

A Decade of Genetic Progress in the English Sheep Industry



Celebrating
ten years of support for
genetic improvement from the
Better Returns Programme

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A decade of supporting genetic progress



By Chris Lloyd

AHDB R&D and KE Director of Livestock

Forward thinking breeders have been making positive genetic progress through performance recording for years, but the challenge facing the industry ten years ago was to encourage commercial farmers to embrace the benefits.

In 2004 the newly launched Better Returns Programme (BRP) produced a manual explaining how to use Estimated Breeding Values (EBVs) when selecting a new ram. BRP strives to communicate the benefits of sourcing recorded animals to enhance the output of a flock, whether through carcass traits for the prime lamb market or maternal traits for breeding replacements.

Press articles, farm events and online training modules have all been used to provide evidence of the benefits to encourage buyers to look for recorded sheep. For example, order of merit cards, supplied by BRP for the past ten years as a marketing tool, identify recorded rams with enhanced breeding potential. Gold, silver and bronze cards clearly highlight recorded rams at sales, creating a unique image and an advantage over non-recorded competition.

Progress made is clear, with performance recorded flock producers reporting greater interest in recorded sheep, with the most progressive customers seeking EBV information to select breeding stock for their farm situation. There are more recorded flocks using the Signet Sheepbreeder service and recorded animals are consistently outperforming unrecorded stock at pedigree sales.

This publication celebrates the progress made by the dedicated breeders of recorded flocks over the past decade and their personal contribution in driving the performance of UK sheep production.



Ten years of genetic progress



By Samuel Boon, Signet Manager

Over the past decade, performance recording of sheep in the UK has focussed on altering growth and carcase characteristics of terminal sire breeds, with associated changes in traits such as milk production, maternal care and prolificacy in maternal breeds.

The progress achieved is impressive. However, genetic trends only tell part of the story, as industry impact is determined by the size of the recorded population and the proportion of that population which is performance recording.

For example, the genetic gain achieved in the Suffolk breed is noteworthy. However, of more interest is the superior rate of gain achieved in recorded flocks compared to those that are not actively recording weights.

Signet recorded flocks are making 50% faster genetic gain for growth rate and at least twice the genetic gain for muscling.

This does not mean non-recorded flocks are not improving. Where breeders have access to superior recorded genetics and choose to use them, considerable gain is also being achieved in the non-recorded population, particularly through the use of top 10% sires via artificial insemination (AI).

At an industry level, the impact of a successful breeding programme is not solely about genetic change, but also the penetration rate of recorded rams within the industry.

While the proportion of flocks in the UK that record with Signet may not be high, by targeting the larger flocks selling rams to other people, the national impact of performance recording is significant.

The proportion of the Texel lamb crop sired by a Signet recorded ram has now reached 40% of all lambs born. The proportion of Suffolk lambs by a recorded ram has stabilised at about 25% of lambs born. More than 60% of Hampshire Down lambs are by a Signet-recorded ram.

Figure 1: Genetic gain in UK sheep breeds

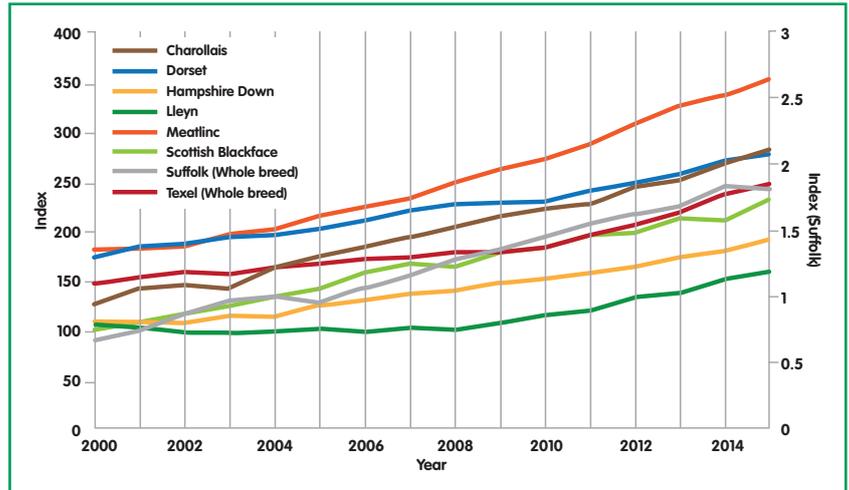
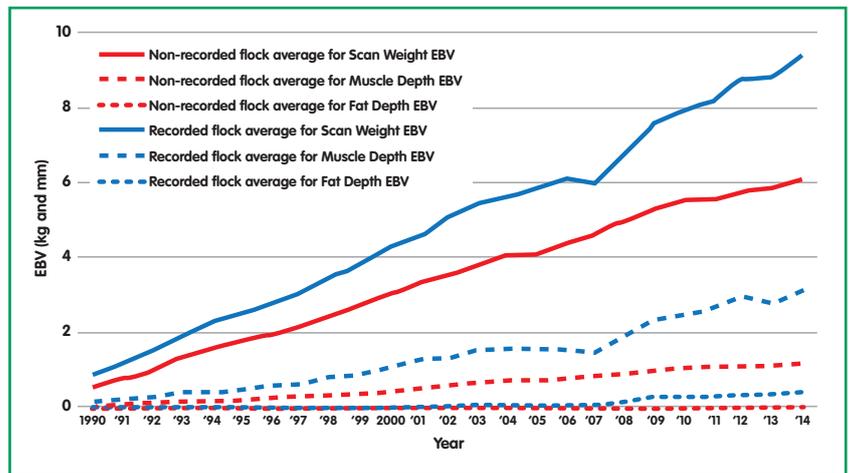


Figure 2: Genetic gain in recorded and unrecorded Suffolk sheep flock



Are current rates of genetic gain sustainable?

There is little evidence that rates of genetic gain are slowing down, or that inbreeding should be a major cause for concern.

Indeed, faster progress could be made in many flocks by paying closer attention to performance records when selecting breeding stock.

New computer tools are available to help breeders monitor inbreeding and avoid any potential inbreeding depression.

Should breeding goals change over time?

Making changes to breeding indexes and the resulting re-ranking of animals understandably unsettles breeders. However, it is an important part of ensuring recording services evolve to meet the needs of the changing industry, particularly as the genetic merit of breeding rams increases.

In recent years, terminal sire breeding programmes have increasingly focussed on the selection of easier finishing lines, that maintain an optimum level of fat across the loin, while striving to improve animal growth rates and muscling.

In maternal breeds, attention now needs to be paid to avoiding large increases in ewe mature size, as well as the selection of breeding lines that are genuinely more efficient.

New traits relating to animal health and meat eating quality, will make selection decisions more complicated in the future, but also provide breeders with stock that can better meet the developing needs of the industry.

Figure 3: Proportion of the lamb crop by a Signet recorded sire

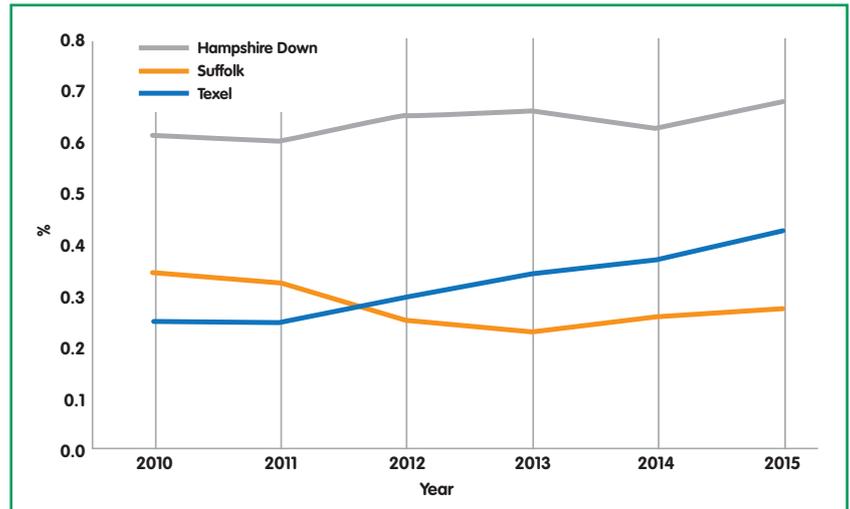
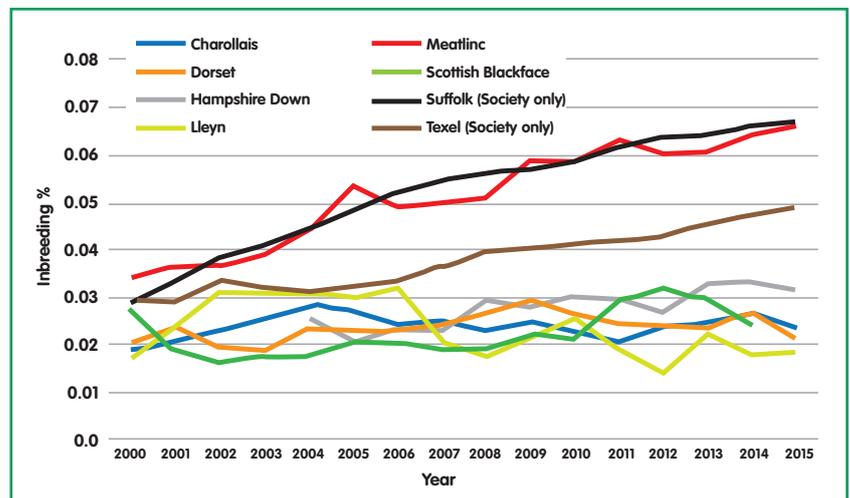


Figure 4: Rates of inbreeding for records (recorded and unrecorded sheep) held on the database



Electronic data



By Stephen West, Breeding Consultant

Over the past ten years, the adoption of electronic identification (EID) and the use of on-farm software to capture data, has revolutionised the way breeders collect information, particularly for large lowland maternal and hill flocks.

Many breeders are dropping numbering systems based on management tags in favour of the one, unique UK number pertaining to that animal. Providing that any retagging is notified to Signet promptly, this approach works well.

With the right equipment (good handling equipment, EID readers, reliable scales and integrated on-farm software), the collection of lamb weights is also now much easier. However breeders must pay more attention to weighing them within the correct time window to achieve an adjusted eight-week weight – as this is a critical measurement when assessing maternal performance. Without a paper-based prompt, some breeders are now weighing lambs too late (more than 84 days of age) to produce an adjusted eight-week weight.

Signet can interrogate historic data if a dataset is clean. In recent years, a number of Lleyn producers have joined the service to enable years of carefully collected weight data to be analysed, to tease out differences in genetic potential for growth, milking ability and prolificacy.

The ability to record greater numbers of sheep by using on-farm software is leading to faster genetic progress and more accurate breeding decisions. This should be an important consideration for any pedigree breeder.

Looking to the future, breeders need to ensure dead lambs are recorded fully, as these tend to be under-reported by those using on-farm software. Fostering information should also be recorded accurately.

Signet can help clients considering setting up a database containing their flock records, by offering electronic files of information to populate it. This saves hours of manual data entry by clients and helps to maintain the integrity of data provided back to Signet in future years.

For smaller flocks, the launch of online data entry will make a major difference to the speed with which information can be processed and analysed.



Peregrine Aubrey

Kingsbridge, Devon

Peregrine performance records over 1500 Lleyn and Suffolk lambs each year with Signet, collating data within his farm management programme produced by Border Software. Recording on this scale allows Peregrine to evaluate and progeny-test large numbers of animals, providing more accuracy to selection decisions and the potential to achieve high rates of breeding improvement.

The introduction of EID technology has made performance recording easier and more effective. Specialised computer software and systems for data capture enable him to harvest infinitely more data than would be possible using pen and paper.



Resistance to internal parasites



By Samuel Boon, Signet Manager

Rising costs of worm control and concerns relating to wormer resistance have increased interest in breeding sheep with greater immunity to roundworms.

The degree to which sheep are affected by roundworms in their gut varies; with some individuals affected much worse than others. This variation has a genetic component, which if it can be assessed, can be used to select animals that are inherently more resistant to roundworm infection.

Breeders interested in breeding for worm resistance can supply faecal samples for individual lambs at around 21 weeks of age to either veterinary laboratories or private consultants. Once these samples are analysed, breeders are provided with a faecal egg count (FEC), indicating the degree of worm challenge facing an individual. This raw data is analysed by Signet to produce FEC EBVs. Sheep with low FEC EBVs are deemed to have more resistance to handling a worm challenge.

Breeders using the FEC counting and analysis services do see benefits. However, in recent years the submission of faecal egg counts into the Signet analyses has fallen. The cost of procuring large numbers of reliable measures is high, presenting a barrier to the development of this trait in Great Britain.

A new approach – a potential test for worm resistance using saliva

In 2014, AHDB funded a Farm Innovation Grant (FIG) for the Performance Recorded Lleyn Breeders Group, in conjunction with Glasgow Veterinary School and KN Consulting, to test for parasite-specific antibody levels in saliva. It was thought this could be a novel indicator of worm resistance in sheep.

Early research indicates that measuring the levels of Immunoglobulin A (IgA), an antibody produced specifically in response to a particular roundworm species in saliva, may provide a new phenotype for assessing resistance.

Immunoglobulin A severely affects roundworm reproductive success in the gut. Therefore if an animal is producing higher levels of IgA, it is likely to be shedding less worm eggs and is therefore more resistant.

Only two seasons of measurements have been completed so far, but initial results are encouraging. Signet and EGENES are working with breeders to see if an EBV can be produced for this in the future.



Table 1: Signet recorded lambs FEC sampled per year

	Beulah	Bluefaced Leicester	Charollais	Composite	EasyCare	Hardy Speckle	Lleyn	Romney Marsh	Scotch Blackface	Surfolk	Texel	Welsh Mountain	Wiltshire Horn	Grand Total
2004			21				13	8	161	158	37		6	404
2005			53				19	42	442	51	40			647
2006			26		28		20	28	178	88	216		19	603
2007		82			55	9	23	36	320	293	337		26	1181
2008		38		48	62	318	158	33	92	218	476	31	50	1524
2009		48			47		10	38	107	99	364	1		714
2010		35		48	102		426	34	55	66	271			1037
2011	57	44		267	38		310	22	52	212	111			1113
2012				366			373	23		103	75		1	941
2013				449			387	39		94	66		21	1056
2014				550			2678	145		177	102			3652
Total since 2000	57	247	200	1728	333	1253	4496	458	1521	2605	2852	32	123	15905

Ultrasound scanning



By Dennis Homer, Meat Technologist, AHDB Beef & Lamb

The levy boards in Great Britain pioneered the development and testing of ultrasound equipment in the late 1980s. For many years the service was delivered using tried and tested machines that met the needs of the industry.

In 2012 Signet completed a procurement exercise that ended in the purchase of Sonoscape scanning machines from Vet Image Solutions.

These new machines provided a crisper, clearer image with defined boundaries of muscle and fat, making scanning easier and faster. In fatter animals, secondary fat layers are easier to detect and the positioning of the probe on sheep and cattle can be achieved with greater clarity.

Over the ten years since the BRP was launched, the Signet scanning team has scanned more than 400,000 lambs belonging to 44 different breeds and crosses.

Table 2 provides a summary of performance data for these different breeds from 2005 to 2015. These differences reflect the varying environments in which lambs are reared, as much as they do genetic differences. However, they do provide an indication of the various measurements obtained for different breed types.

Scanning accreditation

The quality of the measurements obtained by the scanning team is of paramount importance and new staff have to undertake intensive training. Each year all technicians gather to measure a group of lambs where the accuracy, repeatability and reliability of their measurements are assessed. Every two years, they also take part in a live/dead test, where live animals are measured repeatedly and their ultrasound measurements then compared to carcase data collected post-mortem.

What else do Signet technicians do?

Signet technicians undertake a range of services for levy payers, over and above the standard data collection service. For example, the team has recently been involved in research looking at the feasibility of ultrasound scanning lambs at younger ages and work relating to sample preparation for shear force studies in meat.

The team supports a range of research and knowledge transfer projects including beef feeding trials, adult body condition scoring, health and welfare work and the assessment of new traits, as well as training scanning technicians in other organisations.

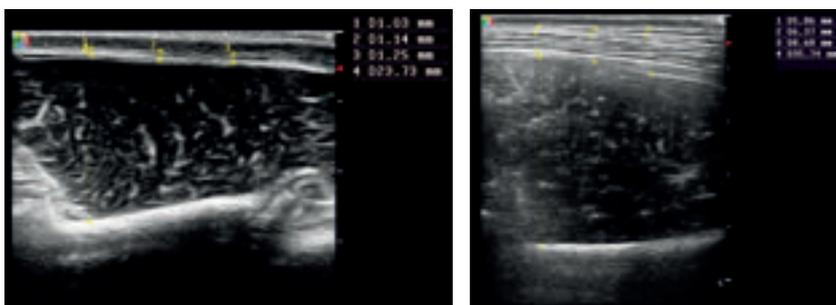


Table 2: Ultrasound scanning measurements collected between 1 April 2005 and 31 March 2015

	Number of records	Average scan age (days)	Standard deviation of scan age (days)	Average scan weight (kg)	Standard deviation of scan weight (kg)	Average muscle depth (mm)	Standard deviation of muscle depth (mm)	Average fat depth (mm)	Standard deviation of fat depth (mm)
Badger Face Welsh	11								
Beltex	3,712	151.68	17.81	36.74	6.97	27.30	3.79	2.09	1.13
Berrichon Du Cher	187								
Beulah	7,163	145.07	18.51	30.03	5.79	21.62	3.14	2.05	1.33
Bleu Du Maine	1,801	155.04	21.45	47.49	8.45	27.10	3.76	2.32	1.30
Blue Texel	215								
Bluefaced Leicester	8,695	142.80	17.51	44.04	9.77	22.92	3.53	2.69	1.80
Border Leicester	1,304	142.51	16.11	43.79	10.28	24.17	4.06	2.43	1.38
Brecon Hill Cheviot	1,044	146.34	12.92	29.50	6.26	21.80	3.18	1.43	0.90
Charmoise Hill	486	133.05	32.94	29.20	5.95	26.13	3.95	3.58	1.95
Charollais	31,562	146.51	19.04	52.53	9.86	30.00	3.62	4.26	2.04
Colbred	437								
Composite (Mixed)	9,532								
Derbyshire Gritstone	102								
Dorper	17								
Dorset	16,296	140.59	19.34	40.94	8.69	28.29	3.78	4.00	2.08
Dorset Down	134								
Easycare	3,847	141.91	13.16	33.73	5.86	22.98	2.78	2.55	1.45
Hampshire Down	8,335	120.12	18.03	42.75	9.39	29.88	3.93	4.46	2.24
Hardy Speckle	3,566	132.97	10.77	27.10	5.54	21.82	3.16	1.81	1.09
Ile De France	961	136.91	16.18	44.07	8.56	29.64	3.74	3.56	1.56
Leicester Longwool	433								
Lleyn	47,543	149.68	21.60	36.87	7.75	24.62	3.42	2.71	1.55
Meatlinc	10,727	142.11	13.43	39.24	7.41	27.41	3.99	2.20	1.55
North Country Cheviot Hill	7,612	141.64	21.94	31.46	5.99	22.48	3.09	2.17	1.10
North Country Cheviot Park	8,448	157.14	30.78	41.18	8.89	24.37	3.61	2.62	1.50
Oxford Down	299								
Romney	9,175	155.02	14.27	37.69	6.34	22.64	3.04	2.58	1.29
Rouge De La Ouest	835	135.85	19.44	46.54	7.67	29.07	2.97	2.90	1.08
Rough Fell	1,079	192.51	17.21	32.82	7.68	18.58	3.36	1.89	1.13
Roussin	25								
Ryeland	22								
Scotch Blackface	35,498	137.22	20.17	30.27	6.40	21.59	3.25	1.99	1.08
Shropshire	3,993	126.78	19.40	39.89	7.71	26.09	3.59	3.53	1.88
South Country Cheviot	305								
Southdown	2,815	138.44	25.85	35.13	9.67	25.45	3.88	3.75	2.37
South Welsh Mountain	2,935	169.68	24.07	33.91	6.41	23.23	2.94	2.58	1.38
Suffolk	52,072	144.34	18.98	51.91	13.05	30.31	5.05	3.49	1.98
Swaledale	473	150.07	10.63	27.66	3.99	20.11	2.31	2.21	0.69
Texel	91,261	145.01	20.71	47.00	9.66	28.98	3.92	2.56	1.33
Vendeen	2,443	128.99	11.71	40.98	7.13	27.05	3.03	3.31	1.59
Welsh Mountain	20,087	148.66	14.91	28.11	5.94	21.11	3.02	1.84	1.04
Wiltshire Horn	2,659	152.59	16.51	35.95	7.48	23.04	3.20	2.53	1.67
Zwartbles	495	154.58	29.77	49.52	12.37	26.85	4.32	2.98	1.60

Computed tomography



By Kirsty McLean, SRUC Computed Tomography Unit Manager

The first Computed Tomography (CT) measurements used in Signet's genetic analyses were collected in 1997 in Edinburgh. The CT unit enables near perfect predictions of muscle and fat yield and tissue distribution within the carcase of a sheep.

Over the past 18 years ten different breeds have been measured (Table 3). There are now nearly 10,000 measurements of carcase lean weight, fat weight and gigot muscularity held on the Signet database.

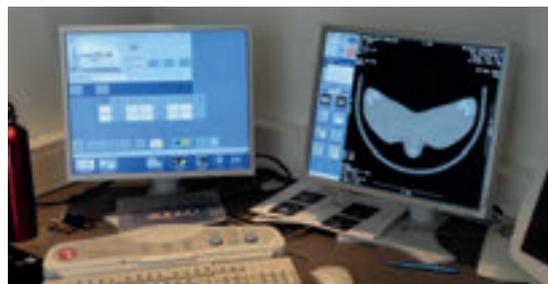


Table 3. Number of CT measurements taken since 1997

	Beltex	Charollais	Hampshire Down	Meatinc	Suffolk	Texel	Others	Total
1997		195			192	196		583
1998		363			384	386		1133
1999		386			375	375		1136
2000		129		57	346	342		874
2002				20	59	90		169
2003		58		25	100	148		331
2004		126	25	30	155	204		540
2005		92		26	167	137	10	432
2006		134	46		114	130		424
2007		100	18		78	33		229
2008	50	20		28	27	88		213
2009	34	107	36	24	128	99		428
2010	20	111	27		98	173		429
2011	15	119	27	48	110	372	6	697
2012	26	242	41	42	127	320		798
2013	28	63	31	51	111	246	1	531
2014	36	142	41	46	92	247	6	610
2015	33	46	34	34	64	180	3	394
Grand Total	242	2433	326	431	2727	3766	26	9951

Over the past decade a mobile CT scanner has been introduced, enabling the service to be taken to breeders for whom the Edinburgh site was too far away.

Breeders in England, Scotland and Wales are supported in their use of CT, with levy funding towards the cost of scanning. This investment ensures the industry makes faster genetic gain in economically important traits.

The CT unit is an important research tool. Recently completed PhDs on spine length and lamb-eating quality, are expected to produce valuable new services for producers over the next couple of years.

More than 250 different breeders have directly benefited from access to the CT unit since it started taking measurements for terminal sire analyses. SRUC and Signet are indebted to the support of the many breeders who routinely use the service, as well as those who help with the co-ordination of scanning services during summer.

Breeders see the benefit of CT scanning

Hans and Audrey Porksen

Suffolk and Texel flocks

Hans and Audrey Porksen who farm in Northumberland, have sent nearly 300 lambs for CT scanning over the past 16 years, from their high index Suffolk and Texel flocks. They are convinced of the benefits of CT scanning.

"We have always selected for well-muscled, fast finishing lambs, but the use of CT scanning allows us to maximise the yield of muscle in the carcass with the optimum amount of finish."

"The greatest benefit to us over the years is that we can clearly see the actual carcass of a live animal. This means the accuracy of predicting the performance of its progeny is greatly increased."



Doug Nesbitt

Texel flock

The lambs in the Alwent Texel flock owned by County Durham farmer Doug Nesbitt, are CT scanned every year, with 178 so far contributing to the genetic analysis.

"Our clients want fast growing lambs, with superior muscling and plenty of shape. CT scanning is the best technology for assessing gigot shape."

"We display our scanning images at the major sales, as they demonstrate our dedication to enhancing carcass quality and provide us with a useful marketing tool."



Andrew Walton

Charollais flock

Andrew Walton, based in Cheshire has worked widely in the supply chain – as a farmer breeding and selling lambs for slaughter through to managerial positions with major retailers. He is quick to recognise the value of the carcass information supplied by CT scanning.

Andrew has sent 134 lambs to the CT unit in the past ten years and supports and encourages fellow Charollais breeders to do the same.

"The information we gather from CT scanning gives a valuable insight into the yield of lean meat in the carcass. However, it is the potential use of the technology in the future that excites me, with the possibility of assessing carcass length and meat-eating quality using CT derived measurements."



Making faster genetic progress

Twenty five years after the completion of the first across flock evaluations, the benefits of this technology are proven, but how can breeders speed up the rate of genetic change within their flocks and deliver greater gains to the industry? The achievable rate of genetic gain within a population can be predicted using the following formula:

$$\text{Rate of gain} = \frac{\text{Intensity of selection} \times \text{Heritability of the trait} \times \text{Variation in the population}}{\text{Generation interval}}$$

Each of these components can be influenced by the breeder.

Intensity of selection

Selection intensity is the superiority of the animals being selected, relative to those available for selection. It is easy to increase the selection intensity of rams, as only a few are needed for breeding and using an elite ram will lead to very fast improvement. With females, where 25% may be retained, the selection pressure is less extreme.

What can the breeder do?

Breeders can increase this by selecting a small number of animals for breeding and selecting the very best breeding lines. However, care must be taken not to increase rates of inbreeding by narrowing the diversity of the population.

The best way to achieve high selection intensity is to move away from selecting within a single flock of say 100 lambs and to investigate information contained within Signet's across-flock analyses. These schemes allow breeders to cherry-pick elite animals, particularly rams, from a population which can comprise tens of thousands of animals.

Heritability of the trait

The heritability of a trait indicates how much of the variation in a particular trait is influenced by an animal's genes.

Whilst these values are fixed within the statistical analyses used to produce EBVs, (every EBV within an analysis is predicted using the same heritability value), every effort that the breeder makes to avoid environmental bias, will ensure the EBVs they are working with are the truest prediction of genetic merit.

In the long term this will deliver more robust EBVs and faster rates of gain.

What can the breeder do?

Make sure all recorded data is accurate. Try and treat all lambs in the same way. Where differences in management arise, record them in separate groups. Record fostering details, embryo recipient ewes and dead lambs correctly. Weigh animals at the right age and maintain a high health status, so that differences in performance are not due to the influence of disease or nutritional challenge.



Variation in the population

Fast genetic progress is only possible if the population is variable. To a large extent this is influenced by the trait. However, breeders can influence the variability of the dataset and enable the best animals to stand out.

What can the breeder do?

Measure all animals, not just a subset of the very best. This is particularly important when ultrasound scanning, when the genetic evaluations (and hence EBVs), will be enhanced for the best animals if the full extent of variation in the flock is known.

Just ultrasound scanning 20 ram lambs destined for a society sale, will not indicate how good they really are compared to their unscanned peers, or anything about females retained in the flock.

Breeders that scan lambs before they have had chance to express variation in their muscle and fat depth measurements, also disadvantage themselves, as the potential performance of the best animals has not had the chance to be expressed.

Generation interval

The generation interval is the average age of parents when their progeny are born. The longer it takes for superior flock replacements to replace older breeding stock, the slower the rate of gain achieved.

What can the breeder do?

Breeders can consider breeding from ram lambs and ewe lambs where they are clearly superior to their parents. They can also increase replacement rates if economically viable, perhaps by selling older breeding ewes before they reach culling age.

However, breeders need to accept that the use of younger animals for breeding is a trade-off – as they also tend to have lower accuracy values, particularly for maternal traits. Every EBV is reported with an accuracy value; these values indicate the amount of data behind the calculation of the EBV. Accuracy Values provide an indication of how well an EBV predicts an animal's true breeding merit and also how likely it is that its EBVs will change over time.

Flocks just starting to record, should take care when making EBV-based selection decisions to replace older, less well recorded animals, as their performance may only have been assessed indirectly through a small number of offspring.

The challenge of making faster rates of gain in a breeding programme is actually more complicated than following a simple formula, as these calculations assume genetic variation in the trait will not reduce over time and is influenced by thousands of genes. However, it is known that sometimes a small number of genes can have a big impact. There is also increasing awareness of genotype x environment interactions, where some animals perform better in a certain situation.

Many farmers have achieved great success over the past decade, through careful attention to detail and planning when selecting breeding stock. The cases studies on the next pages highlight some of the most innovative and successful breeders, who can be a great inspiration to others.



Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Suffolk	Sampfordel	1997	1,116	894

Know your breeding lines

Kathleen Hill, Sampfordel Suffolk Flock

Kathleen Hill has immense knowledge of the pedigree of her Suffolk sheep.

For every ram, she knows what the sire and grandsires are like and whether they are likely to contribute superior genes to the flock.

At Sampfordel the focus is all about carcase attributes. Kathleen has selected heavily for growth and muscling over the past decade, so it is no surprise her flock has made some of the highest rates of genetic gain within the breed.

In some ways this closed flock is unusual. Retaining a high health status, the only new genetics introduced are through AI, something Kathleen does every year. The rest of the flock is mated naturally to high index, homebred stock rams, many of which are equivalent genetic merit to the semen purchased. Cockleby Jumping Jack, Ortum Truline and the homebred Sampfordel Hugo, have all been influential sires in recent years.

Success brings its challenges and having focussed on only the very best muscled breeding lines, time has to be taken now to monitor inbreeding. In recent years, this has been carried out using computer software to measure relatedness between potential matings.

Kathleen is a tremendous advocate for all that is good about the Suffolk breed in terms of growth and carcase attributes. Only once did she try semen from an unrecorded show ram. He sits at the bottom of the stock ram list as a reminder that EBVs still provide the best guarantee of performance.



Tips for success

- Make good use of homebred stock rams. They will perform in their home environment
- Study pedigrees carefully and use inbreeding software to help avoid close matings
- Using semen from proven stock rams reduces the risk of fluctuations in indexes, which makes progeny performance even more predictable



Table 4: A decade of genetic improvement for the Sampfordel Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	67	2.31	5.26	1.48	-0.11	£1.33
2015	99	5.59	11.18	4.23	0.34	£4.37
Gain		3.28	5.92	2.75	0.45	£3.04

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Dorset	Gortleigh	1988	12,940	10,348

Patience pays off when breeding for maternal traits

Gill and Richard Trace, Gortleigh Flock, Poll Dorset Sheep

The Gortleigh flock was one of the first to become involved in performance recording.

Frequent runners up in the BRP Most Improved Flock Award for Dorset sheep, Gill and Richard have made the highest rates of genetic gain for maternal traits of any Dorset flock in the past ten years.

Their achievement is more remarkable as Gortleigh is also one of the leading flocks for terminal sire traits.

In recent years the maternal index for the Dorset breed has been revamped, with greater focus on prolificacy and milking ability. With members of the Poll Dorset Sire Reference Scheme (Centurion) at its heart, the Dorset breeding evaluation is a success story. The leading breeders have worked together to transform the performance of Dorset Horn and Poll Dorset sheep, with high index sheep dominating the breed's main sale the May Fair.

Table 5: Summary of Dorset ram prices (May Fair 2015)

	Average Price	Clearance
All unrecorded rams	£741	85%
All recorded ram	£914	92%
Top 10% recorded ram lambs	£1148	92%

Over the past ten years, Gill and Richard have recorded more than 500 lambs a year, with major increases in both the growth potential and muscling of their lamb crop. However, it is the increase in maternal traits for prolificacy and milk that stand out.

In 2014 the December lamb crop comprised 76% twins, 13% singles and 11% triplets; producing a lamb crop of 182%, with relatively low levels of lamb mortality. Since the Gortleigh flock started recording, there has been a 10% increase in the proportion of the flock born as twins.



Table 6: A decade of genetic improvement for the Gortleigh Flock

Year	Lambs	8 Week Weight EBV	Litter Size EBV	Maternal Ability EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index	Maternal Index
2005	433	1.16	0.12	1.81	4.47	1.44	0.28	206	189
2015	339	2.46	0.19	2.38	7.68	2.91	0.32	330	278
Gain		1.29	0.07	0.57	3.21	1.48	0.04	125	90



Tips for success

- Collect as much data as possible. To increase muscling, scan as many lambs as possible to derive the truest picture of their genetic merit as quickly as possible
- Take time to assess rams for maternal traits. Remember the accuracy of their EBVs will increase when their daughters join the flock
- Do not be afraid to try unrecorded breeding lines, but use them carefully. Test mate them on a small cross-section of ewes in the first year
- To improve maternal performance, select rams with superior maternal EBVs



Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Texel	Gaynes	1987	3,520	3,255

Test lambs under commercial conditions for commercial success

Richard Clay, Gaynes Flock, Texel Sheep

A commercial focus is at the heart of the Gaynes flock breeding policy and it is paying dividends, as Richard Clay has bred the top Texel stock ram in England in 2015.

Gaynes Valliant II (CMG1401162) is sire of three of the top seven Texel ram lambs in the country. This is no small achievement in an analysis containing over 60,000 lambs.

As Signet's longest standing client, the Gaynes flock has seen many changes since its pioneering involvement in the early Sire Reference Schemes.

Much of the credit can be attributed to the dedication of Richard Clay, the farm manager who oversees both this 80-ewe pedigree Texel flock and a large commercial flock that runs alongside it.

The flock, which has not set foot in a show-ring for a decade, has a strong commercial following, selling shearlings to a loyal group of local clients, many of whom are attracted by the flock's commercial ethos.

Lambs are reared at pasture with their mothers, typically weighing 45-50kg at scanning time. A number of the ram lambs are then used on the commercial flock, where their genetic merit shines through. The farm markets more than 800 lambs from their Texel cross Lleyn ewes, typically achieving 20kg deadweight at around 15 weeks of age.

The pedigree flock also makes good use of homebred rams, with influential sires including Gaynes Major (*right*), which is the reference ram being used in the new jointly-funded commercial progeny test, RamCompare (see page 25).



Tips for success

- Rear the pedigree flock in the same commercial conditions as their progeny will be expected to perform
- Make good use of homebred rams. Their genetic merit has been proven on the holding and their performance is known
- Use proven, shared genetics to benchmark how the flock performs relative to other flocks



Table 7: A decade of genetic improvement for the Gaynes Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	176	3.11	7.16	1.94	-0.13	247
2015	94	6.22	13.53	3.99	0.24	390
Gain		3.11	6.37	2.05	0.37	143

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Meatlinc	Thorganby	1974	21,166	17,873

Working together brings benefits

George Fell, Thorganby Flock of Meatlinc Sheep

Genetic progress in Meatlinc breeding is measured in decades, not years, with George managing the flock established by his grandfather Henry in 1974 and supporting other Meatlinc breeders.

Working together is key to the success of the group, with breeders based in Cornwall, Herefordshire, Yorkshire, Scotland, Northern Ireland, France and Austria.

The group meet twice a year to compare rams, exchange genetics and select a reference ram for use by AI. This enables more accurate comparisons to be made between the flocks.

Their diverse locations mean the breeders are not competing for clients and can work together on promotional and marketing strategies, which would simply not be possible if they were neighbours.

The pace of change has increased in recent years, having secured the services of the SRUC mobile CT scanner on ram selection day. This ensures every potential Meatlinc stock ram is CT scanned before use. In a few years, every Meatlinc lamb will be by a CT scanned sire, out of a ewe whose sire was CT scanned.

Inbreeding rates are checked annually and despite the flock being closed for four decades, rates remain low.

The big change over the past decade for the Meatlinc Sheep Company is the establishment of a pioneering R&D project, referred to as gene fishing. Meatlinc ewes have been crossed to elite Suffolk, Texel and Charollais sires, then backcrossed to lock in new genes for growth and muscling. The project could provide new options for Meatlinc breeders in the future, enabling the breed to more than keep pace with the numerically larger terminal sire breeds.



Tips for success

- Work with others. Meet regularly to exchange ideas and share rams to build strong genetic linkage between flocks
- When it comes to marketing, the best collaboration is between breeders who are not competing in the same geographic area
- Make use of new technology – such as CT scanning and crossbred evaluations



Table 8: A decade of genetic improvement for the Thorganby Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	471	2.65	5.02	2.85	0.15	216
2015	458	4.94	9.67	5.50	0.62	342
Gain		2.29	4.65	2.65	0.47	126

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Romney	Aragon	1986	10,588	9,528

Have a clear focus and keep an eye on the future

Hugh and Pauline Skinner, Aragon Flock of Romney Sheep

The Aragon Romney flock was established in 1976, at a time when one of the challenges within this durable, maternal breed was the number of lambs being reared per ewe. Additional genetics were sourced from the Wye College Romney development flock.

Flock recording with the Meat and Livestock Commission (MLC) began in 1986, with a lambing percentage of around 150%; by 2000 200% was regularly achieved. The number of single born lambs has fallen from 33% to 17% in recent years, including hogget lambing.

Focus then shifted more heavily towards selection for eight-week weight and milk production to optimise lamb growth rates. Ram lambs are used to shorten the generation interval, further increasing rates of genetic gain.

Having produced a prolific, productive ewe, Hugh, who is a vet, turned his attention towards the use of Faecal Egg Counts (FEC) within his breeding programme. 2015 will be the 11th year undertaking FEC measurements and producing EBVs for this trait within the flock.

Hugh can see first-hand that lamb health has improved and scouring reduced over this period, which he believes delivers a real economic benefit to his clients.

Hugh is not afraid to innovate, having developed the Romney 2000 – a Romney composite with an infusion of Texel genetics. He is now busy progeny testing NZ Romney genetics to see how they compare to his own.

In 2015 a new breeding group will be created to bring together likeminded Romney breeders, to share in the benefits derived from selective breeding. Reference rams have been chosen and the group eagerly await their first across-flock analysis.



Tips for success

- Focus on economically important traits
- Change breeding goals as genetic progress is achieved or the market changes
- Scan the horizon for new technology that can provide a unique selling point



Table 9: A decade of genetic improvement for the Aragon Flock

Year	Lambs	8 Week Weight EBV	Litter Size EBV	Maternal Ability EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Index
2005	231	1.25	0.09	1.49	2.31	1.40	-0.08	54
2015	340	2.00	0.06	2.20	3.63	2.16	-0.16	100 (fixed base)
Gain		0.75	-0.03	0.71	1.32	0.76	-0.08	46

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Lleyn	Bearwood	1999	6,116	6,644

Invest time where it pays – electronic data collection and marketing

Edward Collins, Bearwood Flock of Lleyn and Blue Texel Sheep

Sheep Farmer of the Year finalist Edward runs an 800-acre farm and makes full use of on-farm software to collect data for his flock.

Through the use of an integrated farm computer package provided by Border Software, he can quickly collect information at lambing time based on the EID of the ewe and her lambs, record fostering accurately and download data to Signet that would take hours to complete manually.

Lamb weights can be with Signet within the hour and analysis tools within the computer software enable him to track flock performance independently. The figures show that eight-week weights recorded between 1999-2001 averaged 16kg; between 2013-2015 they had jumped to nearly 20kg.

Edward regards time spent on marketing as time well spent. However, this does not mean spending days at shows and sales, as most of his sheep are sold off the farm. He feels this creates a better breeder/client relationship, as the buyer can see the flock, understand his business ethos and purchase fit-for-purpose sheep in their working clothes. He feels the less pressurised environment is conducive to both buyer and seller.

The challenge in selling from home is the need for regular communication with potential customers. Edward achieves this through press articles, strategically placed advertisements and an active involvement in social media – drip feeding the messages about his breeding stock to like-minded commercial producers.



Tips for success

- Invest in technology that makes data collection easier and more accurate
- Be clear how breeding stock will be marketed
- Develop a communications strategy to keep in touch with regular and potential new clients



Table 10: A decade of genetic improvement for the Bearwood Flock

Year	Lambs	8 Week Weight EBV	Litter Size EBV	Maternal Ability EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Carcass+ Index
2005	533	0.45	0.02	0.44	1.24	-0.04	-0.01	119
2015	271	1.20	0.00	1.32	4.20	1.36	-0.17	234
Gain		0.75	-0.02	0.88	2.96	1.40	-0.16	115

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Charollais	Crogham	1989 (as Crogham)	5,812	4,722

Producing balanced sheep

Jonathan and Carroll Barber, Crogham Flock of Charollais Sheep

Founder members of Charollais Sires, Jonathan and Carroll have seen great changes since Charollais sheep were first imported in the 1970s. They started performance recording almost immediately.

The breed was competing against established terminal sires and needed to grow faster, whilst maintaining carcass conformation. The average Charollais lamb in the recorded breed is now more heavily muscled at scanning time, with the genetic potential to be over 7.5kg heavier.

At Crogham, 56-day weights have increased nearly 6kg/lamb over 26 years, meaning they are 27% heavier! At scanning, this 6kg/lamb increase remains, despite lambs being scanned three weeks earlier than in the past.

Success brings its own challenges, as it inevitably means that breeding objectives have to change. Several times in the breed's history, index weightings have been changed to help breeders optimise the balance of muscle and fat within the carcass. In particular the introduction of CT scanning data in 2000 and a new Charollais index in 2015.

It is often said the perfect ram is bought 'in bits', with some possessing strong show type, others having superior growth rates and some excellent carcass conformation. The challenge for breeders is to develop balanced sheep that take all of these requirements into account.

In the Crogham flock a legacy was left by Crogham Centurion, one of the first reference rams and arguably one of the most influential recorded sheep in the breed – with tremendous muscling across the loin. Stock rams that followed have tended to be well muscled, but possess faster growth rates, with fatter sires put to leaner ewes and visa versa, to take the whole flock forward.

Whilst different rams will suit different systems, most producers require a balanced animal which is well muscled and fast growing. Decisions based on EBVs have enabled the Crogham flock to take forward both these attributes, whilst still producing stylish sheep for pedigree breeders who wish to show.

Producing good all-round sheep enables the Barbers to appeal to the broadest range of customers, whilst producing a level flock of lambs to be admired at home.



Tips for success

- Produce balanced sheep to appeal to the widest range of customers
- Select sires that excel in areas that will complement the ewe flock
- Eye-catching sheep are still important to buyer and breeder alike



Table 11: A decade of genetic improvement for the Crogham Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	113	3.37	8.06	2.15	0.00	275
2015	141	3.82	9.30	3.18	-0.06	312
Gain		0.45	1.24	1.04	-0.06	37

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Beulah	Stanford	1997	3,396	2,696

Keep things simple when recording big numbers

Ian and Rose Sellar, Stanford Flock of Beulah Sheep

There are few hills in Suffolk, but there are some harsh environments and this is why the Stanford Beulah flock was established. The Stanford battle area is a mixture of grassland and heath growing on sandy soil and sheep have to work hard to adapt and survive there.

This does not however, preclude genetic improvement. Ian and Rose's desire to produce homebred rams for the large commercial ewe flock, encourages them to performance record.

Over 20 years, the Stanford flock has focussed on enhancing the milking ability of the ewe and the carcass attributes of their progeny, whilst keeping an eye on changes in prolificacy.

Recording a large dispersed population of sheep is very difficult, but by creating a nucleus of elite animals, attention can be focussed on ram breeding. For many years the flock operated a type of family-based breeding system, using inbreeding co-efficients produced by Signet to determine how closely related different bloodlines were to avoid inbreeding, whilst optimising rates of gain.

The challenge of introducing proven Beulah genetics back into the flock was limiting progress. So in 2008 a grading-up programme was established, running a maternal Texel ram with a large number of unrelated Beulah ewes. A couple of elite sons from the large lamb crop produced were selected and backcrossed to Beulah ewes for another two generations.

This produced a new line of high performance sires that were over 82% Beulah, to use in the nucleus and latterly the main flock. Part of the Stanford flock is still pure Beulah and many pure Beulah breeding lines compete well with their hybrid contemporaries.

All Beulah records are analysed in a single across-flock analysis by Signet, although breeders recognise that comparisons between the EBVs produced in English and Welsh flocks is difficult, as linkage between the two populations is now limited.

However in recent years, a couple of the better-looking East Anglian Beulah rams have sneaked over the border into Wales. Where they have been used, the progeny have been heavier and better muscled, although it is said they are unlikely to win at the Royal Welsh any time soon!



Tips for success

- Test progeny in the environment they are expected to perform
- Have a clear, long-term breeding plan where the availability of recorded genetics is limited
- Do not be afraid to do something different



Table 12: A decade of genetic improvement for the Stanford Flock

Year	Lambs	8 Week Weight EBV	Litter Size EBV	Maternal Ability EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Carcass+ Index
2004	215	0.81	0.05	0.49	1.48	0.64	-0.08	159
2014	172	2.84	0.05	1.30	5.51	2.87	0.07	311
Gain		2.03	0.00	0.81	4.03	2.23	0.15	152

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Texel	Rugley	1997	1,394	1,120
Suffolk	Rugley	1985	3,892	3,062

Create and maintain a unique selling point

Alan Jackson and Family, Rugley Suffolk and Texel Flocks

With popular breeds such as the Texel and Suffolk, it is sometimes difficult for individual flocks to stand out. While there might be many customers for the stock, there is also tremendous competition. This is good news for the ram buyer, but means breeders have to excel in their work, particularly when selling at very large sales like Kelso.

This is the challenge faced by Alan, who has sold around 60 rams a year at Kelso for more than 35 years. The flock name and sheep are well known, with Suffolk and Texel shearlings averaging £876 and £720 respectively in 2014, topping out at £2,000.

Performance recording is part of the Rugley flock's success story. After years of providing customers with unbiased, reliable information on the genetic merit of each animal, increasing numbers of customers will now only source sheep with performance data behind them.

This demand is a double-edged sword, as it means vendors now have to produce sheep with good figures. If sheep are only 'average', knowledgeable clients will soon start looking elsewhere.

Computed tomography scanning provides Rugley with another unique selling point. Alan has supported the CT unit at Edinburgh for 16 years, taking 141 Suffolk lambs and 83 Texels there.

Few breeders have as much data behind their animals and this information has been converted into genetic gain. Many Rugley ram lambs are in the top 10% of the breed. Many are trait leaders for gigit shape, such as the ram Rugley Terrific, giving a unique selling point.

But even long-established flocks cannot afford to sit back. Clients constantly need reminding about the superiority of the flock. However, in the age of social media, many can be reached at the click of button, with a bit of help from daughter Lucy!



Tips for success

- Create a unique selling point to stand out
- Adopt technology that will give the flock an edge
- Understand the market, particularly at a highly competitive multi-vendor sales



Table 13: A decade of genetic improvement for the Rugley Texel Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	63	3.27	7.54	2.61	0.02	252
2015	109	5.72	12.94	3.61	0.41	371
Gain		2.45	5.40	1.00	0.39	119

Table 14: A decade of genetic improvement for the Rugley Suffolk Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	171	3.27	7.27	2.61	0.11	£2.58
2015	239	5.51	11.12	3.73	0.21	£4.13
Gain		2.24	3.85	1.12	0.10	£1.55

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Hampshire Down	Yarcombe	1972	4,453	3,626

Everyone benefits from a whole-breed approach

The Derryman Family, Yarcombe Flock of Hampshire Downs

Performance recording is difficult in isolation. Even the greatest enthusiast of weight recording finds it difficult to work with a small recorded population, as new rams constantly need testing. Also, the marketing of stock on performance figures is difficult when most breeders have not bought into the concept.

This does not mean the population has to be extensive, but it does mean all breeders need to be involved. The National Genetic Analysis for Hampshire Down sheep is therefore proving very useful, as every pedigree animal is included in the evaluation.

Henry and Hillary Derryman founded the Yarcombe flock in 1970 and have performance recorded for more than 40 years. They have seen major increases in genetic potential for growth rate and muscling, as the Hampshire Down breed has adapted to the needs of the modern, commercial lamb producer. Breeding stock is traded across the UK, with Yarcombe sheep heading to Ireland, Belgium and the Netherlands.

Henry is still actively involved in running the flock, but grandson Philip (right), is also involved, helping with marketing campaigns such as the recent Hampshire Down Sheep Breeders Association (HDSBA) internet and social media campaign. This has helped to explain the importance of genetic improvement work to an increasingly receptive commercial audience.

The renewal in interest in this breed is in no small part due to the hard work of breeders like Henry and Philip, working with the HDSBA to encourage breeders to be involved in performance recording. With over 70 Hampshire Down flocks now engaged in recording and over 60% of Hampshire Down lambs sired by a recorded ram, this strategy is working well and taking the breed forward.



Tips for success

- The more breeders that are involved and using EBVs within a breed, the easier it is for everyone
- Encourage breeders to use recorded sires, as this means at least 50% of the genes in a population are known
- Spend time communicating the benefits of performance recording. Video and social media are increasingly useful tools



Table 15: A decade of genetic improvement for the Yarcombe Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	162	1.09	2.32	0.50	0.05	132
2015	175	3.28	5.87	2.21	0.07	230
Gain		2.19	3.55	1.71	0.02	98

Breed	Flock name	First year of weight recording	Homebred lambs in analysis	Weight recorded lambs
Charollais	Foulrice	1983	15,799	13,171

The advantage of numbers

Charles and Valarie Marwood, Foulrice Flock of Charollais Sheep

The Foulrice flock started performance recording back in 1983. Having weight recorded over 13,000 lambs over the past 32 years, Charles Marwood (*far right*) understands the advantage of performance testing in a large flock.

The first benefit is that rams are always well tested. New rams and homebred ram lambs will drop more than 25 lambs in their first season and their genetic potential for growth and muscling is quickly assessed.

The ability to test new breeding lines allows Charles to even test unrecorded rams, to see if their visual appeal is matched by the performance of their lambs. Not every new stock ram meets Charles's high standards, but in a large flock, the progeny of less successful sires can go to slaughter and the situation is quickly remedied.

A tip within any flock is to mate the best 20% of the ewes to rams that might lead to the production of a future stock ram. These are elite ewes and any male progeny they give birth to are likely to take the flock forward.

In any breed there are only a small number of outstanding rams. When they come along, do not be afraid to use them widely. Using established stock sires over a number of seasons provides an important benchmark against which the progeny of other rams will be compared. It will also deliver robust data to enable the Best Linear Unbiased Prediction (BLUP) analysis to handle differences in management between seasons.

In the Foulrice flock, rams like Ash Charollais Fillibuster (YFD:05002) who produced 1,050 progeny over eight years and more recently Dalby Mount Aloe (PE:1201524) with 470 progeny over the past three years, provide that benchmark.

Having large numbers of progeny is a real asset. However, it is important to ensure lambs are fairly compared with each other. Breeders must record any differences in management and assign lambs to 'management groups', at eight weeks of age and at scanning time. This approach ensures the performance of lambs is only compared when they have been treated in the same way.



Tips for success

- Mate the top 20% of flock ewes to sires capable of producing future stock rams
- Use lower-rated ewes to progeny test new rams
- Elite stock sires should be used over several seasons
- Record management groups accurately



Table 16: A decade of genetic improvement for the Foulrice Flock

Year	Lambs	8 Week Weight EBV	Scan Weight EBV	Muscle Depth EBV	Fat Depth EBV	Terminal Sire Index
2005	854	1.48	3.50	1.41	-0.25	172
2015	603	3.30	8.28	3.52	-0.17	306
Gain		1.82	4.78	2.11	0.08	134

Breeds with smaller populations recording in England

It is easy to look at numerically large breeds and long-established flocks and see the benefits they have derived from performance recording.

In England numerically smaller or less well-recorded breeds are also seeing the advantages.

Here are just a few breeds that have moved forward through recording over the past decade.

1. The average **Bleu du Maine** breeding index has exceeded 200 points, with flocks now producing rams with indexes over 300

2. **Bluefaced Leicester** (BFL) recording has increased in recent years to incorporate over 1,500 lambs in last year's analysis. A group of recording BFL breeders has now established their own marketing group called the Bluefaced Leicester Progressive Breeders

3. A wool-shedding composite, the **Exlana** has been created. Historic records have been analysed to identify the variation in the population and guide future breeding decisions

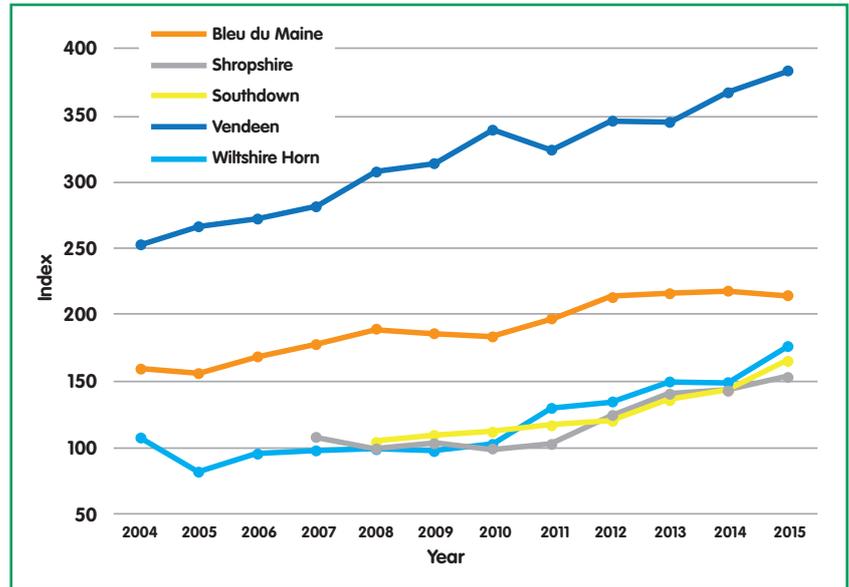
4. The average **Shropshire** index is now 150, with over 50 recorded Shropshire sheep entered at their National Sale in Shrewsbury. Six thousand lambs have been recorded over the past six years

5. **Southdown** breeders continue to record between 700 and 800 lambs per year, with an average index now exceeding 150 points

6. **Vendeen** breeders were amongst the early adopters of performance recording. Members who currently record with Signet, now have an average index that has increased by 100 points in the past decade to 382

7. **Wiltshire Horn** breeding indexes changed markedly in 2015, with the implementation of new techniques to calculate Maternal Ability. The group is sharing a reference ram and had seen the average for the group increase to nearly 150 index points by the end of 2014

Figure 5: Genetic trends for various Signet recorded breeds



Combined breed analysis

UK genetic evaluations of sheep have traditionally been undertaken within purebred populations. However more breeders are now incorporating crossbred sheep into their genetic improvement programmes. Requests for across-breed EBVs are increasing.

Breeders producing pure and crossbred terminal sires could be serviced more effectively by moving the evaluation of terminal sire breeds to a 'Combined breed analysis,' in a similar manner to UK Dairy Evaluations – where Holstein, Friesian and Jersey cattle are all evaluated together in the same breeding evaluation.

Combined breed analysis for terminal sires

Combined breed genetic evaluation allows multiple breeds of sheep to be evaluated simultaneously. Where good genetic linkage exists, animals from different breeds can be compared via the resulting EBVs.

This can accelerate genetic improvement, as it increases the accuracy of EBVs because more data is included in the analysis. This allows more intense selection, as the gene-pool to select the next generation can be substantially widened.

Rates of genetic improvement can also be increased indirectly through the provision of a more efficient Signet service.

Combined-breed sheep genetic evaluations are currently available overseas. The concept of a combined breed analysis was discussed at the Sheep Breeder's Roundtable in November 2013, where more than 95% of attendees voted in favour of such an approach in the UK.

In January 2014, EBLEX agreed to fund SRUC to develop a combined breed analysis for terminal sire breeds, with a view to delivering this service to sheep clients in 2016.

The new approach will

- Enable crossbred animals to be analysed accurately
- Take into account hybrid vigour in breeding value estimates
- Re-base the population to a common and more recent/relevant population of animals
- Enable a review of the genetic parameters and breeding indexes used
- Provide a mechanism for breed comparison in the future
- Improve rates of genetic improvement
- Enable regular EBVs to be delivered to industry

Commercial context

The new breeding information will be

- Easier to interpret
- More accurate, particularly for crossbreds
- Enable breed comparison in the future

Each of these issues is expected to lead to a greater uptake of existing breeding technologies by both ram breeders and commercial ram buyers.

For more information visit www.signetfbc.co.uk/combined-breed-analysis/



RamCompare

The RamCompare project is a two-year pilot study designed to trial strategies for capturing commercial data on slaughter lambs in the UK sheep industry. It will be similar to central progeny tests that are taking place in Australia, New Zealand and Ireland.

The first stage of the project involved developing a network of six commercial farms that will use artificial insemination (AI) and single-sire mating to produce a crop of over 500 lambs per farm per year. In the UK sheep industry the sire of slaughter lambs is not usually known, so this approach will enable sire information to be collected.

Sixty-seven rams from five breeds – Texel, Suffolk, Charollais, Hampshire Down and Meatlinc, will be tested across these flocks over the 2016 and 2017 lambing seasons. The rams will be representative of the top 20% of their breed, based on their EBVs. The AI sires will have good linkage with other pedigree flocks.

Data from their lambs will be collected through to slaughter. This data will be evaluated to see whether its inclusion in the rams' genetic evaluations identifies differences between sires and improves the accuracy with which their genetic merit for carcase traits can be assessed.

A ranking of the tested rams, based on commercially important traits, will be generated at the end of the project in 2017.



AI Sires Kelsey Hero (left) and Dalby Malachite (right)



Natural service sires from Kimbolton (left) and Bentley flocks (right)

The RamCompare project involves partners from right along the UK sheep industry supply chain. It is financed by AHDB Beef & Lamb, Hybu Cig Cymru – Meat Promotion Wales (HCC), Quality Meat Scotland and Agrisearch, with support provided by the Sainsbury's 'Big Data' Agriculture R&D Grant Scheme, Randall Parker Foods, Dunbia and SRUC.

For more information go to www.RamCompare.com or follow RamCompare on Twitter @RamCompare

