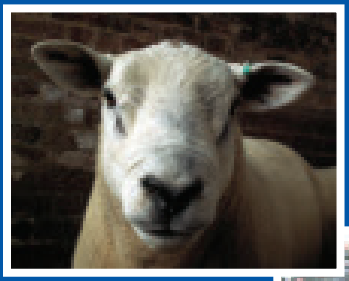
The Benefits of Better Breeding in the Scottish Sheep Sector



SCOTTISH SHEEP STRATEGY

Sheep Focus Farm Project – Year 4

www.scottishsheepstrategy.org.uk
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The Benefits of Better Breeding in the Scottish Sheep Sector

INTRODUCTION *by Maimie Paterson, SSS Chairman*

The Sheep Strategy group is now applying its collective thinking cap to the next phase in its mission to increase the awareness of the benefits of technology. The Focus Farm project which is coming to an end has been a very worthwhile exercise. The aim was to find out if the daughters of high-index sires would pass on their superior genes to their offspring, and the results so far have exceeded expectations. It also emerged that better genes made for higher lambing and rearing percentages which happened just too often to be mere coincidence. This foreword wouldn't be complete without thanks to our Focus Farm hosts who bravely went where angels fear to tread and allowed us to experiment with large chunks of their flocks for the past four years.

EID continues to be a thorn in the flesh, but it will certainly make flock recording a lot easier, and offers the potential to track lambs right to the end of the slaughter line. You have to spend money on EID and you grudge every penny, so why not get some benefit by using it to record the performance of your flock?

It's been a year that Scottish sheep breeders won't forget in a hurry, and at the time of writing, the true cost of the appalling winter is a long way from being fully assessed. Sheep have become accustomed to mild winters, and ewes everywhere were put to the test for the first time in their lives. On many farms it was the bonny ones at tupping time which were the bony ones at lambing time, either in the dead pile, or struggling to feed lambs on less milk than the farm cat gives. If winters like the one we've just endured are to become the norm, selection for the best genetics will be crucial if ewes are to be able to survive the winter, produce and rear lambs, and put on enough condition to start all over again. Identifying the families with the best genes for the job isn't difficult or expensive. Using the best tups from these families will breed ewes fit to take on old Mother Nature and come out on top, so have a word with Rod about a simple system of recording. If you don't select the best, Mother Nature will do it for you, and who can afford that?

Best wishes

Maimie

FOREWORD *Rod McKenzie, SSS Development Manager*

Inevitably, having come through what has been the hardest winter for a long time, lambing reports throughout the country are very mixed. The snow which lay over most of Scotland from before Christmas until the middle of February seemed very bad at the time, but it was only the taste of things to come. Another significant fall towards the end of February followed by a very hard frost proved to be hard on ewes, although they had coped well with the first storm. The real damage was done at the end of March and the first few days of April when many farms were into lambing. This proved to be a real disaster in some areas but it will be quite a while until the full cost can be counted.

There is no doubt that throughout the country sheep required, and ate, a lot more feed than normal. Obviously it is more cost effective to spend money feeding sheep which are productive, than those which are not.

We are now in the final year of our Focus Farm Project and once again results have exceeded our expectations, and wildest dreams. You will remember that in the first two years of this project we proved that ewes mated to High Index tups produced, on average, about £10/ewe more income for the farm. The initial results from the daughters of the original High Index Tups are giving us real cause for excitement.

The detailed figures for each farm are displayed later on in this booklet, but the average benefit, at time of going to press, is £9.39 per gimmer. This financial advantage is solely arrived at through improved genetics and so each productive year of her life she is going to produce, approximately, that amount of additional income compared with her flock mates. Would you grudge giving sheep like that a little extra to help them through the worst of the winter weather?

Each year in the project we are faced with something which crops up unexpectedly, just like real life! Throughout last spring and early summer everything seemed to be sailing along quite nicely: lambings had been good, lambs seemed to be doing well, there was no hint of FMD or anything else which would disrupt the market and the price for finished lamb was at a level where people could see a future in the job. Due to changes in farming policy, one of our farms decided that they could no longer participate in the project. This was very disappointing, but fortunately we managed to collect data on some of the 2009 lamb crop, so all was not lost.

I fully understand the extra work which people undertake to do for the industry in general when they agree to participate in trials like this and can sympathise completely with the fact that when staffing levels are reduced, some things just cannot be done. The whole of the Scottish Sheep Industry is indebted

to our host farmers and those who work with them. On a personal note I feel very privileged to have been so closely involved with the farms. I have learned a great deal, and am very grateful for the willingness and cheerfulness which I have encountered going about all our Focus Farms.

We held our final Group Meeting for that particular farm in March and distilled the results which we had. One of the conclusions was that in the first two years of the trial, when we were looking at the performance of the original tups as sires of slaughter lambs, the two High Index tups earned £1167 MORE than their Low Index colleagues.

The final lambings for this project are now complete and so it is a case of waiting to get the slaughter results for the 2010 lamb crop to conclude this amazing exercise.

I trust that those of you who read this booklet will seriously consider what we have proved. There is hidden money in sheep and using identified superior genetics will help you to find it. For too long the sheep sector has been the Cinderella, but now you know where the glass slipper is, so let's go to the ball!

Rod.

ACKNOWLEDGEMENTS

The Scottish Sheep Strategy is extremely grateful to the continued support of the focus farms:

Alistair and Alexander Brewster, Rotmel Farm, Pitlochry trialling Blackfaced tups on Blackfaced ewes

Dorothy and Amy Clark, Kinnahaird Farm, Strathpeffer trialling Texel tups on Highland Mule and Cheviot Mule ewes with the help of Billy Thow

Forrest and Mary Irving, Whitchesters Farm, Hawick trialling Hill NCC tups on Hill NCC ewes

Andrew and Bryan Robb, Westerhall Farm, Dollar trialling Blackfaced tups on Blackfaced ewes

Lord Rosebery, Dalmeny Home Farm, South Queensferry trialling Texel tups on Mule/Texel ewes and Mule/Lleyn ewes with the help of Andrew Smurthwaite, David Arkley and Hugh Kyle

Derek and Cindy Steen, Hazelbank Farm, Lockerbie trialling Lleyn tups on Lleyn ewes with the help of Keith and Doreen Whitelaw

Without their help, co-operation and enthusiasm this work would not have been possible.

Success has many fathers. Failure is an orphan.

Trial Outline and Results to Date *by Alison Glasgow & Samuel Boon, Signet*

Objective

The project was established to achieve two aims:

A) To run 6 on-farm trials to compare the genetic merit of progeny produced by sires of different genetic merit

B) To share the knowledge and skills of local producers via on-farm meetings

A) The Farm Trials

Over the four-year term of this project (lambing 2007 to lambing 2010), the financial performance of lambs from High Index tups is being compared to that of lambs from Low Index tups and also to that of lambs from 'Farm Choice' tups (i.e. those without performance information, typically bought 'by eye') in terms of:

- The value of the finished lambs produced, and
- The breeding value of the females retained

The purpose of this is to identify and quantify the economic benefit of High Index recorded tups in terms of their value...

- as sires of the slaughter lamb generation, and
- as sires of breeding ewes

...under normal commercial conditions.

The trials commenced with the 2006 tupping season, where four tups were purchased for each farm at an average price of £500/tup. Two tups on each farm have high EBVs (Estimated Breeding Values) and two have low EBVs for each of the following traits: Growth, Muscle Depth, Fat Depth, Litter Size and Maternal Ability.

In Years 1 and 2 of the trial (2007 and 2008 lambing), these tups were mated to two groups of randomly selected ewes of similar breed type and age. A third group of ewes were mated to the Farm Choice tups (i.e. those without any performance data) that had already been purchased by and used on the farms.

Lambs born to all three sire groups were tagged at birth with a unique identifying

number and basic lambing details recorded in terms of sire, date of birth and whether a single, twin etc. Lambs are weighed at around eight weeks of age and again when they are drawn for slaughter. Finally, details from the abattoir kill sheets were recorded.

On all but one of the farms in one of the years, the results from Years 1 and 2 demonstrate that lambs sired by High Index tups outperformed lambs sired by Low Index tups and that this can be worth up to £20.49/ewe. The Farm Choice tups performed as expected; sometimes better than both High and Low Index groups, sometimes worse and sometimes in between them. This demonstrates the lack of predictability when using non-recorded tups.

Details of each farms' performance in the first years of the project are available in the booklets titled "Sheep Focus Farm Project – Year 2" and "Sheep Focus Farm Project – Year 3." These can be downloaded from www.scottishsheepstrategy.org.uk

Details of the 2009 lambing results are shown later in this report.

Testing Maternal Performance – The Second Phase

The second phase of the trial is in now in progress. At tupping 2008, the gimmers bred in the first year by the three groups of tups were all mated either to a single tup or to two tups where the breeding values of both was known. The performance of their lambs to 8 weeks of age (and in some cases through until slaughter) has been compared.

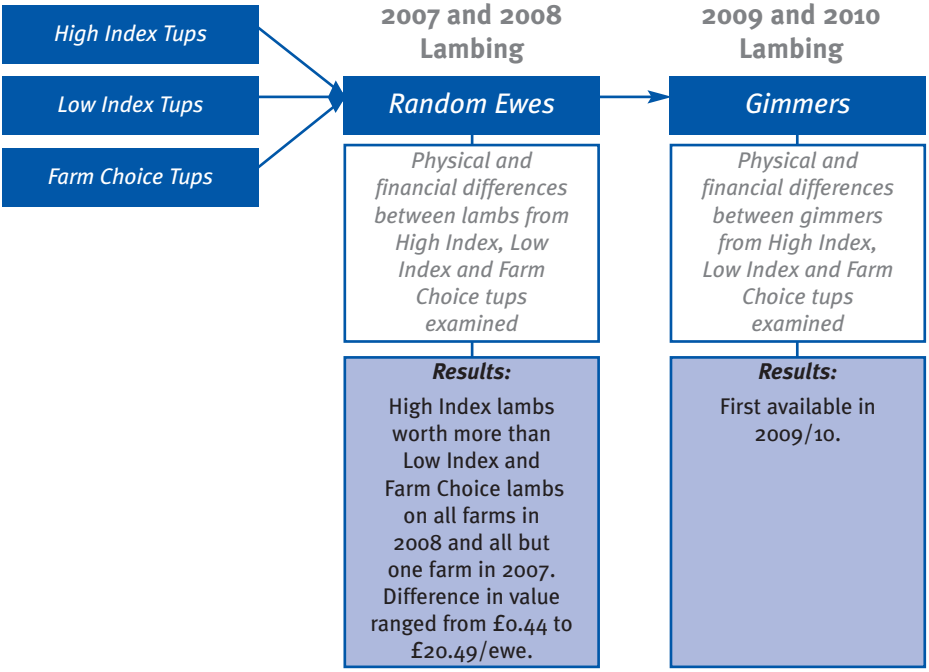
The comparison aimed to draw out differences in:

- Prolificacy – both in terms of the number of lambs produced and the number reared
- Early lamb growth rate – due to both the maternal ability of their mothers and their own genes for growth.

This second phase of the project was repeated again for tupping 2009, with the ewes by the high and low index sires mated once again to sires of known genetic merit so that their performance as mothers can be assessed.

Nothing else in the world is so powerful as an idea whose time has come – Victor Hugo

The complete trial approach can be illustrated as follows:



B) Farm Meetings

One of the main vehicles for disseminating the information from these trials are meetings that run regularly on each of the trial farms, with a minimum of three occurring on each farm each year.

A fixed group of around 15 to 20 local producers and other industry representatives attend each meeting. The purpose of them is to examine and discuss the breeding policy of each flock, including target setting and review. The trial results and gross margin data (prepared once per annum by an independent adviser) are an integral part of this process.

If you would like to join one of the groups, please contact Rod McKenzie 01463 811804.

Measurement is the first stage of management!

FARM RESULTS - YEAR 1 & 2 (2007 & 2008 Lamb Crops)

The first phase of the project focussed on the financial benefits that could be obtained through the use of a high index sire with superior growth and carcase characteristics.

These financial benefits were expressed in different ways on different farms, but they included:

- A reduction in the number of days to slaughter
- The production of heavier carcases
- A lower risk of lambs becoming overfat
- Better conformation carcases
- More uniform batches of lambs
- Lambs sold to hit a better trade
- More efficient growth leading to a reduction in costs of production
- Heavier store lambs
- Heavier ewe lambs and gimmers prior to tupping

The degree of financial benefit varied from farm to farm, but over two years the progeny by high index rams outperformed those by low index sires on all but one occasion.

Financial benefit of high index rams relative to low index rams

	Financial benefit (£/ewe) high index vs. low index rams	
	2007	2008
Dalmeny	-£0.63	£0.44
Hazelbank	Started in 2008	£20.49
Kinnahaird	£3.29	£17.94
Rotmell	£11.42	£7.37
Westerhall	£3.13	£17.93
Whitchester	£13.95	£7.79

If you only do what you've always done, you will only get what you've always had.

On each farm a “farm choice” ram was selected by the farmer and their progeny evaluated alongside those of the high index ram.

The performance of lambs sired by farm control rams was highly variable. On a couple of occasions a farm choice ram proved to be of high genetic merit – but more frequently the farm choice rams performed less well.

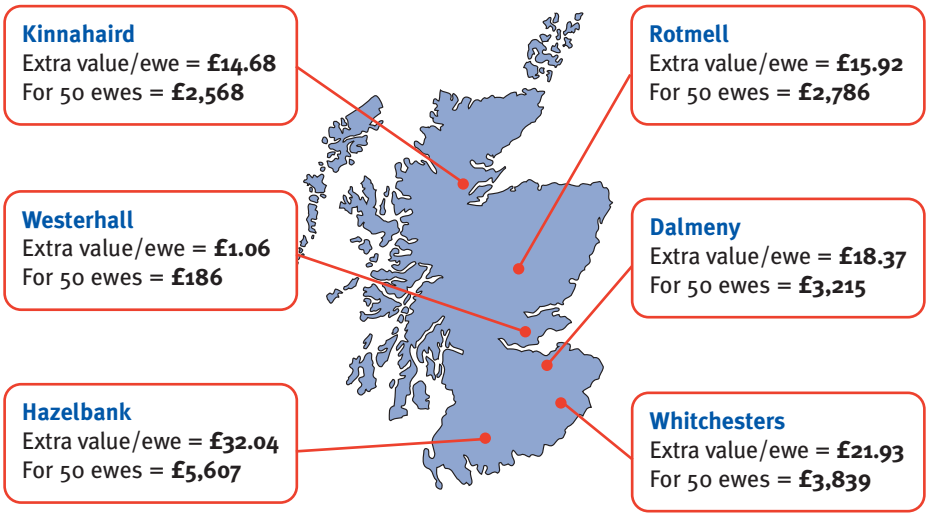
The conclusion from this part of the trial is that the purchase of rams that have not been recorded is a gamble; the genetic merit of a ram can’t be assessed on a purely visual basis.

The difference between a tup lamb and a wether lamb is about 30 seconds. It could be time well spent!

FARM RESULTS - YEAR 3 (2009 Lamb Crop)

SUMMARY

Details of the 2009 results are included in the pages that follow, but in summary...



- ✔ **Ewes sired by high index rams out performed ewes sired by low index rams on all six farms in 2010.**

In general they expressed:

- ✔ **Higher levels of prolificacy, producing and rearing more lambs**
- ✔ **Greater maternal performance, with lambs that grew faster to 8 weeks of age and beyond**
- ✔ **The financial benefit ranged from £1.06/ewe to £32.04/ewe**

If you think you are a man of influence, try working someone else's dog!

DALMENY ESTATES

Breed: Texel tups on Mule/Texel ewes and Mule/Lleyn ewes

At Dalmeny Estates a comparison was made between the performance of three groups of lambs whose mothers had been sired by either a high index, low index or control ram.

The ewes by high index sires produced and reared more lambs than those by the low index sires, lamb weights were also higher due in part to the genetic potential for milk production of the ewes.

Physical Performance

Gimmer Group	Rearing percentage	Average adjusted 53 day twin lamb weight (kg)	Average weight of lamb reared per ewe to 53 days (kg)
High Index Sire	163%	21.19	35.05
Control Sire	163%	20.74	31.78
Low Index Sire	150%	20.77	28.57

Impact of breeding:

- Ewes by high index sires were more prolific and their lambs grew faster to 8 weeks of age.
- Ewes by high index sires produced over 6kg more lamb to 8 weeks of age compared to those by low index sires and 3kg more than the farm control.
- Slaughter data indicated lambs in the high index group were slightly heavier at slaughter, but more significantly they finished 14 days earlier than those in the low index group. This reduction in finishing times is worth a lot on this particular farm, with grass being used later in the season for finishing additional lambs.

Financial Performance

Gimmer Group	Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire	£18.37	£3,215
Control Sire	£8.85	£1,549
Low Index Sire	£0	£0

Striving for maximum production is vanity, striving for maximum profit is sanity.

HAZELBANK

Breed: Purebred Lleyn

At Hazelbank, a study was undertaken to compare the performance of lambs produced by three groups of ewe hoggs. The hoggs in each group had been sired by either a high index, low index or control ram.

Before they went to the ram it was noticeable that the hoggs by the high index sire were on average 4kg heavier at tupping than those by the low index sire. This difference in liveweight at mating may have been one of the factors influencing their productivity later in the year.

Hoggets sired by high index rams were markedly more prolific than those sired by either the control ram or the low index rams. Despite containing a high proportion of lambs that were born as multiples, lambs produced by hoggets by the high index sires were heavier at 8 weeks of age.

Hoggets sired by high index rams produced 18kg more lamb/ewe at 8 weeks of age than those by the low index rams.

Physical Performance

Hogget Group	Rearing percentage	Average adjusted 56 day lamb weight (kg)	Average weight of lamb reared per ewe to 56 days (kg)
High Index Sire	163%	24.69	40.24
Control Sire	118%	23.78	28.06
Low Index Sire	100%	22.44	22.44

Impact of breeding:

- The daughters of high index sires were considerably more prolific than those by low index sires – but due to their genes for maternal ability (milk), early lamb growth rates were not compromised
- The weight of lamb produced by the hoggets lambing in the high index group was considerably higher than either the control or low index breeding lines

Financial Performance

Gimmer Group	Estimated Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire	£32.04	£5,607
Control Sire	£10.12	£1,770
Low Index Sire	£0	£0

* A high proportion of lambs were retained, so this is an estimate based on the extra growth achieved to 8 weeks of age. Assuming £1.80/kg liveweight and rearing percentage as shown.

It's the things you don't do that you regret.

KINNAHAIRD

Breed: Texel tups on Highland Mule and Cheviot Mule ewes

At Kinnahaird the trial monitored the performance of lambs produced by Texel cross shearling ewes that had been sired by either a high or low index Texel ram.

It was noted that both sets of ewes were prolific, but those by high index sires produced more lambs.

Lambs born in the high index group were 1kg heavier at 90 days of age. This was due to both the lambs innate ability to grow (attributable to its genes for growth) and the genetic potential of its mother to produce milk.

Physical Performance

Gimmer Group	Tagging percentage	Average adjusted 90 day lamb weight (kg)	Average weight of lamb reared per ewe to 90 days (kg)
High Index Sire	200%	29.21	58.42
Low Index Sire	178%	28.24	50.27

Impact of breeding:

Daughters of high index sires produced more lambs and the lambs that were reared grew faster to 90 days of age.

Financial Performance

Gimmer Group	Estimated Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire	£14.68	£2,568
Low Index Sire	£0	£0

* Estimate based on the extra growth achieved to 90 days of age. Assumptions include £1.80/kg liveweight and tagging percentage as shown.

Let your performance do the thinking.

ROTMELL

Breed: Purebred Scottish Blackface

At Rotmell a study was undertaken to compare the performance of Scottish Blackface lambs produced by three different groups of ewes. Two groups of ewes were by different high index sires and one group was by a low index sire.

At lambing time the daughters of high index sires were rearing 13% and 20% more lambs respectively than those by the low index sire.

Whilst average lamb weights at 56 days of age were slightly lower (due to the number of multiple births), the daughters of high index rams were rearing between 2kg and 2.5kg more lamb per ewe mated at 56 days of age than those by the low index ram.

Physical Performance

Gimmer Group	Rearing %	Average adjusted 56 day lamb weight (Kg)	Average weight of lamb reared per ewe to 56 days of age (Kg)	Average weight of lamb reared per ewe to 157 days of age (Kg)
High Index Sire 1	133%	17.01	23.81	47.89
High Index Sire 2	140%	16.73	23.44	43.95
Low Index Sire	120%	17.77	21.32	37.96

This difference was even more apparent when lambs were 157 days of age, when the superior growth potential of multiple reared lambs by the high index line had started to be expressed. Daughters of the high index sires went on to rear an extra 6kg to 10kg of lamb compared to those by the low index sire.

A high proportion of the high index lambs were retained for breeding purposes, but the analysis of slaughter records obtained in November enables a prediction to be made as to the expected differences in slaughter weights that could have been obtained if all progeny had been killed.

Impact of breeding:

- High index sires produced daughters that reared more lambs and had superior breeding potential for growth.
- The net result was a marked increase in ewe productivity. Large numbers of lambs were retained for breeding as a result

Gimmer Group	Estimated Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire 1	£15.92	£2,786
High Index Sire 2	£14.06	£2,460
Low Index Sire	£0	£0

* Forecast based on £3.80/kg deadweight and relative to a 19kg carcase.

The key to change is to let go of fear – Rosanne Cash

WESTERHALL

Breed: Purebred Scottish Blackface

The performance of lambs out of 36 ewes that had been sired by either a high or a low index ram were monitored from birth to slaughter.

At lambing time similar levels of prolificacy were detected. Lambs were weighed at 55 and 147 days of age. The lambs born in the high index group were slightly heavier than those in the low index group.

At weaning time gimmers by high index sires were rearing nearly half a kilogramme more lamb per ewe mated than those by the low index sire. If this difference in weights was maintained through until slaughter it would generate slightly heavier carcases which at £3.80/kg deadweight would be worth an extra £1.06/lamb.

Physical Performance

Gimmer Group	Lambing %	Average adjusted 55 day lamb weight (Kg)	Average weight of lamb reared per ewe to 55 days of age (Kg)	Average weight of lamb reared per ewe to 147 days of age (Kg)
High Index Sire	117%	21.98	25.72	37.67
Low Index Sire	117%	21.92	25.65	37.24

Impact of breeding:

- Physical differences in performance were smaller at Westerhall than those seen on the other farms
- Levels of prolificacy were the same within the two groups of ewes
- Lambs produced by ewes that had been sired by high index rams were slightly heavier than those by a low index sire

Financial Performance

Gimmer Group	Estimated Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire	£1.06	£186
Low Index Sire	£0.00	£0

* Forecast based on £3.80/kg deadweight and relative to a 19kg carcase.

Ignoring the fact does not change the fact.

WHITCHESTERS

Breed: Purebred Hill North Country Cheviot

At Whitchesters a comparison was undertaken to compare the performance of lambs produced by three groups of North Country Cheviot gimmers. The gimmers in each group had been sired by either a high index, low index or control ram.

Prior to tupping it was noticeable that the gimmers by the high index and control sire were on average 4kg heavier than those by the low index sire. This difference in pre-mating liveweight may have been one of the factors that enhanced productivity later in the year.

The daughters by the high index and control rams were considerably more prolific than those by the low index ram. The heaviest lambs at 56 days of age were those reared by the ewes sired by the high index ram, despite the fact that many more of these lambs were being reared as multiples.

Ewes sired by high index rams reared over 2kg more lamb/ewe than those by the control ram and over 9kg more lamb/ewe than those by the low index sire.

Physical Performance

Gimmer Group	Rearing %	Average adjusted 56 day lamb weight (kg)	Average weight of lamb reared per ewe to 56 days (kg)
High Index Sire	164%	17.63	28.91
Control Sire	163%	16.31	26.59
Low Index Sire	127%	15.09	19.16

Impact of breeding:

- Ewes sired by high index rams were more prolific than those by low index rams and their lambs grew faster to 56 days of age – despite more of them being reared as multiples.
- The ewes sired by the control ram performed well, but the estimated net return from these ewes was still £5/head less than those by the high index sire

Financial Performance

Gimmer Group	Estimated Extra Value (£) relative to the ewes by the low index sire	Farm benefit for 50 ewes lambing over 3.5 years
High Index Sire	£21.93	£3,839
Control Sire	£16.72	£2,925
Low Index Sire	£0	£0

* A high proportion of lambs were retained, so this is an estimate based on the extra growth achieved to 8 weeks of age, a further growth differential of 0.25. Assuming £1.80/kg liveweight and rearing percentage as shown

Start catching up now, don't wait till you fall behind.

FORMULATING A BREEDING PLAN
– Getting The Whole Picture

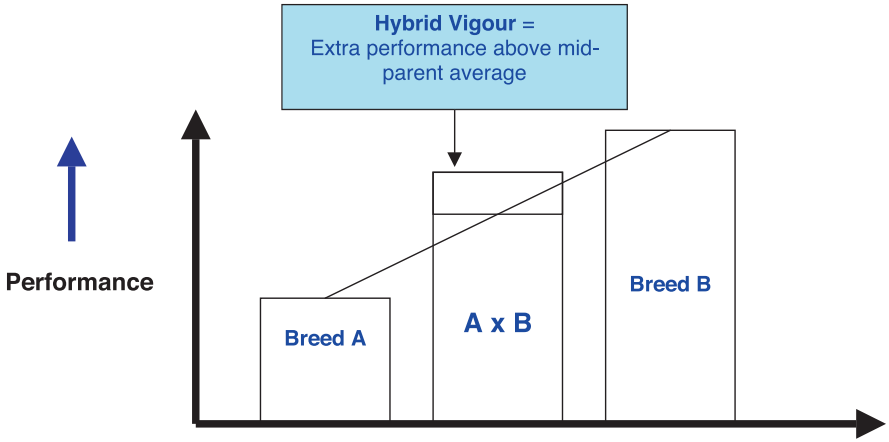
This project has focussed on a range of traits that can be easily measured by performance recording and assessed using Estimated Breeding Values (EBVs). These attributes include the growth rate and carcase conformation of the lamb and the milkiness and prolificacy of the ewe.

A complete flock breeding programme has to take into account a far wider range of traits, including those genetic components that influence lamb survival, ease of management, health and ewe longevity.

Exploiting Hybrid Vigour

A number of these traits have a very low heritability, meaning that the degree to which they can be improved through genetic selection within the breed is relatively small and will take a long time. The good news is that these traits can be quickly enhanced by exploiting hybrid vigour.

Hybrid vigour is the additional level of performance that is achieved when two different breeds are crossed, over and above the average performance of those two breeds.



Which traits can be improved through hybrid vigour?

Many of the economically important traits influencing the lifetime productivity of the ewe can be enhanced through hybrid vigour

Traits	Potential hybrid vigour
Carcase measurements Skeletal size Mature weight	Low 0-5%
Growth rate Early weights Milk production	Medium 5-10%
Lamb survival Fertility and reproduction Health Ewe longevity	High 10-30%

When improving hybrid vigour it is important to identify in which generation you wish to see the hybrid vigour expressed.

Hybrid vigour in the lamb may improve lamb survival, whilst in the ewe it may increase fertility and longevity. Many commercial production systems benefit from the use of crossbred females.

Creating a Breeding Plan

When pulling together a breeding plan remember:

- Identify the traits that will make you the most money
- Use EBVs to select rams with superior growth, carcase and maternal attributes
- Consider using hybrid vigour to enhance traits of low heritability
- Keep basic records relating to lambing percentage, slaughter data and culling levels to assess the success of your breeding policy
- No two farms are the same, so breed sheep to fit your system

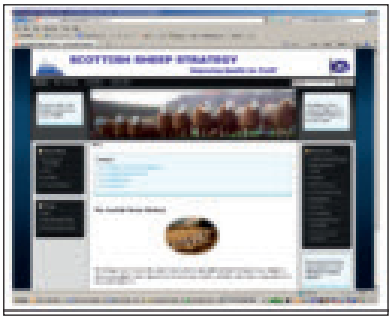
THE SCOTTISH SHEEP STRATEGY

The aim of the Scottish Sheep Strategy is to increase the uptake of breeding technologies within the Scottish Sheep Industry, leading to a reduction in production costs, improvement in the quality and consistency of Scotch lamb and an increased demand for recorded breeding stock.

This is achieved through a variety of activities and information sources, available free of charge to all producers. For further details of events and who on the Scottish Sheep Strategy Committee, check out the Scottish Sheep Strategy website at www.scottishsheepstrategy.org.uk see below.

IT'S ALL ONLY A CLICK AWAY! www.scottishsheepstrategy.org.uk

All Scottish Sheep Strategy Information is available on the web site, including:



- Assistance in performance recording your own pedigree flock
- Assistance in buying a tup using EBVs, including
- A directory of recorded flocks
- Leaflets "How to Buy the Right Tup for Your Flock" and "Planned Carcase Production"
- E L S A & R A M S Recording – a method of low level recording for commercial flocks
- Details of forthcoming events
- Reports from previous events
- Bulletin Board
- Brewster's Blog – a regular blog from Alex Brewster (Rotmell Focus Farm) using performance recording to produce commercial Blackface sheep, with the help of EID.

For further details, please contact Rod McKenzie on
01463 811804 or email rod.mckenzie@sheepstrategy.org.uk

Information on sheep breeding is available from a number of sources:

Scottish Sheep Strategy

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