

Buying a recorded ram for maternal traits



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Introduction

Since the first ram selection BRP manual in 2004 many more producers, both pedigree and commercial, have taken a more informed approach to breeding.

Estimated Breeding Values (EBVs) are now more widely understood and important traits such as growth rate and maternal ability have improved. Indeed, the annual return attributed to genetic improvement within the British sheep sector is estimated to be worth £10.7 million per annum.

EBVs are not just for pedigree breeders. Commercial producers are also seeing the benefits of looking deeper into an animal's background before purchase, rather than buying on looks alone.

Commercial producers are seeking maternal sires that suit their particular farms to breed female replacements and improve early growth rates. Their investment in high-performance genetics is rewarded through increased flock productivity, which has never been more important in today's ever changing world.

Tools like EBVs and indexes are freely available. Hopefully, this updated manual will encourage more producers to give them a try and, in doing so, generate Better Returns from their sheep enterprise.

As part of continuing updates, the BRP manual 2 **Buying a recorded ram to generate Better Returns** has now been split into terminal sire and maternal sire traits. If you are interested in terminal traits, please refer to the new manual 2 **Buying a recorded ram for terminal sire traits**.



Samuel Boon
Signet Manager

Why use EBVs?

A flock's physical performance directly affects its profitability. Efficient animals require fewer inputs (mainly feed) for the same or increased output (eg they produce more kilograms of lamb per ewe) and thereby boost the financial returns to the business.

The only way to lift flock productivity permanently and with some certainty is through selective breeding. The initial improvements made will build year on year, making genetic improvement sustainable, cumulative and therefore a cost-effective way of boosting productivity and profitability.

A maternal breeder needs to think about more than just the traits required in a profitable slaughter lamb.

Genetic traits influencing a breeding plan

Traits expressed in the ewe

Productivity

- Early maturity
- Out of season breeding
- Fertility – including pregnancy rate
- Number of lambs born
- Lambing ease

- Maternal behaviour (lamb survival)
- Maternal ability (milkiness)
- Mature size (ewe efficiency)
- Longevity

Health and ease of management

- Temperament
- Local adaptivity (hardiness)
- Disease resistance eg
 - Worm resistance
 - Worm resilience
 - Footrot resistance
 - Mastitis susceptibility
 - Scrapie genotype
- Polling
- Wool shedding

Traits expressed in the lamb

Lamb survival

- Birth weight
- Lamb vigour
- Lamb survival

Lamb sale value

- Growth rate (weight and feed efficiency)
- Carcase conformation
- Fat class/level of finish



Superior genetics lift performance

The Lennox family in Scotland have been performance-recording Scotch Blackface for over 20 years. In that time, the flock has substantially increased the number of lambs achieving carcase grades of R or better, from 51 per cent in the early 1990s, to 85 per cent in more recent years. At the same time, carcase weights have also increased by over 3kg.

The Lennox family feels that the other big gain is ease of lambing, now assisting fewer than 20 ewes per year in a flock of 1,500.

Peregrine Aubrey (below) breeds Lleyn sheep in Devon. In 2017, his top 1 per cent index Lleyn ram produced lambs that were, on average, over 2.5kg heavier at eight weeks of age than that of his ram in the top 25 per cent. Peregrine is also an active member of the Performance Recorded Lleyn Breeders group, which uses performance recording to monitor and improve parasite resistance within their flocks.



Peregrine proves that you can breed for health traits while continuing to improve performance characteristics such as early growth rate.

Recorded rams reduce risk

Rams that are not recorded may be cheaper to buy than recorded rams, but breeding from them is a plunge into the unknown. They could take flock performance forwards or backwards, but there is no way of knowing until their lambs are sold, or until replacements produce their first crop of lambs.

Progress in recorded flocks

The genetic progress in recorded populations is known. Major gains have been made in improving maternal traits in lambs over the past 20 years.

The breeding potential of performance-recorded rams today is very different to that of rams used in the past. In the Lleyn breed, the average animal has increased its index by 75 points in the last 20 years (see Figure 1). Thanks to the work of performance-recorded breeders, this improvement means the average Lleyn now has higher early growth rates, improved carcase characteristics and enhanced mothering/milking ability than the average Lleyn 20 years ago.

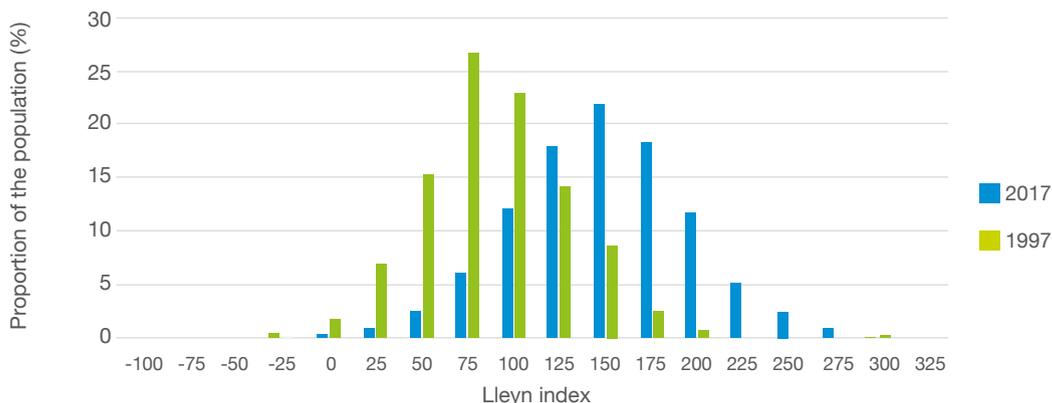


Figure 1. Distribution of Lleyn indexes from lambs born in 1997 and 2017

Looks can be deceptive

Despite the importance often placed on the look of a ram, the only influence it has upon the performance of its progeny is through its genes. It is vitally important that commercial buyers assess the genetic merit of the sires they intend to buy.

Remember

You can't identify maternal traits simply by looking at a ram.

EBVs

The best guide to a ram's genetic merit is provided through EBVs. Performance data collected by pedigree and commercial producers is analysed by the Signet Sheepbreeder Service. This independent analysis calculates how much of each animal's performance is due to its breeding merit.

EBVs have been used in the UK sheep industry for over 25 years and offer a practical and unbiased guide to whether a ram will do the job expected. In essence, EBVs predict the superiority or inferiority of breeding stock for specific traits.

Table 1. EBV trait and explanation

EBV	Purpose of EBV
Eight-week weight (kg)	Indicator of growth rate
Scan weight (kg)	Indicator of growth rate
Muscle depth (mm)	Indicator of loin muscularity
Fat depth (mm)	Indicator of potential to produce a lean carcase, or heavier carcasses without being overfat
Maternal ability (kg)	Indicator of daughter's milking ability
Litter size (lambs)	Indicator of prolificacy
Mature size (kg)	Indicator of ewe efficiency



EBVs: a tool in the box

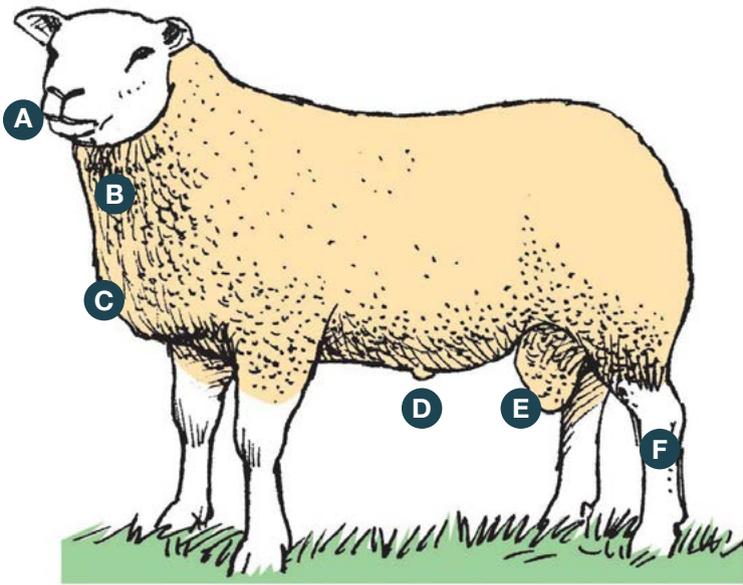
It is important to take all factors into account when buying a ram – not just its EBVs. A ram can have the greatest genetic potential available, but if he is unable to work efficiently, those genetics and your investment will be wasted.

It is a good idea to view potential rams to check there are no physical defects and that they are in a fit condition to work. Ideally, purchase rams well in advance of the breeding season to ensure adequate quarantine time and allow them to

acclimatise to your system and changes in diet. Ensure you have treatment and vaccination history from the vendor and administer any vaccinations needed in this time.

Carry out a ram MOT 10 weeks before tupping to ensure he is as fit and healthy as possible for the season ahead.

For more information on fit-for-purpose rams, please see the AHDB **Ram MOT** leaflet, available at beefandlamb.ahdb.org.uk



A. Teeth and mouth – check incisor and molar teeth

B. Neck, head and shoulders – check for any wounds from fighting or signs of Caseous lymphadenitis (CLA)

C. Brisket – pay attention to sores from raddles

D. Penis/sheath – check that the sheath is clear of infection with no sign of shearing damage and that the penis can be extracted

E. Testes – should be firm but springy and a good size. Check for lumps, adhesions and evenness in size

F. Legs and feet – rams need sound feet to work well. Footrot and other infections reduce fertility, because of raised body temperature

EBVs that influence growth & carcass quality

Why growth and carcass quality matters

High growth rates and carcass traits can enhance:

- Weight, conformation and yield of lambs sold
- Proportion of lambs finished off grass and subsequent levels of finish or fat cover
- Timing of sales to hit periods with better market returns
- Size of store lambs

Financial returns in a maternal flock can be significantly improved by enhancing the terminal characteristics of lambs that are not being kept as replacements. Breeders can produce lambs with high early growth rates and increase the number of carcasses meeting market specifications without losing the maternal traits that are essential for breeding replacement females.

Eight-week weight EBV (kg)	Scan weight EBV (kg)
An indication of breeding potential for growth to eight weeks of age	An indication of breeding potential for growth at scanning time – typically 21 weeks of age
Example A ram with an EBV of +4kg is estimated to produce lambs which are 2kg heavier at eight weeks of age than a ram with an EBV of 0	Example A ram with an EBV of +6kg is estimated to produce lambs that are 3kg heavier than a ram with an EBV of 0
Muscle depth EBV (mm)	Fat depth EBV (mm)
An indication of breeding potential for muscling across the loin	An indication of breeding potential for fatness across the loin
Example A ram with an EBV of +4mm is estimated to produce lambs with loin depths 2mm deeper than a ram with an EBV of 0	Example A ram with an EBV of –1mm is estimated to produce lambs with 0.5mm less fat across the loin than a ram with an EBV of 0

Remember

Growth rates are important in all production systems. Breeding potential for high growth rates is only realised under good management, including appropriate feeding and maintaining high flock health status.

In flocks where females are retained for breeding, selecting rams with high EBVs for growth rate will increase ewe mature size. In some production systems, this may reduce flock efficiency.

Select rams with the optimum fat depth EBV for the flock. Flocks producing too many overfat lambs should select sires with lower fat depth EBVs.

EBVs that influence maternal performance

A key economic driver influencing flock profitability is the number of lambs reared per ewe. This is a function of both ewe fertility and her ability to successfully rear lambs.

Rams pass maternal traits to their female offspring. These traits are important in closed flocks or where females are sold for breeding.

- Selecting rams with high litter size EBVs will increase the number of lambs produced by their female offspring
- Selecting for improved maternal ability EBVs will ensure ewes have sufficient milk to rear their lambs



Litter size born EBV (lambs)	Litter size reared EBV (lambs)	Maternal ability EBV (kg)
An indication of breeding potential for female prolificacy	An indication of breeding potential for lambs successfully reared	An indication of breeding potential for maternal care, particularly milkiness
Example A ram with an EBV of +0.20 is estimated to produce ewes that produce 10 per cent more lambs than a ram with an EBV of 0	Example A ram with an EBV of +0.40 is estimated to produce ewes that will rear 20 per cent more lambs than a ram with an EBV of 0	Example A ram with an EBV of +1kg is estimated to produce ewes whose lambs are 0.5kg heavier at eight weeks than a ram with an EBV of 0

Remember

The benefits of superior maternal genetics will be expressed for several seasons.

Using EBVs to enhance prolificacy is more reliable than simply selecting rams born as twins or triplets.

Lamb survival is influenced by genetic and non-genetic factors. Flock management should be reviewed if large increases in prolificacy are planned.

New maternal traits

New EBVs have been developed for some maternal analyses. These may be rolled out more widely in the future:

- Age at first lambing (years) – an indication of breeding potential for age when ewes can lamb for the first time
- Longevity (years) – an indication of breeding potential for age when ewes reach the end of their productive lifespan
- Lambing interval (days) – an indication for breeding potential for number of days between lambing events
- Lamb survival – an indication for breeding potential for lamb survival to an early age weighing event (eg eight-week weight)

EBVs that influence ewe efficiency

There is a relationship between lamb growth rate and ewe mature size, with larger ewes tending to produce faster-growing progeny.

There is usually a benefit from increasing growth rates because lambs will be ready to market earlier. However, breeders must consider how this may affect the mature size of their dams.

Larger ewes may look good and have increased cull value, but as well as improved lamb growth rates, larger ewes:

- Have increased feed requirements
- Lower the stocking density
- May perform poorly in a harsh environment
- Are more difficult to handle



Mature size EBV (kg)	Scan weight EBV (kg)
An indication of breeding potential for size at maturity	An indication of breeding potential for growth to 21 weeks of age
Example A ram with an EBV of +8 is estimated to produce ewes which are 4kg heavier at maturity than a ram with an EBV of 0	Example Where flocks are not recording mature size and the mature size EBV is of limited benefit, the scan weight EBV can be used to identify breeding lines that will be heavier at maturity

Remember

Optimum mature size for ewes in a flock depends on the target lamb market and available farm resources, particularly feed and housing.

The close relationship between lamb growth rate and ewe mature size makes it difficult to select for faster lamb growth rate and smaller mature size at the same time. However, certain bloodlines are available that can do both – these are known as ‘curve benders’.

EBVs that influence health and welfare

Selecting for traits that have a beneficial impact on flock health and welfare can reduce veterinary and labour costs and have a positive impact on flock profitability.

Recent AHDB-funded research has led to the development of new EBVs that help sheep breeders select for health and welfare traits.



Lambing ease EBV (%)	Birth weight EBV (kg)	Worm resistance EBV	Saliva IgA EBV
An indication of breeding potential for ease of lambing	An indication of breeding potential for birth weight	An indication of breeding potential for resistance for worms reported as: FEC (N) – Nematodirus FEC (S) – Strongyles FEC Combined – overall egg output	An indication of breeding potential for resistance to <i>T.circumcincta</i> worm species
Example A ram with an EBV of +6 would be expected to produce 3 per cent more unassisted lambing events compared to a ram with an EBV of 0	Example A ram with an EBV of -1kg would be expected to produce lambs 0.5kg lighter at birth than a ram with an EBV of 0	Example Negative values are superior. A ram with an EBV of -2 will produce progeny that shed less worm eggs on to the pasture than one with an EBV of 0	Example Positive values are superior. A ram with an EBV of +0.05 will produce progeny that produce more saliva IgA than one with an EBV of 0

Remember

When breeding for health traits, pay attention to accuracy values which tend to be lower than for carcase and growth traits. Ask the breeder whether an animal has been sampled for the trait of interest.

Saliva IgA EBVs should be used in conjunction with worm resistance EBVs because this trait is still new to the industry. To breed for worm resistance traits, use rams with negative FEC EBVs and positive saliva IgA EBVs.

Maternal breeding indexes

EBVs identify animals that excel in individual traits, but they can also be combined to create a breeding index. Within an index, each EBV is weighted according to its importance to meet a specific breeding objective.

Lowland maternal index

Lowland maternal indexes are designed to enhance pre-weaning growth rates and lamb survival by improving maternal ability. Most maternal indexes also place a positive weighting on litter size EBVs to enhance prolificacy.

Scottish hill index

The Scottish hill index is designed to enhance the overall productivity of the ewe.

The index will increase lamb growth rates, maternal ability and the number of lambs reared to weaning in hill farming situations.

Welsh hill index

The Welsh hill index identifies sheep with superior breeding potential for maternal ability, lamb growth and carcase quality. It is not designed to increase prolificacy.

Making genetic progress

All Signet-recorded flocks are provided with charts showing the genetic gain achieved in the flock over time. Ask to see this information when buying a ram, because this will show you whether or not the flock is actively improving the traits that are of importance to you.



Remember

Select rams with measurements. Indexes use information from a range of sources including lamb weights, shearing weights and ultrasound measurements. The most accurate predictions are obtained for rams that are fully recorded, so always ask the breeder which measurements they use, how many lambs they measure and whether they are using recorded rams for breeding.

The more measurements they collect, the more likely they are to breed superior rams.

Interpreting EBVs

Accuracy values

Accuracy values indicate how much information has been used to calculate an animal's EBVs. They indicate the likelihood of a ram's EBVs changing over time and hence the risk associated with making a particular breeding decision.

Accuracy values are percentage figures presented on a scale of 0–99 per cent. The higher the value, the more is known about that ram. Maternal traits with low heritability tend to have the lowest accuracy values.

Purchasing recorded stock with high accuracy values for traits of interest reduces the risk of poor performance.

Breed benchmark

The best way to put a set of EBVs into context is to compare them to the breed benchmark. This identifies the range of values that exist for a given trait and ranks them from best to worst. Signet publishes breed benchmarks for 35 sheep breeds. These are updated annually and are available to view at www.signetfbc.co.uk



Table 2: Example breed benchmark

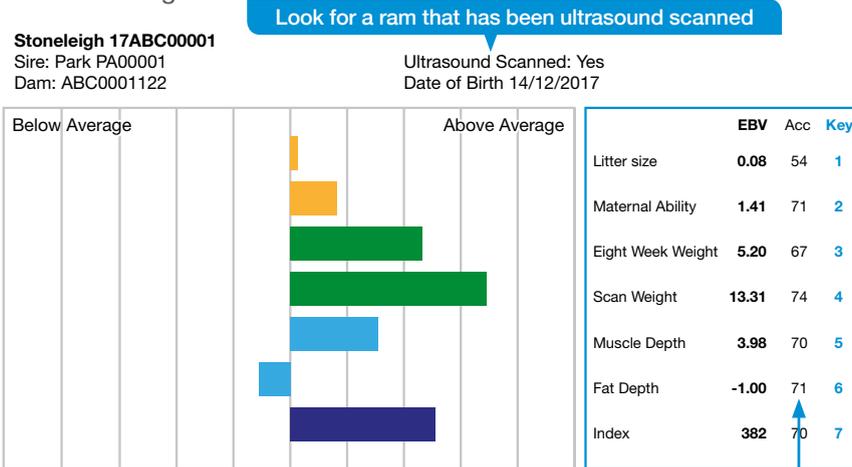
Trait	Bottom 10%	Bottom 25%	Breed Average	Top 25%	Top 10%
Scan weight	-2.27	-1.47	0	1.47	2.27
Muscle depth	-1.21	-0.63	0	0.63	1.21
Fat depth	-0.58	-0.30	0	0.30	0.58
Maternal index	35	66	100	134	165

Note: The top 10 per cent for fat depth (ie the fattest animals) are not necessarily the best; this simply indicates that these are the 10 per cent fattest animals

Interpreting EBVs

Sale charts

Buyers will often see EBV charts displayed at sales and on promotional information. The charts make it easy to evaluate a ram's EBVs at a glance. The centre line indicates the average for the breed, while bars to the right indicate above average traits, with those to the left below average.



Accuracy values are percentage figures. The higher the figure, the more accurate the EBV. They indicate how much information has been used to calculate an animal's EBVs

1. A ram with an EBV of +0.08 is estimated to produce ewes which produce 4 per cent more lambs than a ram with an EBV of 0

2. A ram with an EBV of +1.41 is estimated to produce ewes whose lambs are 0.70kg heavier at eight weeks of age than a ram with an EBV of 0

3. A ram with an EBV of +5.20 is estimated to produce lambs which are 2.60kg heavier at eight weeks of age than a ram with an EBV of 0

4. A ram with an EBV of +13.31 is estimated to produce lambs which are 6.65kg heavier at 21 weeks of age than a ram with an EBV of 0

5. A ram with an EBV of +3.98 is estimated to produce lambs with loin depths 1.99mm deeper at 21 weeks of age than a ram with an EBV of 0

6. A ram with an EBV of -1.00 is estimated to produce lambs with 0.50mm less fat across the loin at 21 weeks of age than a ram with an EBV of 0

7. Each breed will have its own index which combines important traits to rank animals on one standard breeding goal. Some of the most common maternal indexes are explained on page 12.

High-index animals are most fitting to this breeding goal

At sales, buyers may also see sale cards and order of merit cards with EBVs for growth, carcase and maternal traits. These values need comparing to a breed benchmark.

How to interpret EBVs when buying a ram

Sheep farmers selling breeding stock present key information about their animals in several ways, including on their websites, in sale catalogues and on sale cards.

BETTERRETURNS

Order of Merit

This is to certify that this animal has a Breeding Index within the top 10% of the breed

Ear No.

Lot



	Estimated breeding values (EBVs)	Accuracy values
Scan weight EBV	8.85 kg	<input type="text"/>
Muscle depth EBV	2.18 mm	<input type="text"/>
Fat depth EBV	0.21 mm	<input type="text"/>
Index	282	<input type="text"/>

For more details on the Better Returns Programme, call 024 7647 8834, email brp@ahdb.org.uk or visit beefandlamb.ahdb.org.uk

AHDB

High scan weight EBV = high growth rates

High muscle depth EBV = better conformation

Negative fat depth EBV = leaner lambs

Index = overall ranking

These EBVs are expressed in real units of measurement, so this ram has the breeding potential to be 8.85kg heavier at scanning time, with over 2mm more muscling across the loin compared to a ram with EBVs of 0.

This information might be shown in a sale catalogue as follows:

Stoneleigh perfection	UK524429	ABC11001(E)	Born: 01/01/2017				
Sire: COVENTRY OXYGEN XYZ08019(E) by FRANKTON FRED (1) Dam: DEC070001(2) by WARWICK MAGNET (2)							
	Litter size	Maternal ability	8-week weight	Scan weight	Muscle depth	Fat depth	Index
EBVs	0.15	0.14kgs	4.82kgs	8.85kgs	2.18mm	0.21mm	282
Accuracy	28%	25%	88%	90%	86%	88%	89%

Finding a recorded ram

Signet Breeding Services performance records over 550 flocks and over 80,000 lambs per year, identifying the leading animals among 35 different breeds of sheep.

Breeders and performance records for the majority of Signet-recorded flocks can be accessed via the Signet website:

www.signetfbc.co.uk

Contact Signet if you need further assistance on how to use this feature.

Buying a recorded ram

Rams can be purchased by auction at ram sales or directly from the breeder. There are advantages of both.

Advantages of on-farm sales

- Lower biosecurity risk
- There may be more time to examine records and discuss specific needs
- The rest of the flock can be inspected
- Purchases can be made at any time
- Can gain a better understanding of the system that the ram has been reared in

Advantages of auctions

- Greater range of recorded rams available
- Competitive bidding
- Sale cards and published information on show
- Opportunity to compare stock from different flocks



Always:

- Speak to vendors about the performance data on display
- Take a breed benchmark to assess how each ram ranks compared to the rest of the breed
- Ask for the most recent indexes and EBVs for the rams you plan to buy
- Check if the ram has been scanned using ultrasound

Seek the standard

Spotting high-merit genetics at a glance

2017 saw the launch of Signet's new marketing campaign 'Seek the Standard'.

The campaign allows commercial and pedigree producers alike to recognise the advantages of buying recorded stock and spot high-merit genetics quickly and easily.

Rams in the top 5, 10 and 25 per cent of their breed based on index are eligible for gold plus, gold and silver standard awards, respectively, and can have identifiers placed around their necks at the point of sale.

Once buyers have identified rams with top genetics they are interested in, they should check the ear tag identity of the animal and review its EBVs with the breeder. At sales, it is likely the ram's sale chart will be present to do this. Alternatively, this can be done online at basco.org.uk

To learn more about the 'Seek the Standard' campaign, contact Signet.



Female replacements: breed your own or buy?

Deciding whether to retain homebred female replacements, or buy them in, depends on several factors that influence the flock's financial performance.

Think about what works best for your flock. Keeping replacements should not be a knee-jerk reaction to high breeding stock prices or low ewe lamb prices.

Aim for a planned approach to improve flock performance. Breeding your own replacements allows you to keep full control of the genetics of your flock, tailoring them to your specific requirements, while knowing the full health status and history of every ewe.

Producers considering breeding their own replacements must develop a plan that:

- Assesses the financial implications of keeping homebred females
- Establishes performance-based breeding goals
- Always considers EBVs when selecting breeding stock to improve economically important traits
- Capitalises on hybrid vigour
- Enforces simple recording systems to identify cull animals

	Buy-in replacements	Home-bred replacements
Impact on replacement costs	Depends on relative market price for lambs and breeding ewes	
Control over breeding potential of ewe	Very little	High with EBV-based selection
Extra resources needed, eg land and labour	No	Yes
Threat to flock health status	Significant risk where females are bought-in	Greatly reduced – closed flock may be run

Remember

Don't practise 'negative selection' by keeping poor-performing, less saleable females for breeding.



Female replacements: crossbred or purebred?

Producers breeding their own replacements need to consider whether these are purebred or crossbred.

Advantages of purebreeding	Advantages of crossbreeding
<ul style="list-style-type: none">• Simple system, where only one breed is needed• Potential marketing advantages from purebred sales• Greater uniformity among breeding stock	<ul style="list-style-type: none">• Exploitation of hybrid vigour• Wide access to different genetics• Faster rates of genetic change

Benefits of hybrid vigour

Crossbreeding has the greatest impact on traits influencing reproductive performance and longevity through the exploitation of hybrid vigour.

Hybrid vigour (or heterosis) is the improved performance of a crossbred animal, achieved over and above the average performance of its two parents.

Crossbreeding strategies

Producers considering a crossbreeding programme should be aware of several different strategies that each build in hybrid vigour in different ways. No single strategy is better than another, but some will suit individual farms better than others:

- First cross – utilising the crossbred offspring produced by two purebred parents
- Second cross – mating a purebred ram to a first-cross ewe, creating a lamb with genes from three breeds
- Rotational crossing – alternating two different sire breeds in successive generations
- Backcrossing – introducing a new breed to bring in a desirable characteristic (eg polling) and then a sustained programme of ‘grading up’ using the original breed
- Composite production – creating a crossbred breeding line by crossing two or more breeds and keeping crossbred replacements from within that population

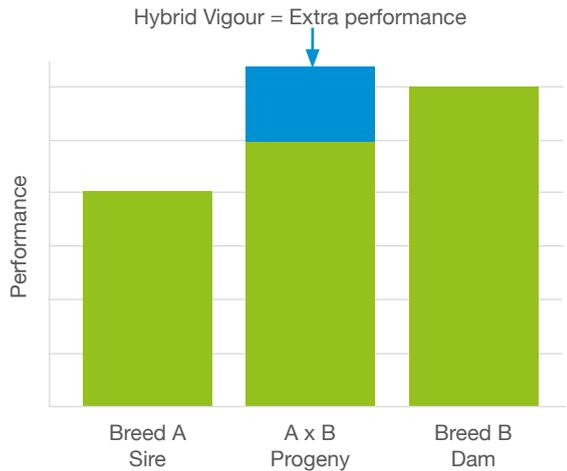


Figure 2: Performance from hybrid vigour



Sheep BRP Manuals

- Manual 1** Marketing prime lamb for Better Returns
- Manual 2** Buying a recorded ram for terminal sire traits
- Manual 3** Buying a recorded ram for maternal traits
- Manual 4** Managing ewes for Better Returns
- Manual 5** Growing and finishing lambs for Better Returns
- Manual 6** Target easier management for Better Returns
- Manual 7** Reducing lameness for Better Returns
- Manual 8** Worm control in sheep for Better Returns
- Manual 9** Improving ewe breeding for Better Returns
- Manual 10** Controlling external parasites for Better Returns
- Manual 11** Target ewe fertility for Better Returns
- Manual 12** Improving ewe nutrition for Better Returns
- Manual 13** Improving sheep handling for Better Returns
- Manual 14** Reducing lamb losses for Better Returns

See the AHDB Beef & Lamb website beefandlamb.ahdb.org.uk for the full list of Better Returns Programme publications for beef and sheep producers.

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