), Potassium (K) and Magnesium (Mg). This is summarised in the form of a soil index and ideally should be two for Phosphorus and two minus for Potassium. The higher the soil index, the lower the need for additional nutrients from slurry/manure or chemical fertiliser. Soils at index 0 and 1 will require additional nutrients to reach the required levels. Soils at index 3 or above will provide an opportunity to save on purchased fertilisers.

Soil analysis results should be used to identify fields with lower fertility and apply the correct amount of organic manure rather than applying it to the same fields year after year.

### Balancing the nutrient supply

Selecting the correct chemical fertiliser to balance the nutrient requirements of the crop will depend on the soil nutrient status from soil analysis and the quantity of organic manure applied.

### Crop nutrient recommendation calculator

CAFRE has developed an online Crop Nutrient Recommendation Calculator to help you comply with nutrient limits while meeting the crops NPK requirement. The programme will:

- Determine the N, P and K requirements for your crops.
- Calculate the quantity of nutrients provided by organic manures.
- Select the most appropriate fertiliser and application rate to ensure nutrients are optimised.
- Retain information required under the Nitrates Action Programme 2011-14 and Phosphorus regulations.

The program can be accessed by visiting the Ruralni website www.ruralni.gov.uk

## Soil Compaction

Farmers are currently trying to manage swards that have been badly poached and compacted by both machinery and livestock, as a result of yet another wet summer. How and when to rectify this problem are two questions that are commonly asked.

### Is compaction a problem?

Water lying on the soil surface for a prolonged period is an indication that soil structure may have been damaged. Soil compaction can only be properly diagnosed by digging an inspection pit in a field and examining the soil layers. The top soil should break apart easily into small rounded blocks. When the blocks are angular, they fit together too tightly and water cannot pass through to the subsoil below.



There should also be plenty of grass roots extending to 15cm in the soil. A good earthworm population is an indicator of a healthy soil and a well aerated structure. It is also important to look below the topsoil to identify if the subsoil is compacted. Large solid blocks in the subsoil layer will also disrupt root growth and drainage. Rusty colours in the subsoil are an indicator of water logging and such wet soils would benefit from sub-soiling to improve land drainage.

### Rectifying compaction

There are two types of machine that can be used on compacted soils. Both machines are more effective on heavy soils. Dry, free draining soils, which have a lower risk of compaction, are unlikely to show a benefit from these machines.

A soil aerator with water tanks to increase the weight of the machine in dry weather.

1. Soil aerator – this machine works by cutting divets in the ground with a spiked roller. These allow air down into the soil and surface water is allowed to drain away more freely. A soil aerator is ideal for surface compaction which has been properly diagnosed from soil inspection. The tines or spikes will go into the soil between 10 and 15cm.

One model of subsoiler on the market that has a variable depth setting.

2. Subsoiler – this machine has tines which create a ripple effect 25-30cm below the soil surface across the width of the machine. It lifts and shatters the soil and in the process opens up the soil structure introducing air and improving drainage. Discs at the front of each tine open up the sward and prevent excessive damage to the top of the sward. The roller at the back of the machine leaves the sward level. This machine is effective on soils where compaction is deeper and where a pan has been created from heavy machinery or excessive poaching from out wintering livestock.

## When to rectify the compaction problem?

Soil conditions need to be dry to carry out subsoiling or soil aeration work. If carried out during wet conditions, the problem may be made worse. A dry autumn period is the ideal time to carry out this work as it improves drainage and reduces the risk of water logging during the winter months. This will help to increase spring grass growth. It is also important to do this work before reseeding or 'stitching in' grass seed as there is no point putting new seeds into capped or compacted soils which hinder growth rates.

## Benefits

The benefits of repairing compacted soils are:

- Reduced risk of water logging and poaching thus reducing the opportunity for weeds species to ingress into swards.
- Better seed germination in newly reseeded swards.
- Better response to fertiliser.
- Better absorption of slurry.

For more information on how to improve soil fertility or on soil compaction contact your local CAFRE Beef and Sheep Development Adviser.




# Selection of breeding bulls based on Estimated Breeding Values

Many producers buy a bull on looks alone and this allows for some assessment of locomotion, length, soundness, condition, etc. However, it is impossible to tell by looks alone:

- How easily his calves will be born.
- How quickly they will grow.
- Whether his progeny will be lean or fat.
- How milky will his daughters be.
- How fertile his daughters will be.

These characteristics are determined by his genetics and the tools to measure genetics have been around for some time in the form of Estimated Breeding Values (EBVs).

## What are the key traits for a bull to produce replacement heifers?

There are two genetic evaluation systems in use in the UK, namely Breedplan and Signet. Both systems show a bar chart deviating from a vertical central line which is the current breed average. Anything to the right is better – the further to the right the higher the EBV. Anything to the left is worse than breed average.

There are four vital EBVs to be checked in a bull to produce replacement heifers, namely:

**Milk** – to ensure the heifer will have sufficient milk to rear a calf.

**Calving ease direct** – a dead calf will never make a replacement heifer.

**Calving ease daughters** – to ensure the bull's daughters will give birth to their progeny easily.

**Scrotal circumference** – to ensure the bull's daughters will be more fertile and reach puberty earlier.

Other traits that should also be assessed are:

**Eye muscle area** – 50% of the bull's progeny will be male so it is important that they meet market specification. On the other hand, excessively muscled females tend to have poorer fertility and increased calving difficulty.

**Growth** – again moderate, rather than extreme values are desirable so that progeny reach market specification without increasing the mature weight of the herd which increases maintenance and reduces efficiency.

**Fat depth** – in some cases it may be desirable to have more fat (although this will appear on the left hand or undesirable side of the graph). Ideally a suckler cow should gain condition cheaply at grass during the summer and lose some condition during the winter months. Very lean animals may not be capable of this.

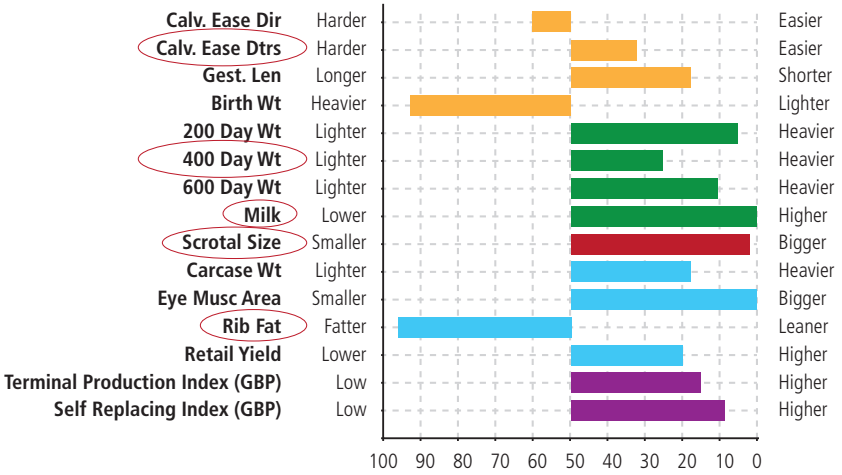


Figure 1: A bull, using the Breedplan system, which would be suitable for producing replacement heifers.

This bull is not hard calving and is above average for calving ease daughters, 400 day growth, milk and scrotal circumference and is fatter than average.



EBVs to be checked in a bull to mate with replacement heifers are:

**Calving ease direct** – a dead calf can never be sold.

**Birth weight** – a smaller calf is delivered more easily.

**Gestation length** – a shorter gestation may mean a smaller calf and also helps reduce calving interval.

It should be noted that calving ease figures for a young bull will be based on the mid-point of his parents' EBVs. This means that his figures may change over time as more performance data from his relatives and progeny becomes available. However, if a young bull is purchased by a commercial farmer, it is unlikely there will be any progeny information available and the potential for his calving ease figures to change is reduced. On the other hand, an older bull that has been widely used for AI and has sired many calves will have a calving ease EBV with a high accuracy, i.e. unlikely to change. Therefore, if calving ease is a really high priority, an older, widely used AI bull with proven calving ease is more likely to be a suitable choice than gambling on a young bull.

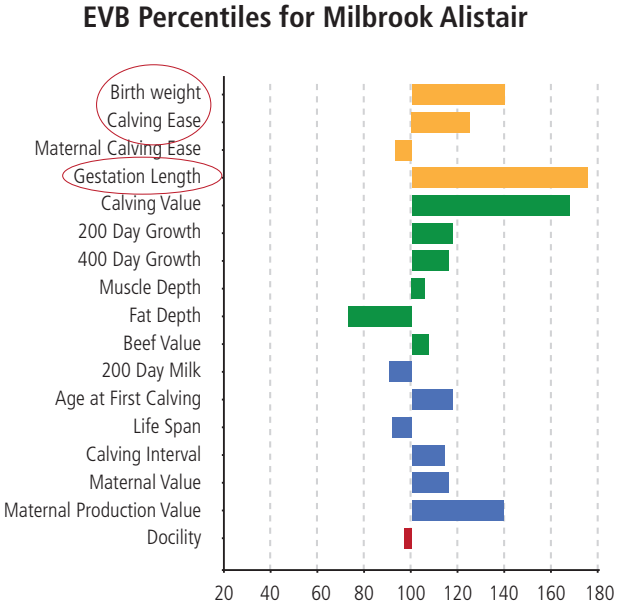


Figure 2: An example of a bull (Milbrook Alistair), using the Signet system, ideally suited to mate with replacement heifers and previously used at CAFRE Hill Farm, Glenwherry.

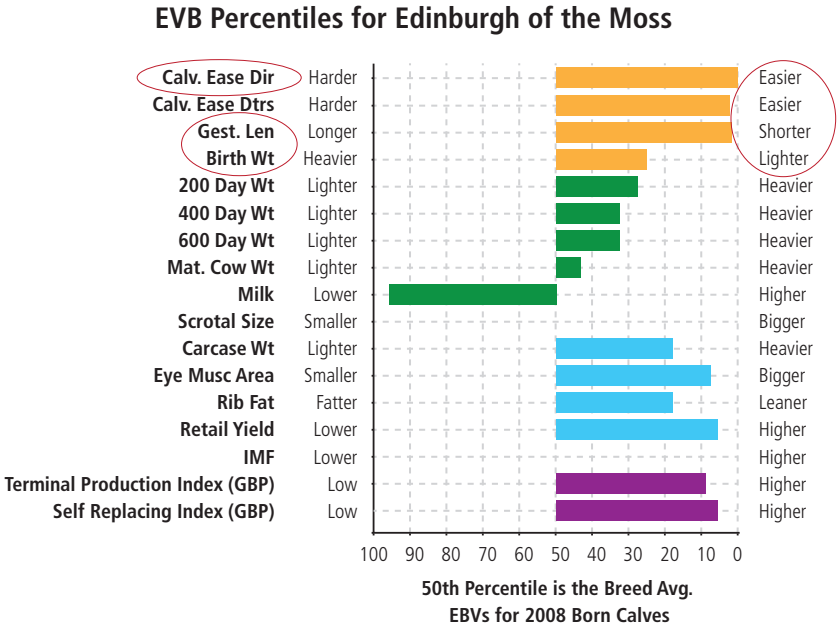


Figure 3: An example of a bull (Edinburgh of the Moss), using the Breedplan system, ideally suited to mate with replacement heifers and previously used at CAFRE Hill Farm, Glenwherry.

At the CAFRE Hill Farm, Glenwherry, 28 two-year-old heifers have calved with Edinburgh of the Moss (Aberdeen Angus) calves. Gestation length averaged 281 days, average birth weight was 42.5kg and average calving score was 2.6 (some assistance with calving aid). The progeny of these heifers gained 1.03kg/d from birth to weaning. All of these heifers went on to calve again successfully for the second time as three-year olds. A further 27 heifers have calved with Milbrook Alistair (Limousin) calves. Gestation length averaged 285 days, average birth weight was 38.1kg and average calving score 3.0 (assistance with calving aid).

EBVs to be checked in a bull to produce slaughter stock:

**Calving ease direct** – a dead calf can never be sold.

**Carcase weight** – higher values means a heavier carcase.

**200 and 400 day weight** – higher values mean faster growing animals.

**Eye muscle area/muscle depth** – higher values mean increased muscularity.

**Fat depth** – select higher values for crossing with lean type cows and vice versa.



## Summary

- Select a bull to mate with replacement heifers based on calving ease, birth weight and gestation length EBVs.
- Select a bull to produce replacement heifers based on EBVs for milk, calving ease daughters, scrotal circumference and calving ease direct.
- Select a bull to produce slaughter stock based on EBVs for carcase traits, fatness and growth.

# From theory to practice

Simon Frost's farm, Hopping Farm, is at Youlgreave in the Derbyshire Peak District. It is an upland farm which consists of some 420 acres, including 80 acres of rough hill ground, in an area with 34" of rain at an average of 800' above sea level. Soil type is classified as reasonably light loam/clay over limestone. The land is noted for problems with copper deficiency due to the soil containing high levels of molybdenum, locking up the available copper.

Simon keeps a herd of Limousin x Holstein cows, which are put to high terminal index Charolais bulls. He also has a flock of 315 North Country mules put to Suffolk rams.

The suckled calves are sold direct off-farm to Alan and John Dore at Glapwell, near Chesterfield, with a reciprocal trading arrangement supplying straw to Simon Frost. The last batch of Simon Frost's bulls recorded a carcase weight of 438kg at 447 days old (14.6 months), which is exceptional performance. The fastest growing bull had a daily carcase gain of 1.22kg/d.

## Simon Frost's suckler herd:

The herd consists of 125 spring calving Limousin x Holsteins, which start calving on the 10th of February. The herd is put to high terminal index Charolais bulls and current herd sires include Balthayock Clifford (Terminal Index +45 – a top 1% bull) and Littlebovey Altra (Terminal Index +33). Total faith is placed on selecting bulls using EBV's with focus on calving ease, birth weight, growth, muscle depth, retail beef yield and negative fat scores. Simon aims to buy the elusive 'curve bender' bulls. These are bulls with low birth weights and very high growth rates.

Some 25 replacement bulling heifers are purchased each year from a local dairy farm. Unlike many other suckler producers, the Holstein influence in the beef cow holds no fears for Simon since it gives plenty of milk for high calf growth rates and running a three way cross breeding programme maximises hybrid vigour and hence improves fertility.

Cows stay indoors after calving aiming to turn out before the 23rd of April, before lambing starts. Cows with bull calves at foot are run separately from cows with heifer calves. The stock bulls go into the herd on the 7th of May to the replacement heifers and 13th of May to the rest of the herd. The bulls are rotated every 3 weeks. Creep feeding starts with the bull and heifer calves in early and late August respectively, feeding up to a maximum of 1.5kg per calf. The calves therefore go to the Dore's 'knowing what concentrates are' but they are not fed ad lib. The key is to continue to grow frame, especially with the heifers, at this stage.

The calves are weaned in October and two weeks prior they are vaccinated with Rispoval4® (Pfizer Animal Health) to minimise respiratory disorders. They have their backs clipped out and treated with Closamectin® (Norbrook) and sold to the Dore's for intensive finishing. The cows are then put onto rough hill grazing for four days to dry off then put onto deferred grazing to gain body condition prior to housing.

The calf weaning weights this year were 391kg @ 212 days equating to a 200 day weight of 370kg and DLWG of 1.63kg. The heifers were 329kg @ 221 days equating to a 200 day weight of 302kg and DLWG of 1.31kg. When this is benchmarked against EBLEX recorded producers (see table below) this is some 43% and 36% higher than average and top 1/3 producers respectively, which is tremendous performance. Simon Frost's motto is "Growth is King".

| | EBLEX | | S Frost | | |
|---|---|---|---|---|---|
| | Average | Top third | Bulls | Heifers | Average |
| Wean age | 246 | 239 | 212 | 221 | 217 |
| Wean wt | 294 | 298 | 391 | 329.5 | 360 |
| DLWG | 1.03 | 1.08 | 1.63 | 1.31 | 1.47 |
| 200 day wt | 246 | 256 | 370 | 302 | 336 |

Table 1: Calf weaning weights at Hopping Farm compared to EBLEX recorded LFA suckler herds.

The cows are cubicle housed in the winter and feeding is based on restricted big bale silage plus straw to hold or manipulate cow condition so that the cows are 'fit not fat' at calving i.e. condition score 2.

With regard to cattle health, the cows are given two Cosecure boluses twice per year, in spring and autumn. First and second calvers are vaccinated with Rotavac to prevent Rotavirus. High magnesium/copper molassed mineral buckets are fed free access throughout the year with average consumption being 55g/cow/day i.e. 20kg/cow/year.

Last year the herd recorded 92% calves sold per 100 cows put to the bull, which is higher than EBLEX recorded Average and Top 1/3 producers with 89.5% and 90.5% respectively.

## Maximising efficiency in suckled calf production

The key areas identified in maximising efficiency, and hence profit, in suckled calf production are as follows:

1. Maximise economies of scale and focus on output.

2. Easier care systems with low labour requirements.

3. Maximise hybrid vigour and focus on breed improvement i.e. use Top 1-10% Beef Value/Terminal Index sires that have very high 400 and 600 day weights, muscle scores, negative fat depth and are easy calving (curve benders).

4. Use easy calving bulls identified by calving ease EBV's with high accuracy figures. Don't be afraid to buy 'ugly bulls' if their EBV figures are good. Too many buyers are obsessed with appearance and ignore EBV's.

5. Improve herd fertility and block calve. Data from Herdplus in Northern Ireland and a recent EBLEX survey shows the average calving interval is 399 days, calving rate was 88.3% so therefore there are 80.8 calves produced per 100 cows per 365 days.

6. Correct cow condition scores especially at bulling. The target is a minimum of 2.5.

7. Improve calf DLWG's and reduce slaughter age. The current target is now to wean a calf at 50% of the cow weight and look at suckler cow efficiency i.e. target 50+kg calf weaned [200 day wt] per 100kg cow weight. Earlier slaughter reduces the carbon footprint of beef production.

8. Focus on feed costs and quality and maximise utilisation of home grown forage. Reduce wintering and fixed costs by out-wintering where ground conditions permit.

9. Maximise herd heath status to minimise losses.

10. Assess market requirements and supply stock to meet specification and therefore maximize prices received.



Charolais X Bulls

Charolais X Bull

Charolais X Heifers

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# Notes

# Notes

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