Buying a recorded ram for terminal sire traits

AHDB

BEEF & LAMB

Contents

Introduction

Since the publication of the first sheep BRP manual on ram selection, many more producers, pedigree and commercial, have taken a more informed approach to breeding.

Tools such as estimated breeding values (EBVs) have become more widely understood and important traits such as growth rate and carcase conformation have improved with the wider uptake of technologies such as computed tomography (CT) scanning. Indeed, the annual return due to genetic improvement within the British sheep sector is estimated to be worth £10.7 million per annum.

Samuel Boon
Signet Manager

Commercial application

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

Commercial producers are seeking terminal sires to suit their particular farms, reducing days to slaughter and increasing the value of the lambs sold. Their investment in high-performance genetics is rewarded through an increase in flock productivity, which, in today's ever-changing world, has never been more important.

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 ongoing updates, the BRP manual 2 **Buying a recorded ram to generate Better Returns** has now been split into terminal sire and maternal traits. If you are interested in maternal traits, please refer to manual 3 **Buying a recorded ram for maternal traits.**

Why use EBVs?

A flock's physical performance directly affects its profitability. Efficient animals require less inputs (mainly feed) for the same or increased output (eg more kg of meat) 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 improvements made initially will build year on year, making genetic improvement sustainable, cumulative and therefore a cost-effective way of boosting productivity and profitability.

Earn an extra £3–4 per lamb

Using rams with superior breeding can increase flock profitability. Financial benefits vary from farm to farm, but at least £3 per lamb increase is often reported in trials.
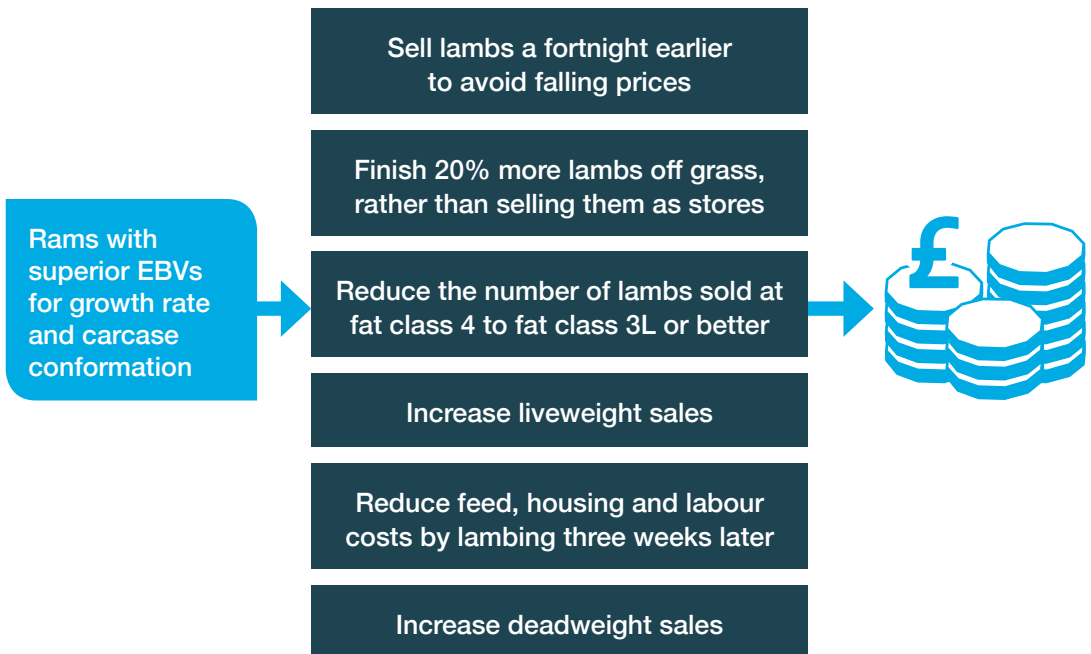

Rams with superior EBVs for growth rate and carcase conformation →

- Sell lambs a fortnight earlier to avoid falling prices
- Finish 20% more lambs off grass, rather than selling them as stores
- Reduce the number of lambs sold at fat class 4 to fat class 3L or better
- Increase liveweight sales
- Reduce feed, housing and labour costs by lambing three weeks later
- Increase deadweight sales

Figure 1. Advantages of using rams with superior EBVs for growth rate and carcase conformation

Superior genetics lift performance

Duncan Nelless (right) farms in Northumberland and data collected on his farm shows that the progeny of high-genetic-merit rams produced carcases worth £4 more than lambs from his average ram.

This can amount to an extra £1000 over a ram's working lifetime, more than repaying an investment in superior genetics.

Philip and Charlie Whitehouse (below, right) produce prime lambs for slaughter in Gloucestershire. They use high-index rams to breed more lambs that finish within abattoir carcase specifications.

Their high-index rams produce over 15 per cent more lambs within specification than those from a ram with below average genetic merit. This results in an extra £4.50 per lamb in added carcase value.

Recorded rams reduce risk

Rams that are not recorded may be cheaper to buy, 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 sent for slaughter.

Progress in recorded flocks

The genetic progress in recorded flocks is proven. Major gains have been made in improving growth and carcase 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 Charollais breed, the top 10 per cent in 1997 would now find themselves in the bottom 5 per cent of the breed today (see Figure 2).
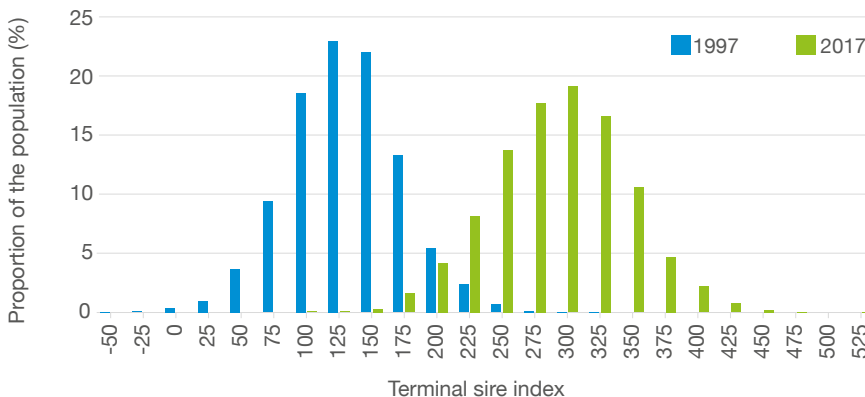

Figure 2. Distribution of Charollais indexes from lambs born in 1997 and 2017

Looks can be deceptive

Despite the importance often placed on the appearance 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.

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 terminal sire 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 carcase without being overfat
CT lean weight (kg)	Best prediction of lean meat yield
CT fat weight (kg)	Best prediction of fat weight in the carcase
CT muscularity (mm)	Highlights genetic potential for gigot muscularity

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 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.

For more information on fit-for-purpose rams, please see the AHDB Beef & Lamb **Ram MOT** leaflet, available at **beefandlamb.ahdb.org.uk**
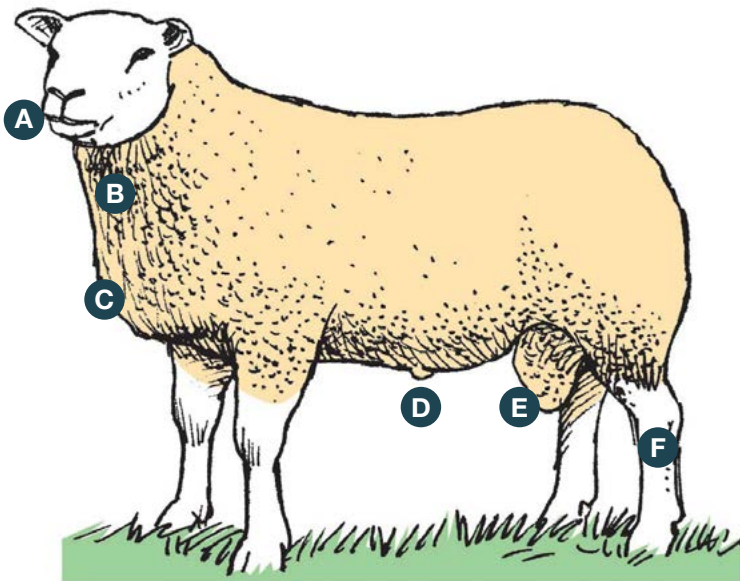
A. Teeth and mouth – check incisor and molar teeth

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, due to raised body temperature

EBVs that influence growth

Why growth matters

High growth rates can enhance the:

- Weight of lambs sold
- Proportion of lambs finished off grass
- Timing of sales, to hit periods with better market returns
- Size of store lambs

Which EBVs are important?

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

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.

EBVs that influence carcase quality

Why quality matters

Carcase quality is a key determinant of consumer acceptability and therefore price.

- Muscle depth EBVs influence carcase conformation and yield
- Fat depth EBVs influence levels of fat cover at slaughter and how quickly lambs can be finished
- Financial returns can be improved significantly by increasing the number of carcases meeting market specification

Which EBVs are important?

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

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. They should also check how they monitor and select lambs for market.

Extensive grass-based finishing systems may want to consider selecting rams with more positive fat depth EBVs to ensure lambs have sufficient finish at the desired slaughter weight.

EBVs from computed tomography (CT)

A number of terminal sire breeders now make use of computed tomography (CT). This allows them to assess carcase characteristics to a much finer degree than by ultrasound scanning. Live animals are CT scanned which measures the total amount of muscle and fat in the body to a very high level of accuracy. Three EBVs are predicted using CT measurements.

CT lean weight EBV (kg)	CT fat weight EBV (kg)	CT gigot muscularity EBV (mm)
An indication of breeding potential for weight of muscle in the carcase	An indication of breeding potential for weight of fat in the carcase	An indication of breeding potential for width of gigot
Example A ram with an EBV of +2kg is estimated to produce lambs with 1kg more muscle in their carcase than a ram with an EBV of 0	**Example** A ram with an EBV of -1kg is estimated to produce lambs with 0.5kg less fat in their carcase than a ram with an EBV of 0	**Example** A ram with an EBV of +4mm is estimated to produce lambs with 2mm wider gigots than a ram with an EBV of 0

New CT carcase traits

New EBVs are being developed from CT images, including:

- Total spine length (split into thoracic and lumbar regions)
- Total vertebra number (split into thoracic and lumbar regions)
- CT-predicted intramuscular fat percentage
- CT-predicted eye muscle area

The availability of these new carcase traits will allow breeders to select for improved meat-eating quality and spinal length.

Terminal breeding index

EBVs identify animals that excel for 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.

The terminal sire index is designed to increase lean meat yield in the carcase, while limiting any associated rise in fatness.

Optimising fat depth

One of the most widespread modifications applied to Signet's breeding indexes is the inclusion of the ATAN function. This reduces the indexes of sheep with very low fat depth EBVs, which are more likely to produce overly lean progeny. Terminal sire breeds have adopted this function in their index calculation to optimise selection for fat.

Select rams with measurements

The terminal sire index uses information from a range of sources, including lamb weights, ultrasound measurements and CT scanning data. The most accurate predictions are obtained for rams that are fully recorded, so always ask the ram breeder which measurement services they use, how many lambs they measure each year and whether they are selecting CT-scanned rams for breeding. The more measurements they are collecting and using, the more likely they are to breed superior rams.

Making genetic progress

All Signet-recorded flocks are provided with charts showing the genetic gain achieved in their flock over time. Ask to see this information when buying a ram as this will show whether the flock is actively improving the traits that are of importance to you.

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 range of 0–99 per cent. The higher the value, the more that is known about that ram. Maternal traits with low heritability will 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 available to view at **www.signetfbc.co.uk**

Sales charts

EBV charts, often displayed at sales and on promotional information, 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.

Table 2. Example benchmark for the key EBV traits

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
Terminal index	35	66	100	134	165

Note: The top 10 per cent for fat depth (ie the fattest animals) are not necessarily the best – it simply indicates that these are the 10 per cent fattest animals.
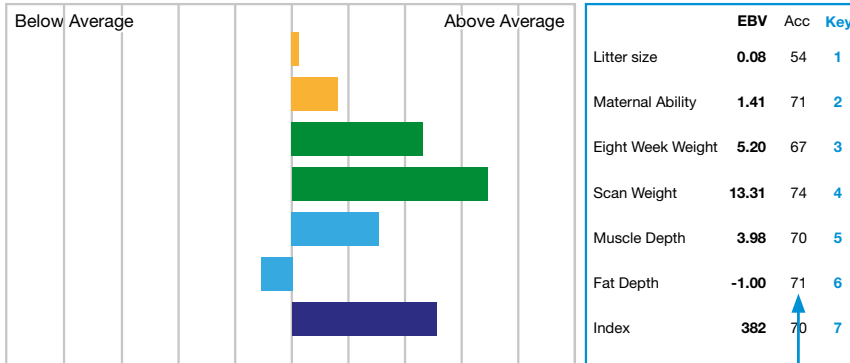
EBV sale charts

Look for a ram that has been ultrasound scanned

Stoneleigh 17ABC00001
Sire: Park PA00001
Dam: ABC0001122

Ultrasound Scanned: Yes
Date of Birth 14/12/2017

	EBV	Acc	Key
Litter size	**0.08**	54	**1**
Maternal Ability	**1.41**	71	**2**
Eight Week Weight	**5.20**	67	**3**
Scan Weight	**13.31**	74	**4**
Muscle Depth	**3.98**	70	**5**
Fat Depth	**-1.00**	71	**6**
Index	**382**	70	**7**

Below Average   Above 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
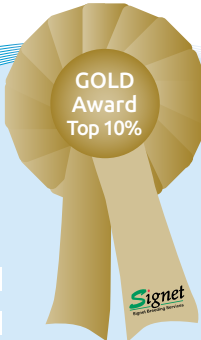
7. The terminal index is designed to increase lean meat yield in the carcase, while limiting any associated rise in fatness

High-index animals are most fitting to this breeding goal

Buyers will also see sale cards and order of merit cards at sales, with EBVs for key growth and carcase 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.

High scan weight EBV = high growth rates

High muscle depth EBV = better conformation

Negative fat depth EBV = leaner lambs

Index = overall ranking

BETTERRETURNS

GOLD Award Top 10%

Order of Merit

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

Ear No.

Lot

Signet

	Estimated breeding values (EVBs)	Accuracy values
Scan weight EBV	8.85 kg	
Muscle depth EBV	2.18 mm	
Fat depth EBV	0.21 mm	
Index	282	

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

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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:

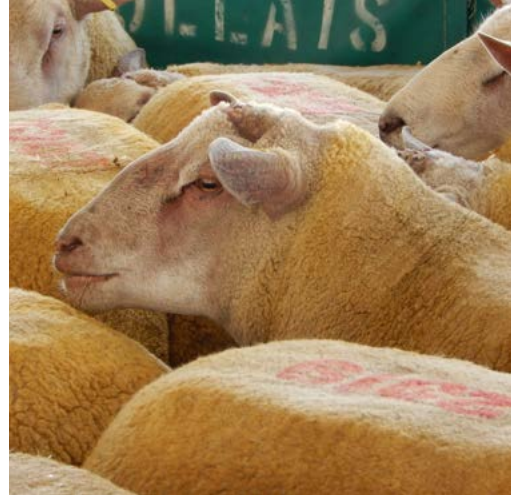| Stoneleigh perfection		UK524429		ABC11001(E)			Born: 01/01/2017	
Sire: COVENTRY OXYGEN XYZ08019(E) by FRANKTON FRED (1) Dam: DEC070001(2) by WARWICK MAGNET (2)								
	Litter size	Maternal ability	8-week weight	Scan weight	Muscle depth	Fat depth	CT gigot muscle	Index
EBVs	0.15	0.14kgs	4.82kgs	8.85kgs	2.18mm	0.21mm	2.93mm	282
Accuracy	28%	25%	88%	90%	86%	88%	78%	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 **www.signetfbc.co.uk**

Contact Signet if you need more 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.

Advantages of on-farm sales	Advantages of auctions
• 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 the ram has been reared in	• 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 in comparison 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 and CT technologies

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 the 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**

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

Changes to terminal sire evaluations

Adjusting for weight rather than age

Historically, traits such as muscle depth have been adjusted for age to identify those lambs that will lay down the most muscle at a certain age, regardless of weight.

Sheep with high muscle depth EBVs might achieve them in two ways:

- Being big, as genetically bigger sheep tend to have more muscle
- Having a high muscle depth, relative to their weight

Lambs are selected for slaughter based on a combination of their liveweight and level of finish, not age.

AHDB Beef & Lamb-funded research has shown that adjusting carcase traits to a fixed liveweight will improve the ability of commercial producers to select for lambs with the right amount of muscle and fat (finish) at a set weight, eg 40kg liveweight.

When carcase traits become adjusted for liveweight from 2019 analyses, breeders should expect re-ranking of animals and be aware of the negative correlation between the amount of muscle and fat in the carcase at a fixed liveweight, because as the amount of muscle in a carcase increases, lambs tend to become leaner.

New terminal sire indexes are being created to take this into account, optimising fatness and avoiding the promotion of over-lean breeding lines.

Combined breed analysis

During 2019, a new evaluation will be implemented for terminal sire breeds. The new analysis will be a multi-breed analysis called the 'combined breed analysis'.

This approach is similar to the way sheep are analysed in New Zealand, Australia and America and is the approach for UK dairy cattle.

The new analysis will see:

- More regular Best Linear Unbiased Predictor (BLUP) runs
- New and enhanced EBVs for terminal sires
- More accurate assessment of crossbred animals
- Re-basing of EBVs

Re-basing EBVs and indexes

In the new analysis, EBVs will be re-based and relate to the average genetic merit of lambs born in 2012 for each breed. EBVs for each breed will still be reported separately and breed benchmarks will be updated.

At the time of publication, the breeds involved are: Texel, Suffolk, Charollais, Dorset, Meatlinc, Hampshire Down, Beltex, Blue Texel, Bleu du Maine, Vendeen, Shropshire and Southdown. Signet will look at ways to include other breeds in the future.

There will be more information available on combined breed analysis throughout 2018, explaining the changes in evaluations that both pedigree and commercial breeders need to be aware of.

RamCompare

RamCompare is the UK's first commercial progeny test for terminal sire rams. The two-year pilot study was completed in 2017, with over 70 rams tested on six commercial production systems. In 2017, it was confirmed that the project would continue for a further three years, testing more rams and representing a wider range of breeds.

Data on growth and carcase traits has been collected from over 7,000 commercial lambs and used in genetic evaluations to produce new breeding values.

The new traits are:

- Carcase weight EBV
- Carcase fat class EBV
- Carcase conformation EBV

What data was collected?

- On-farm lamb performance, including ultrasound scanning
- Abattoir data, including carcase grades and weight
- Tenderness scores from shear force
- DNA for future research

What does this mean?

RamCompare has shown that data derived from commercial farms and abattoirs can be used to produce breeding values and strengthen the national genetic evaluation of terminal sires.

RamCompare highlights the differences in performance between the progeny of high-genetic-merit rams in commercial systems, with differences of over £4.50 per head in added carcase value regularly reported between the best and more average rams.

The project demonstrates that EBVs for growth and carcase traits are an accurate predictor of economic performance in commercial environments.

More information on RamCompare can be found at **www.ramcompare.com**

Buying a recorded ram for maternal traits

If you are interested in buying a recorded ram for maternal traits such as maternal ability and litter size, please refer to the BRP manual: **Buying a recorded ram for maternal traits**

Sheep BRP Manuals

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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