Signet
BREEDING SERVICES

THE NATIONAL MATERNAL BREEDING EVALUATION

CONTENTS

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INTRODUCTION

ACHIEVEMENTS THROUGH SELECTIVE BREEDING

Ewe breeding flocks have been involved in weight recording programmes for over 50 years. The reasons breeders were interested in flock recording back then are the same today. Breeders need an unbiased way to find those rams and ewes in the flock with the best genetic potential.

It is difficult to identify the best sheep by eye alone, particularly for maternal traits. For this reason, data services were developed to get a fuller picture of a flock's performance and the genetic merit of the individual sheep within it.

In the last 50 years, massive advances in flock identification, record keeping, ultrasound scanning, handling systems, computing power and more recently, genomics have transformed our ability to use this basic information to identify and breed from sheep with superior genetics.

The value of genetic improvement to the UK sheep industry exceeds £10.7m per annum (Abacus Review, 2015), and at the farm gate, lambs sired by high index sires can easily exceed an additional £4 per lamb – with greater gains in maternal breeds where genetic gains are expressed year after year.

Performance records can add value to your pedigree enterprise

Adding value to ram sales

Performance records enable buyers to purchase rams with confidence, compare rams between flocks and buy better quality stock. Buyers are now seeking rams with records, so it pays to record.

- Achieving a higher average sale value
- Selling more rams, with better clearance rates

Increasing flock productivity

Both the flocks that performance record and those flocks buying rams from them will benefit from any genetic improvement that is made; selectively retaining the best ram lambs and ewe lambs will lift flock productivity and enhance profitability.

THIS BOOKLET EXPLAINS HOW BREEDERS WITH MATERNAL BREEDS CAN GET INVOLVED WITH PERFORMANCE RECORDING SERVICES AND TAKE THEIR FLOCK FORWARD.

WHAT'S NEW IN THE PERFORMANCE RECORDING OF MATERNAL BREEDS?

A multi-breed approach has been launched to evaluate lowland maternal breeds like the Lleyn, Romney, Roussin, Exlana, Easycare, Wiltshire Horn, Charmoise Hill, Jacob and Bluefaced Leicester.

The National Maternal Breeding Evaluation incorporates a series of enhancements which include:

- Updating existing Estimated Breeding Values (EBVs) to make them more accurate and commercially focused
- The development of new EBVs for maternal traits
- Monthly analyses to provide more frequent results

The following EBVs are produced as part of the National Maternal Breeding Evaluation:

Birth weight Lambing ease Lamb survival Litter size born Litter size reared Maternal ability	›	Influencing the number of lambs successfully reared by the ewe
Eight-week weight Scan weight Muscle depth Fat depth	›	Weight and quality of lambs sold
Faecal Egg Count Serum IgA	›	Parasite resistance
Shearling ewe weight Ewe mature size Body condition score Age at first lambing Ewe longevity	›	Lifetime productivity and efficiency of the ewe

Additional breeding values for carcase weight, days to slaughter, carcase conformation and fat class will be developed where abattoir records are provided for analysis.

SIGNET'S MATERNAL EVALUATION WILL GENERATE A SET OF BREEDING VALUES THAT ARE MORE RELEVANT AND EASIER TO INTERPRET BY COMMERCIAL RAM BUYERS.

A BREEDING INDEX FOR MATERNAL SHEEP

While EBVs aid the selection of breeding stock for individual traits, they can also be combined to produce a breeding index. The weightings within the index take account of economic principles to determine the value of each trait, enabling sheep to be ranked on their overall genetic merit.

Signet's maternal indexes have been created to enhance lamb growth rates and muscling while selecting more prolific ewes with superior maternal performance.

A positive weighting has been placed on fat depth to avoid flocks getting leaner, and two non-linear penalties have been applied to optimise flock performance:

- A penalty has been placed on those sheep with the highest ewe mature size EBVs in order to enhance flock efficiency
- A penalty has been placed on breeding lines producing either lots of singles or lots to triplets/quads in an attempt to increase twinning rates

Index weightings may vary between breeds depending on their role in the industry and their current strengths and weaknesses.

INDEX CUSTOMISATION – A NEW WAY FOR BREEDERS TO LEARN ABOUT INDEXES

For breeders that are interested in Index weightings and wish to test their own ideas, a online service is available from Signet that enables 'index customisation'.

Funded by HCC and AHDB, this breeding tool shows breeders how animals in the flock would rank if index weightings were changed and allows them to create indexes to meet their specific needs.

See more online at signetdata.com

HOW DO I GET STARTED?

Most breeds in the UK performance record through Signet Breeding Services and it is simple to get started.

1. Fill in a Signet contract indicating the breed and size of your flock.
2. Using paper records or the output from on-farm software, provide Signet with details of the ewes and rams in your flock.
   - Provide a one- or two-generation pedigree where known
3. Decide whether you would rather supply data online or via on-farm software. Paper-based services do exist but usually incur an extra charge.

DATA SUBMISSION

The main ways to supply data are either via:

- Spreadsheets – often generated from on-farm software
- Online at **signetdata.com**, where clients can enter lambing records and weights

Accurate and timely on-farm data collection is at the heart of any recording system.

These are the key times when data is needed:

At lambing for each lamb, provide details of sire, dam, sex and date of birth. Fostering information and records of dead lambs are important. The provision of birth weights and lambing ease scores is optional and probably of less relevance for extensively run flocks.

Weigh lambs between 6 and 12 weeks of age to get an adjusted 8-week weight. Remember to record if lambs have been in different management groups.

Contact a technician to scan lambs at around 20 weeks of age to weigh lambs and measure ultrasound muscle and fat depth.

Consider if the lambs are to be assessed for worm resistance (see page 9).

Prior to mating, weigh the ewes that are going to the ram (shearlings and older ewes). Breeders should also supply body condition scores for their older ewes if this trait is of interest to them.

The most important time of the year to weigh and body condition score ewes is at mating time, but weights can be supplied at other times, such as weaning.

ULTRASOUND SCANNING

Ultrasound scanning provides breeders with the opportunity to assess the carcase quality of their sheep.

WHY USE ULTRASOUND TO ASSESS MUSCLING?

Unlike growth rate, it isn't easy to identify sheep with superior muscling across the loin. Ultrasound images enable breeders to select animals with superior loins and avoid those with a high level of carcase fat. While this measurement simply reflects muscle depth across the loin, research indicates that selective breeding for muscle depth can greatly enhance total meat yield.

RAW DATA OR EBVS?

As with any raw performance data, muscle and fat depth measurements are affected by non-genetic factors such as age at scanning and flock nutrition. It is important that breeders select based on muscle and fat depth EBVs, rather than on the raw data alone.

WHAT IS INVOLVED?

The technique involves parting the wool and applying liquid paraffin at the third lumbar vertebra at 90 degrees to the backbone. The transducer is adjusted until a clear image of the eye muscle and fat layers can be seen on the machine's screen. A single measurement is taken of muscle depth at the deepest point and three measures of fat depth are taken at 1 cm intervals. These measurements are then submitted to Signet for inclusion in the forthcoming breeding evaluation.

WHEN DO I SCAN?

In the past, Signet recorded flocks have been scanned at around 21 weeks of age onwards. However, in recent years, Signet changed their guidance to focus on the weight of lambs at scanning rather than their age. It is recognised that adjusting for the weight of the lamb is more commercially relevant and breeders now aim to scan lambs as they approach 40 kg, though for hill flocks it is recognised they will often be lighter.

Flocks can opt to scan a sub-sample of their lambs, but as a minimum we recommend that all potential male and female replacements are scanned – as well as any breeding sheep being sold to other flocks.

ASSESSING MUSCLE AND FAT DEPTH ON A WEIGHT-ADJUSTED BASIS

The UK sheep industry were pioneers in the use of ultrasound scanning technology to assess muscle and fat levels across the loin.

Historically, traits like muscle depth have been adjusted for age within the analysis 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

However, breeders can already select for growth rate using the Scan Weight EBV, and a better approach is needed to assess muscling independently from growth, i.e. the ability to compare levels of muscling at a fixed weight rather than a fixed age.

Within Signet's breeding evaluations, this approach has been widely implemented to help breeders to select more muscular lambs at a fixed liveweight.

COMMERCIAL CONTEXT

Our approach is advantageous for commercial producers as lambs tend to be drawn on their weight (and finish), not their age. Commercial producers want lambs with the right amount of muscle and fat (finish) at a set weight, say 38 kg liveweight – not a set age, and these EBVs help achieve this.

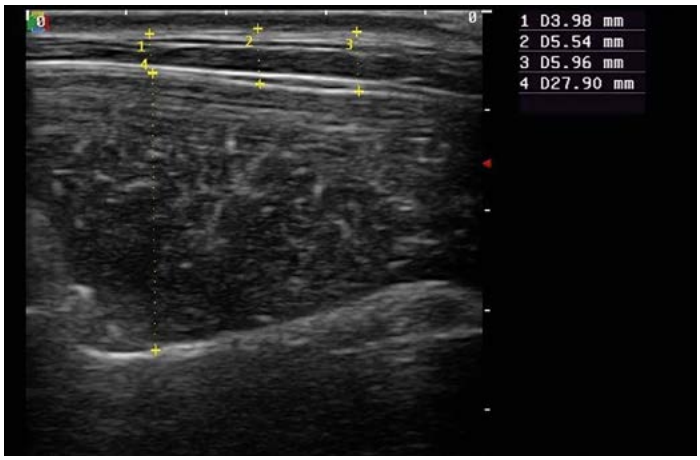
In maternal breeding lines where female replacements are retained, it enables producers to breed lambs with a better yield of meat in their carcase without generating large increases in ewe mature size. This is an important consideration in breeding programmes where the efficiency of the ewe is important, particularly when farming in the hills.

IMPLICATIONS FOR BREEDERS

Work completed by Janet Roden, Independent Sheep Geneticist, has shown the new approach will result in faster genetic gain in muscling at a fixed weight.

Breeders benefit from the fact that weight-adjusted traits tend to be more heritable than age-adjusted traits. However, they also tend to show less genetic variation, and the scale of any EBVs produced on a weight-adjusted basis will be smaller.

When selecting for weight-adjusted traits, breeders should be aware there can be a negative relationship between the amount of muscle and fat within the carcase. With weight-adjusted traits, the size of the animal is assumed to be 'fixed', so if it has more muscle, it tends to have less fat and vice versa. This explains why some of the gains made in the amount of muscle in the carcase in recent years has resulted in a reduction in the amount of fat in the carcase.



BREEDING FOR WORM RESISTANCE

Genetic variation exists between sheep in their ability to resist parasites, and this can be exploited in breeding programmes.

Selection for low faecal egg count (FEC) is practised in a number of flocks, with the Lleyn, Exlana and Romney breeds most engaged. Progress has been challenging. The collection of FEC samples is time consuming, expensive and comes at a cost to the enterprise in terms of lamb performance. However, the main challenge is the relatively low heritability of FEC, with only around 10% of the variation between individuals due to their genes. Breeders are making improvements by selecting sheep with low breeding values for FEC, but genetic progress tends to be slow.

A NEW PHENOTYPE FOR ASSESSING WORM RESISTANCE

Research at Glasgow University has shown that antibody responses against the larval stage of *Teladorsagia circumcincta* (an important member of the Strongyles family) can be used as a biological marker for host response to infection. This potential phenotype provides a new way to identify genetic differences between sheep in their resistance to worm challenge.

High levels of IgA have been shown to regulate both worm growth and fecundity – leading to a decrease in egg output.

Work within Lleyn and Exlana populations has shown the heritability of IgA levels in blood serum to be ~30%, providing optimism that selection for high IgA may aid the quest for greater parasite resistance.

ADVICE TO BREEDERS CONSIDERING BREEDING FOR WORM RESISTANCE

Flocks considering sampling their flocks are advised to take a mob sample and ensure lambs are experiencing a challenge of at least 400 eggs per gram. Further advice can be found online at **signetdata.com**.

BREEDING FOR EWE EFFICIENCY

Selection for faster lamb growth rates will lead to an increase in ewe mature weights. While heavier ewes are worth more as culls, they are also more expensive to feed and need to be run at a lower stocking density.

Work for AHDB by AbacusBio highlighted that there is an optimum ewe size for maternal breeds in the UK that balances gains in output against increases in production costs and thus enhances overall flock efficiency.

Breeders can select for these more efficient breeding lines by recording both lamb and ewe weights, enabling the selection of 'curve benders', which have a fast early growth rate but a more moderate mature weight.

MEASURING EWE MATURE WEIGHTS

EBVs are calculated for ewe mature weights and ewe body condition scores taken at any of three key times during the year: prior to mating, when weighing lambs at eight weeks of age and at weaning. The EBV for mature weight at mating is published and is thus the main focus of our data collection and breeding decisions.

Please try to weigh your shearling and older ewes at mating time. Record differences in their management and, where practical, collect a record of body condition score, though we recognise this isn't possible in all flocks. Most breeders submit this information to Signet as data files exported from their farm software. The file should contain the ewe's identity, weight in kilograms, the weigh date and the management group if ewes have been reared in different groups.

WHAT DO I GET FROM SIGNET?

Performance recording is used to convert pedigree information (family relationships) and performance records (measurements) into breeding values to enable sheep to be ranked on the basis of their genetic merit.

Our statistical analysis determines how much of each animal's performance is due to their genetics and how much is due to environmental influences, like the farm of origin, their sex, age and rear type.

In each analysis, three types of breeding information are produced:

- EBVs
- Accuracy values
- Breeding Indexes

EBVs predict an animal's breeding potential for a specific trait, while accuracy values indicate how good an estimate this is likely to be given how much is known about the animal and its relatives.

EBVs help breeders to select breeding stock for specific traits, but they can also be combined into breeding indexes. Each trait is weighted within the index according to its economic importance in meeting a specific breeding objective or objectives.

INDIVIDUAL FLOCK REPORTS

Breeders are sent electronic reports containing breeding values once scanning data has been submitted for analysis. These reports contain updated breeding values for all of the lambs, shearlings, stock ewes and rams within the flock.

WHEN DO I GET REPORTS?

Signet currently produces a monthly analysis, and the latest breeding values will always be found online at **signetdata.com**. Reports are sent out after new lamb weights have been submitted, but breeders can also generate their own reports directly from the database.

WHERE CAN I FIND MORE INFORMATION?

All of the breeding values generated in Signet's sheep breeding programmes are available online at signetdata.com

A simple search function provides open access to the breeding values of millions of animals, with lists of leading sires, ram lambs and shearling rams made publicly available.

On the Signet website, commercial ram buyers can find:

- **EBV Search – Which enables potential buyers to find rams that meet their specific breeding objectives.**
- **Flock Finder – A list of recording breeders**
- **Sheep for Sale – A list of recorded sheep that are for sale**

ADVICE FOR NEW AND LARGE FLOCKS

NEW FLOCKS

The establishment of a new flock recording programme takes time. Many of the ewes in the flock are only being assessed on the basis of a couple of lamb records, and early culling decisions should be made with care.

In the first year, focus on the differences that can be seen between the sires (as they will have the most accurate breeding values).

REMEMBER

- A ram's genetic merit for maternal traits can only be assessed through female relatives. For a brand new stock ram, it will take a couple of years for these to be assessed through daughter records unless his female ancestors have been recorded. This is where accuracy values can prove useful in helping to make breeding decisions
- Take care in making comparisons between the EBVs for sheep in your flock with those in other flocks unless there is a good genetic linkage between both flocks

COMPARING SHEEP REARED IN DIFFERENT FLOCKS

Although all flocks are analysed within a multi-flock evaluation, to enable accurate comparisons to be made between flocks, there needs to be some genetic linkage between them, i.e. some common genetics used between the flocks through shared or related rams.

While it is a challenge to maintain genetic linkage between flocks, by working together, breeders can enable robust comparisons to be made. To build linkage, breeders are advised to exchange or share some Signet recorded rams of known genetic merit. Older stock rams, with progeny on the ground, create particularly good linkage.

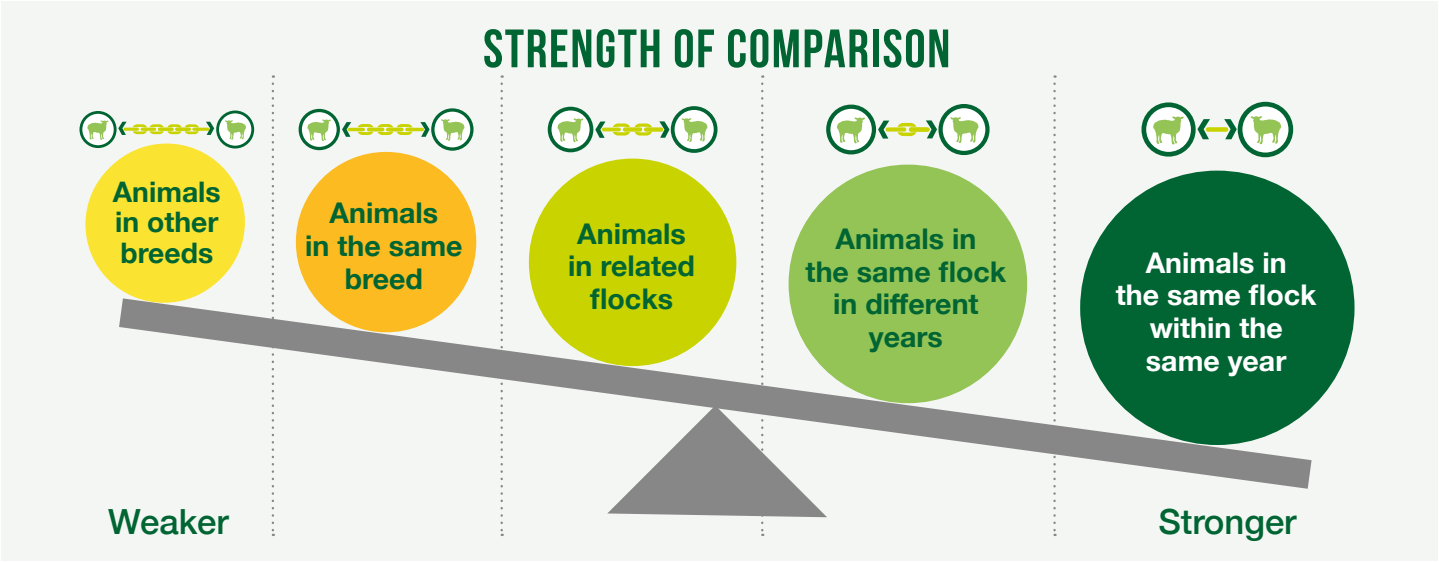
An online tool to report the degree of genetic linkage that exists between flocks is being developed.

LARGE FLOCKS

Breeders with large flocks stand to gain the most by improving the genetic merit of their sheep, particularly when it comes to maternal characteristics, which are nearly impossible to enhance without records.

Understandably, many breeders are daunted by the task of collecting and recording the data, but the following tips may help:

1. **Create a breeding nucleus** – breeders don't have to record their entire flock. The key to a successful nucleus is selecting the right foundation animals.
2. Don't do it on the appearance of older ewes; you may overlook hard-working ewes in poorer condition. Better approaches might be to select ewes that reared twins the previous year or the heaviest ewe lambs within a group.
3. **Adjust lambing dates** – enthusiasm for recording tends to drop over time. Consider lambing the nucleus flock earlier or later than the main flock and keep the lambing period tight.
4. **Recording birth weight and lambing ease is not essential** – this data is useful but not crucial within maternal breeding evaluations.
5. **Not every lamb needs to be ultrasound scanned** – if you are interested in maternal characteristics and growth, consider just scanning a sub-group of your lambs. If you don't scan all your lambs, please weigh the rest at scanning time.
6. **Collect weight data around other tasks** – e.g. weaning or drenching.
7. **Use labour-saving devices that make recording easier** – these range from distance readable tags to more complex EID, farm software and handling systems.
8. **Involve your shepherd** – whoever is involved in collecting data needs to understand the importance of accurate data. Take time to explain why rams are selected using their EBVs and how it will improve flock performance.



MAKING BREEDING PLANS

WHAT SHOULD I DO WHEN I GET MY REPORT?

Firstly, check that all the information is correct. Inform Signet of any amendments that need making to pedigree or performance data.

Then create a breeding plan:

1. Consider your breeding objectives and select the breeding stock with the right balance of breeding values to achieve them.
2. Assess the relative merit of last season's stock rams and choose those that will be used again. Always use at least one ram from the previous season to strengthen within flock comparisons.
   - Be cautious in assessing the maternal attributes of unrecorded rams until their daughters have produced lambs in the flock.
3. Review the breeding merit of homebred shearling rams and ram lambs which may be introduced into the breeding programme.
4. Identify ewe lambs/shearlings with high genetic merit and good physical attributes to be retained. Those with low genetic merit can be sold.
5. Review your genetic progress over time. The Signet website provides breeders with the opportunity to see the genetic progress they are making for any given trait over time.

THE 20/80 APPROACH

When deciding which rams to mate to which ewes, rank your ewes according to their genetic merit and focus on the top 20% of the flock. These females are the most likely to produce elite sons that will be of use for breeding in the future. Mate these high genetic merit ewes to a range of unrelated, high genetic merit rams. The remaining 80% of the flock can be used for multiplying up high index bloodlines or for test matings made to new sires entering the flock.

USE OUR FREE INBREEDING SOFTWARE

Inbreeding is the practice of mating two genetically related animals, and to a degree, it is inevitable in any long-term selection programme involving a closed population.

Breeders will sometimes deliberately inbreed specific bloodlines to fix certain characteristics in the population, increasing the frequency of favourable genes. However, it will also tend to increase the number of deleterious genes being expressed, leading to a reduction in fitness and productivity, which is referred to as 'inbreeding depression'.

Complete avoidance of inbreeding is almost impossible, and a balance has to be struck between the genetic superiority of a specific sire and the level of inbreeding he creates in the flock. Low levels of inbreeding (<6.25%) are often considered the acceptable compromise, and levels higher than that should be avoided.

Signet provides clients with free access to inbreeding software that enables them to predict the level of inbreeding between two individuals. The Signet website provides more details.

FIT FOR PURPOSE RAMS

Selling rams is what sheep breeding is all about. However, to ensure future success, breeders need to produce rams that producers want to buy again and again.

For a commercial buyer, rams are costly to purchase and, therefore, must last at least three or four mating seasons. However, too many die or have to be culled after just one or two years.

OVERFEEDING

There have been concerns for many years that some breeding rams are overfed and that this may limit their working life and the number of ewes they will cover. Overfeeding can also mask a ram's genetic merit for traits such as grazing ability and parasite resistance.

In recent years, ram buyers have been increasingly active in looking for ram's that have been performance tested under forage-based conditions.

HEALTH STATUS

The introduction of a new ram into the flock brings with it the risk of introducing disease. Help your customers by knowing the status of your flock for diseases like Maedi Visna, Border disease, OPA, CLA and Ovine Johne's disease.

Ensure rams are not carrying drug-resistant parasites or foot infections that could be spread within the flock.

A JUDGEMENT CALL

Every breeder will need to reach a balance where rams have been tested and recorded under commercial farming conditions, but also look the part when presented for sale. Extreme rams that are either overfed or badly presented are not likely to find a buyer.

By producing what the market wants and needs, ram buyers can be encouraged to invest with confidence in rams with superior genetics – reassured they will have a long and productive working life.

MARKETING RECORDED RAMS

Ram buyers do not make their decisions solely on the basis of a ram's genetic merit and appearance – other features such as the health status, after-sales service and breeder reputation all play their part.

There are many ways ram sellers can influence ram purchasing decisions, thinking more about their 'product', their customers and how they communicate with them.

With so much effort going into producing high-quality breeding stock, it is a pity not to maximise returns by poor or non-existent marketing.

Five simple marketing ideas:

1. Consider what the unique selling points for your ram and farming business are. Do your customers understand the benefits they bring?
2. Remember farmers are motivated by different things. Some will rate your expertise, some value the rewards obtained from investing in your genetics, while others simply buy because of the self-satisfaction it brings.
3. Make your breeding information accessible:
   - Send promotional mailings/emails to potential and existing customers
   - Report EBVs in sales catalogues
   - Print EBV sale charts for animals directly from **signetdata.com**
   - Use social media to reach out to potential customers
4. Develop a database of past and present customers with details of previous purchases and current contact details.
5. Think about your marketplace and prepare and present your rams accordingly. The appearance of a ram is still important. EBVs explain a great deal about an animal's genetic potential, but at a multi-vendor sale, those rams that are poorly presented are unlikely to sell.

BUILDING A RELATIONSHIP

Post-sale engagement with buyers is just as vital as pre-sale engagement. Getting to know your buyers and allowing them to get to know you through newsletters, emails or social media posts, is a great way to drive repeat custom.

Signet BREEDING SERVICES

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AHDB is a statutory levy board, funded by farmers, growers and others in the supply chain. Our purpose is to inspire our farmers, growers and industry to succeed in a rapidly changing world. We equip the industry with easy to use, practical know-how which they can apply straight away to make better decisions and improve their performance. Established in 2008 and classified as a Non-Departmental Public Body, it supports the following industries: meat and livestock (cattle, sheep and pigs) in England; horticulture, milk and potatoes in Great Britain; and cereals and oilseeds in the UK. AHDB's remit covers 72 per cent of total UK agricultural output. Further information on AHDB can be found at **ahdb.org.uk**

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