Beef Sires for the Dairy Herd

About Hybu Cig Cymru - Meat Promotion Wales

Hybu Cig Cymru - Meat Promotion Wales (HCC) is the strategic body for the promotion and development of red meat in Wales and the development of the Welsh red meat industry. Its mission is to develop profitable and sustainable markets for Welsh lamb, Welsh beef and pork for the benefit of all stakeholders in the supply chain.

HCC's five strategic goals are:

- Effective promotion of Welsh meat products
- Build strong differentiated products
- Improve quality and cost-effectiveness of Welsh red meat production
- Strengthen the red meat supply chain
- Communication of HCC activities and industry issues

This booklet forms part of a series of publications produced by HCC's Industry Development team.

The Industry Development team deal with a range of issues that include:

- Technology Transfer
- Research and Development
- Market Intelligence
- Training
- Demonstration farms
- Benchmarking

Hybu Cig Cymru / Meat Promotion Wales
PO Box 176, Aberystwyth
Ceredigion SY23 2YA

Tel: 01970 625050   Fax: 01970 615148
info@hccmpw.org.uk

www.hccmpw.org.uk

Index

1. Making the most of beef calves

Returns for milk producers are under pressure. This means all producers are looking for more ways to increase the efficiency of their business, reduce costs and increase returns. There are several ways to increase returns for those dairy producers who serve their cows with beef semen or use a beef bull. Primarily, they revolve around choosing the right beef bull that will not only leave high value beef calves but those calves will be born on time and will not cause calving difficulties.

Choosing the right bull or the right semen will have a large effect on the profitability of your business.

For a 100 cow herd with 50% of females put to a beef bull the additional income from calf sales could be £480 per year or £1920 over four years of the stock bull.

2. Benefits of EBVs

Calves sired by a bull with high Estimated Breeding Values (EBVs) for beef traits grow faster, have better muscling and less fat than their lower EBV counterparts. Using a bull with above average EBVs for calving traits is likely to reduce calving difficulties with huge benefits to both the cow and the calf.

In fact, the benefits of using beef bulls that perform at the top of their breed bring a multitude of benefits throughout the beef supply chain. The dairy farmer has reduced calving problems leading to better cow fertility and calf vigour. The calf has a higher growth rate and carcase yield potential which should be reflected in a higher market value whether sold for rearing, finishing or slaughter.

3. Why use genetic information?

It doesn't matter how good your management or production system is – a beef animal will only ever perform to the limit of its genetic potential in the environment in which it is kept. Why invest in feed, veterinary inputs, machinery and housing, etc, if these cannot be fully exploited by the animals with which you work?

Choosing a bull on the basis of his breeding potential (genetic merit) will ensure his progeny have the potential to perform well. Genetic information in the form of the Estimated Breeding Values (EBVs) and Selection Indexes described in this leaflet provide a measure of a bulls breeding potential regardless of the management and environmental factors to which it has been exposed to.

A good stockman can make a low genetic merit bull look good whilst a high genetic merit bull can look like an average bull in a commercial herd. Visual assessments are useful to check feet, legs, testicles, teeth, etc, but cannot be used to gauge how well a bull's progeny will perform.

4. What are Estimated Breeding Values (EBVs) & Indexes?

Estimated Breeding Values (EBVs) provide an indication of the breeding potential of a bull for a specific characteristic. They are expressed in the same units as the trait they represent, eg, kg for liveweight, and are expressed relative to a common baseline set in 1980.

EBVs are tools, which allow a professional approach to sire selection. EBVs are available for Artificial Insemination (AI) and natural service bulls and can be used to choose a bull for breeding cattle for prime beef production (terminal sire traits) or for breeding females for suckler herd replacements (maternal sire traits).

Estimated Breeding Values (EBVs) describe the genetic potential of a beef animal.

5. Selection Indexes

Selection Indexes are a combination of EBVs that have been grouped together to make it easier to select bulls for a given breeding objective.

For example:

- **Beef Value** is a terminal sire index, which enables animals to be ranked on the expected financial merit of their offspring's carcases

- **Calving value** is the overall assessment of the likely economic and welfare benefits associated with calving. High positive values indicate animals with low calving difficulties and short gestation lengths, which will lead to fewer assisted calvings and easier re-breeding

Other indexes exist for terminal sires and they differ between breeds, eg, Terminal Production Index, Carcase Yield Index and Terminal Index. Indexes are also available to assess the maternal characteristics of a bull, eg, Maternal Value but these are intended for breeding replacement females out of suckler cows and are generally less appropriate for choosing beef bulls for the dairy herd.

EBVs and indexes cannot be compared across different breeds, only within the same breed.

Since a bull's genetics only ever make up half of his offspring's genetic potential (the other half coming from the dam) then EBVs and indexes need to be halved to estimate the genetic value a bull will pass on to his calves.

A bull with a beef value of +20 can be expected to sire calves that are on average £10 more valuable at slaughter than calves sired by a bull with a beef value of 0.

The system for genetic evaluation of beef cattle is very similar to that used for dairy cattle:

6. Comparison of beef and dairy genetic indicators:

Beef	Dairy	Notes
Estimated Breeding Values (EBVs)	Predicted Transmitting Ability (PTA)	Allows animals to be ranked within breed for genetic merit of a specific trait.
Selection Indexes eg, Beef Value Calving Value Carcase Yield Index	Selection Indexes eg, Production Profit Index (£PIN) Profitable Life Index (£PLI)	Selection indexes help producers achieve progress towards a breeding objective by selecting for a balance of different traits.
Accuracy	Reliability	A guide to the degree of confidence that can be placed on a genetic value

7. How Reliable are EBVs?

As their title suggests, EBVs are an estimate of a bulls breeding potential. They are calculated from performance records of recorded progeny and relatives of a bull and as such are subject to change as more records are submitted. Accuracies are presented along side EBVs and provide an indication of the likelihood of an EBV changing as more information becomes available. Accuracies above 50% indicate a good base of records behind an EBV or index, making it less likely to change substantially. Accuracies above 70% suggest a high degree of reliability.

8. How should the Dairy Producer use EBVs & Indexes?

For mature cows:

- Look for bulls with a high overall Beef Value or Terminal Sire index, with good growth and muscling EBVs, be aware of Calving Value, and look for positive Calving Ease (direct) EBVs

- Calving surveys conducted by semen companies also provide a useful guide to the ease of calving, gestation length and quality of calves from a given bull

For heifers & difficult calvers:

- First look for positive Calving Ease (direct) and negative Gestation Length and Birth Weight EBVs - Calving Value should be top 25% or better, especially in the more developed terminal sire breeds

- Then look to maximise the Beef Value without compromising Calving Ease. Again calving surveys conducted by semen companies can provide additional information about AI sires

Choosing the right EBVs for your system

A number of EBVs are available for recorded bulls, see Appendix 2.   Rather than look at all the figures it is better to concentrate on the EBVs of most relevance to your production system.

Table 1: Choosing EBVs for a specific production system

System	Important EBVs	Objective
Producing beef X calves to be sold for rearing and finishing	Positive Calving Ease direct Negative/average Birth Weight Negative Gestation Length Positive Muscle Depth	Aiming to breed well conformed calves that are born easily without extended gestation periods that will grow well.
Producing beef X calves to be reared and finished on home farm and sold for slaughter	Positive Calving Ease direct Negative Birth Weight Negative Gestation Length Positive 400 day Growth Positive Muscle Depth	Aiming to breed calves that are born easily without extended gestation periods that will grow well and have good conformation.
Producing female beef x calves for suckler herd replacements	Positive Calving Ease direct Positive Calving Ease maternal Negative Birth Weight Negative Gestation Length Positive Muscle Depth Positive 200 day Growth Negative Calving Interval Positive Longevity/Lifespan	Aiming to breed well conformed calves that are born easily without extended gestation periods that will subsequently be able to calve easily themselves, get back in calf quickly and have a long breeding life.

9. How to buy a bull using EBVs

1. Make a short list of bulls available with a Beef Value or Terminal Sire Index in the top 25% of the respective breed.

2. Select bulls with the best positive EBVs for calving ease, negative gestation length and negative/average birth weight EBVs to ensure calves are born easily and on time. Secondly, look for positive EBVs for muscling and growth.

3. Visually examine all bulls on your short list for physical soundness, eg, legs, feet, testicles, etc, and avoid any that are not sound.

4. Purchase the best remaining bull on your shortlist you can afford taking into account the health status of the herd from which you are purchasing.

EBV and Index information can be obtained from the breeder of the bull if he keeps performance records for his herd or from the relevant breed society (Appendix 1).

10. How well do EBVs work on farm?

The benefits of using bulls with superior EBVs is evident from their calves' performance and the reduction in difficulties encountered at calving time and subsequently improved cow fertility.

- Increased carcase weight
- Increased killing-out percentage
- Improved conformation
- More lean carcases
- Increased returns

Below are some examples of real farm results.

Table 2: Growth and Carcase performance

	Ranking within Breed for growth and carcase traits	Slaughter weight (kg)	Days to slaughter	Carcase weight	Conformation score	Fat score	Extra value
Bull A	Top 10%	568	491	314	5.18	3.41	+£17.10
Bull B	Bottom 25%	546	482	298	5.03	3.61	

Table 3: Birth Weight and Calving Ease Performance

	Ranking within breed for birth weight and calving ease	Above average calf birth weight	Unassisted calvings	Extra value per cow in herd
Bull W	Top 25%	12%	67%	£7.41*
Bull X	Bottom 10%	29%	51%	

* Estimate of benefit associated with increases in calf survival and cow fertility together with reduced veterinary and labour costs

- Lower calf birth weights
- Less assisted calvings
- Increased returns
- Reduced costs

11. The Breed Benchmark and EBV Indexing

As well as information about individual bulls, it is useful to refer to the breed benchmark. The Breed Benchmark shows a percentile breakdown of the EBVs within the breed, enabling buyers to see where bulls rank within their breed for each trait. An example of a breed benchmark is shown in Table 4.

Table 4: Breed Benchmark

TRAIT	BOTTOM			BREED	TOP		
	1%	10%	25%	AVERAGE	25%	10%	1%
Calving Value	LM-4C	LM-1C	LM0C	LM1C	LM2C	LM3C	LM5C
200-Day Milk (kg)	-7	-3	-2	0	1	3	6
200-Day Growth (kg)	-8	0	5	12	18	24	37
400-Day Growth (kg)	-13	0	10	21	31	41	63
Muscling Score (pts)	-0.3	0	0.1	0.3	0.6	0.8	1.2
Muscle Depth (mm)	-1.4	-0.1	0.5	1.3	2.1	3.0	4.7
Fat Depth (mm)	0.4	0.1	0	-0.1	-0.2	-0.3	-0.5
Beef Value	LM0	LM6	LM11	**LM16**	LM20	LM25	LM34

Some breeds in the UK have adopted a method of indexing EBVs. This system converts each EBV into a figure between 70 and 130, where 100 is maintained as the average value for the breed. This information is presented on sale cards and in sale catalogues, an example of which is shown in Table 5 and 6.

12. Interpreting EBVs

Bull buyers are able to assess a bull's strengths and weaknesses by looking at its EBVs. Only then can they decide whether it has the right breeding attributes for their herd. Compare and contrast the EBVs for these two Limousin bulls in Tables 5 & 6.

Tables 5 & 6: Sale Cards for two Limousin Bulls

BULL A: CARDIFF CRAIG

Sire: WINTERHILL DAVID

Dam: BRADWELL MARY

Analysis Date: 07/11/2005	Calving Value	200 Day Milk (kg)	200 Growth (kg)	400 Growth (kg)	Muscling Score (pts)	Muscle Depth (mm)	Fat Depth (mm)	Beef Value
E B V	LM1C	+4	+28	+42	+1	+4.1	-0.1	LM27
Accuracy %	57	42	72	69	63	69	62	63
Index	100	120	120	117	126	128	103	120

100 day wt.	200 day wt.	300 day wt.	400 day wt.	500 day wt.	Scanned
118	253	378	556	710	YES

Signet — MLC's Signet Breeding Services

BULL B: ABERYSTWYTH DAVID

Sire: OAKHAM IAN

Dam: OLDBROOK CLARE

Analysis Date: 07/11/2005	Calving Value	200 Milk (kg)	200 Growth (kg)	400 Growth (kg)	Muscling Score (pts)	Muscle Depth (mm)	Fat Depth (mm)	Beef Value
E B V	LM4C	-5	+30	+52	+0.5	+2.0	+0.3	LM25
Accuracy %	59	43	73	68	60	66	60	64
Index	120	86	124	125	107	107	76	116

100 day wt.	200 day wt.	300 day wt.	400 day wt.	500 day wt.	Scanned
126	256	385	568	744	YES

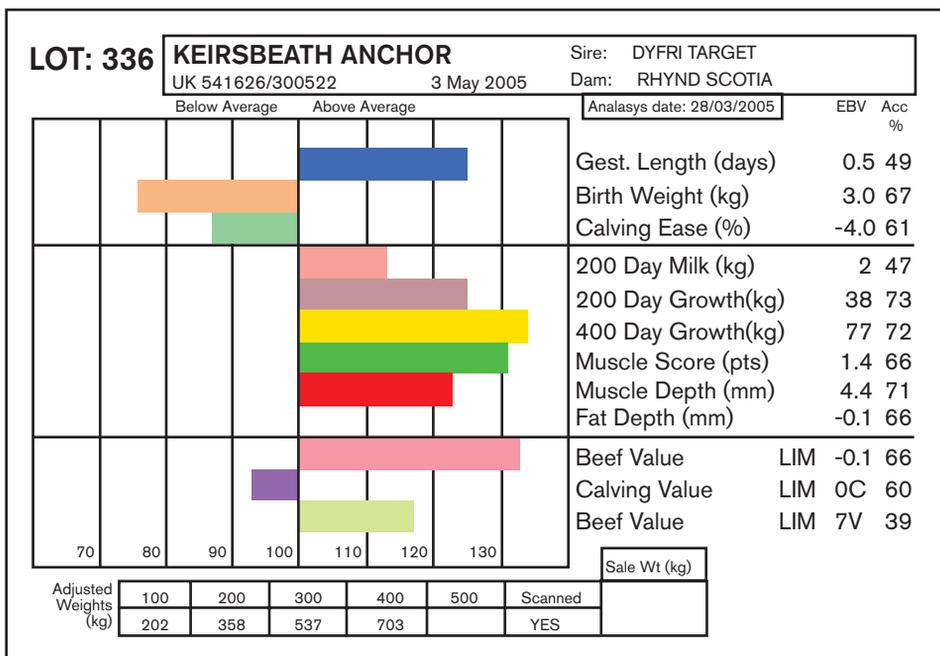*Signet — MLC's Signet Breeding Services*

By comparing each bull's EBVs against the EBV benchmark for the breed in Table 4 and reviewing the information displayed on the cards, the following points can be observed:

- Each bull has been fully weight recorded, scanned and possesses satisfactory accuracy figures (for a young animal)

- Both bulls have above average EBVs for growth and carcase traits and would make suitable bulls for use as terminal sires, but in several important ways their characteristics differ

- Bull A has high muscle depth and muscle score EBVs (top 10% of breed)

- Bull B has the highest EBVs for growth rate

- Bull B has a Calving Value in the top 10% of the breed

- Bull A would be ideal for a beef production system where cattle are sold on a deadweight basis and carcase quality takes a high priority

- Bull B would be suitable for mating to heifers, because of its high Calving Value. It could also be used in herds where the top priority is to improve growth rate

- Buyers need to take the time to consider their own breeding objectives and then select those bulls with the right combination of EBVs

Estimated breeding values are produced on sale cards and in sale catalogues. They can also be represented graphically, as shown in Figure 1

Figure 1: EBVs presented graphically on a sale card

LOT: 336	KEIRSBEATH ANCHOR			Sire: DYFRI TARGET		
	UK 541626/300522	3 May 2005		Dam: RHYND SCOTIA		
	Below Average	Above Average		Analasys date: 28/03/2005	EBV	Acc %
				Gest. Length (days)	0.5	49
				Birth Weight (kg)	3.0	67
				Calving Ease (%)	-4.0	61
				200 Day Milk (kg)	2	47
				200 Day Growth(kg)	38	73
				400 Day Growth(kg)	77	72
				Muscle Score (pts)	1.4	66
				Muscle Depth (mm)	4.4	71
				Fat Depth (mm)	-0.1	66
				Beef Value LIM	-0.1	66
				Calving Value LIM	0C	60
				Beef Value LIM	7V	39
70	80	90	100	110	120	130	Sale Wt (kg)	

| Adjusted Weights (kg) | 100 | 200 | 300 | 400 | 500 | Scanned | |
| | 202 | 358 | 537 | 703 | | YES | |

13. Summary

- **By selecting sires with high EBVs dairy farmers can increase profitability**

- **Beef sires should be chosen using EBVs and selection indexes to suit the target beef production system**

- **All beef sires and beef semen should be selected on the basis of calving ease information, taking into account the large financial impact long gestation lengths and difficult calvings can cause**

- **Dairy farmers can improve the recognition of their high value beef stock by promoting the high genetic merit of the sires used at every marketing opportunity and by participating in marketing groups that reward well bred cattle**

Appendix 1

Beef Breeds using Signet Beefbreeder

Signet Beefbreeder	ABRI Breedplan
Limousin	Aberdeen Angus
Blonde d'Aquitaine	Belgian Blue
British White	Charolais
Devon (Ruby Reds)	South Devon
Salers	Simmental
Stabiliser	Hereford
Sussex	Beef Shorthorn
Welsh Black	Murray Grey
Galloway	
Lincoln Red	
Highland	
Piemontese	
Red Poll	

Appendix 2

Interpretation of Estimated Breeding Values - Cattle evaluated by MLC's Signet Breeding Services

EBV	Interpretation	Trait	Notes
Birth weight (kg)	Negative values = lighter calves at birth	Size of calf at birth	High birth weights are more likely to be associated with difficult calvings
Gestation length (days)	Negative values = shorter gestation lengths	Length of pregnancy	Shorter gestation lengths result in easier calvings, because birth weights tend to be lower. A short gestation also increases the interval between calving and the start of mating, giving the cow more time to recover body condition.
Calving ease direct (%)	Positive values = more unassisted calving influence (calf)	Calving ease of a bulls progeny	Estimates the percentage of unassisted calvings that can be expected from a particular sires progeny
Calving ease maternal (%)	Positive values = more unassisted calving influence (dam)	Ease with which a bulls daughter will give birth to a calf	Estimates the percentage of unassisted calvings that can be expected when the female offspring of a bull calve.
200-day growth (kg)	Positive values = faster growth rates	Growth rate	Selection for faster growth will result in animals that have heavier carcases at a constant fat class or leaner carcases at a constant age Selection for high growth rates also tends to result in an overall increase in mature size (and therefore higher birth weights).
400-day growth (kg)	Positive values = faster growth rates	Growth rate	
Muscling score	Positive values = more muscular carcases	Muscling of the carcase	Selecting for these traits will increase the yield of lean meat in the carcase.
Muscle depth (mm)	Positive values = deeper loin muscles	Depth of loin	
Backfat depth (mm)	Negative values = leaner carcases	Leanness of carcase	Indicates animals capable of producing lean carcases or if required, can be taken to heavier carcase weights without becoming over fat.
200-day milk (indirect)	Positive values = more milk produced by cow	Milk production	Good milk yields are usually reflected in higher calf weights at weaning, however excessive yields can be at the expense of body condition and fertility.
Calving interval (days)	Negative values = cows that will get back in calf more quickly	Interval between consecutive calving dates	Indicates how quickly a cow will get back in calf. For males it predicts the reproductive success of female offspring.
Age at first calving (%)	Negative values = heifers that will reach puberty at an earlier age	Proportion of heifers reaching puberty earlier	Indicates the proportion of females with the ability to calve for the first time at a young age.
Longevity/Lifespan (years)	Positive values = cows that will have a longer breeding life	Age at culling	Predicts the age at culling for females.
Maternal Calving Ease (%)	Positive Values = More unassisted calvings	Interval between consecutive calving dates	Indicates how quickly a cow will get back in calf. For males it predicts the reproductive success of female offspring.
Cow Weight (kg)	Negative Values = Smaller mature size	Maintenance requirements of the cow	Cow weight has a large impact on the efficiency of the cow with regard to feed conversion. The optimum cow size will vary from herd to herd, depending on resources and objectives.
Docility (pts)	Positive Values = More docile temperament	Temperament	Temperament has a direct bearing on labour and health and safety requirements. Animals that are easily stressed grow more slowly and tend to have poorer meat quality than those that are not.

Cattle evaluated by ABRI (Agricultural Business Research Institution)

EBV	Interpretation	Trait	Notes
Calving ease direct (%)	Positive values = more unassisted calvings	Calving ease of a bulls progeny at birth	Positive EBVs are favourable and indicate easier calving.
Calving ease daughters (%)	Positive values = more unassisted calvings	Ease with which a bulls daughter will calve at 2 yrs old	Positive EBVs are favourable and indicate easier calving.
Gestation length (days)	Negative values = shorter gestation lengths	Length of pregnancy	Shorter gestation lengths result in easier calvings, because birth weights tend to be lower. A short gestation also increases the interval between calving and the start of mating, giving the cow more time to recover body condition.
Birth weight (kg)	Negative values = lighter calves at birth	Size of calf at birth	High birth weights are more likely to be associated with difficult calvings.
200 day weight (kg)	Positive values = faster growth rates	Growth rate	Selection for faster growth will result in animals that have heavier carcases at a constant fat class or leaner carcases at a constant age Selection for high growth rates also tends to result in an overall increase in mature size (and therefore higher birth weights).
400-day growth (kg)	Positive values = faster growth rates	Growth rate	
600 day weight (kg)	Positive values = faster growth rates	Growth rate	
Mature Cow Weight (kg)	Positive values = heavier weight	Mature weight	This EBV is an estimate of the genetic difference in cow weight at 5 yrs old.
Milk (kg)	Positive values = More milk produced	Milk production	This indicates the milking ability of the sires daughters.
Scrotal Size (cm)	Positive values = Larger scrotum	Female progeny fertility	This EBV indicates scrotal size which is positively correlated to fertility in a bulls daughters.
Eye muscle area (sq. cm)	Positive values = bigger loin muscling	Loin muscling	This EBV indicates better muscling on animals
Rib fat (mm)	Negative values = leaner carcases	Leanness of carcase	Indicates animals capable of producing lean carcases or if required, can be taken to heavier carcase weights without becoming over fat.
Retail beef yield (%)	Positive values = higher carcase yield	Meat yield of carcase	Represents total (boned out) meat yield as percentage of carcase.
Intramuscular fat (%)	Positive values = more marbling fat	Marbling fat	Indicates degree of marbling in carcase.
Carcase weight (kg)	Positive values = higher carcase weight	Carcase weight	Indicates animals capable of producing heavier carcases at slaughter.