A Comparison of the Performance of New Zealand Suffolks with UK Suffolks in a Welsh lowland Environment

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Summary

- The objective of the project was to quantify and compare the performance of the progeny of New Zealand Suffolks with UK Suffolks when used as terminal sires on commercial crossbred ewes in a Welsh lowland situation.

- The comparison was carried out in a flock of 506 mixed age ewes Welsh Mule ewes run as a commercial enterprise, finishing lambs off grass without concentrates. 10 rams were used in the project, 4 New Zealand, 3 high index and 3 'traditional' type Suffolks.

- There were no significant differences in the survival of lambs sire by different sire types at any stage of the trial.
- A lower proportion of lambs sired by New Zealand Suffolks required asistance at birth compared to high index UK Suffolks. On average the progeny of the traditional UK Suffolks were intermediate in their requirement for assistance but there was considerable variation between sires within this group.
- The variation between individual sires was far greater than between sire types for birth weight, vigour or ability to suck of lambs. This suggests that within all three breed types there is potential for genetic improvement of these traits.
- Up to 8 weeks of age there were no significant differences in the growth between the progeny of the three sire types. However, from 8 weeks to slaughter the lambs sired by New Zealand Suffolk grew significantly more quickly than the progeny of the traditional UK Suffolks. The progeny of both the New Zealand and high index UK Suffolks had a significantly higher growth rate from birth through to slaughter than the traditional Suffolks, resulting in a signficantly lower average age at slaughter.
- The carcasses of the New Zealand sired lambs had significantly poorer conformation grades than those of the UK sired lambs, resulting in a carcass value of approximately 8p/kg less than lambs slaughtered at the same time.
- The lambs of the traditional UK Suffolks tended to be leaner throughout the trial than any of the other lambs, and produced significantly leaner carcasses than the lambs of the New Zealand Suffolks.
- The lambs of the high index Suffolks were slaughtered at a slightly but signficantly lower live weight and consequently produced slighttly lighter carcasses than the lambs sired by the New Zealand or traditional UK Suffolks.
- The progeny of the high index UK sires were dirtier than the progeny of the other sires in the trial. They had signficantly higher dag scores than the New Zealand sired lambs, and significantly more required dagging before slaughter compared to both of the other sire types. There was, however, considerable variation between the progeny of different sires suggesting that there is potential to improve this trait by selection.
- The lambs sired by UK high index sires had significantly lower faecal egg counts (FEC) at weaning than lambs sired by the other two sire types.
- Over the trial as a whole the New Zealand sired lambs cost less to produce than the traditional UK sired lambs with the high index UK sired lambs incurring an intermediate cost. The New Zealand sired lambs tended to finish earlier and benefitted from the seasonal variation in price, but were heavily penalised compared to the UK sired lambs because of poorer carcass conformation.

Objective

Suffolk genetics from New Zealand are being promoted throughout the UK on the basis of their ‘easicare’ attributes. However, the extent to which these genetics contribute to ease of management when run under the same management conditions as UK Suffolk genetics has not been quantified. The objective of this project is to quantify and compare the performance of the progeny of New Zealand Suffolks with UK Suffolks when used as terminal sires on commercial crossbred ewes in a Welsh lowland situation. This study is being carried out by the Institute of Biological, Environmental and Rural Sciences (IBERS) at Aberystwyth University in collaboration with industrial partners Innovis Ltd. and Suffolk Sheep Society, and was funded by HCC, Innovis Ltd, Suffolk Sheep Society

Aim

This demonstration project will provide a comparison of the performance of progeny of Mule type ewes when sired by either New Zealand Suffolks born in the UK, high index Suffolks and ‘traditional’ UK Suffolks (from non-recorded or average index flocks). Primary performance indicators included slaughter weight, age at slaughter, conformation and fat class as well as benchmarking the management traits of lamb vigour, ease of lambing and faecal egg counts. Any treatments/interventions required were recorded and modelling was applied to determine the economic benefits in terms of the labour saved.

Sheep management and recording

The comparison was carried out at the IBERS farm, Morfa Mawr, near Aberaeron. This 545-acre lowland sheep farm is in a coastal location, with the land rising from sea level to approx. 200 feet in altitude. It comprises a mixture of leys and permanent grassland, with a small area of cereals to meet the Tir Gofal agri-environment scheme requirements. There is a flock of 1300 Welsh Mule ewes from which the 506 mixed age ewes for this trial were drawn. The flock is run as a commercial enterprise, finishing lambs off grass without concentrates and selling them into the Waitrose contract organised through Livestock Marketing and slaughtered at Randall Parker Foods in Llanidloes.

10 rams were used in the project. Four New Zealand Suffolk ram lambs, three high index rams (1 yearling, 1 two year old and 1 mature) sourced from IBERS and Innovis and three unrecorded Suffolk ram lambs sourced from Suffolk Society members. The rams were trained at Innovis’ Aberystwyth Centre for up to 4 days prior to semen collection for AI to ensure good semen quality and quantity.

506 ewes were divided into three balanced mating groups of 160 – 170 ewes with respect to ewe breed, ewe age and ewe condition for mating to each of the three genotypes of Suffolk sire. The mean condition score was 3.56 and mean age was 3.1 years. Ewes were artificially inseminated (AI’d), in two batches one week apart (14 and 21 September), with fresh semen from the three sires per genotype group. Of the 506 ewes programmed for AI, 488 were successfully inseminated. A further 3 ewes lost their tags between insemination and scanning, and 15 between scanning and lambing.

Following AI all ewes were run as one mob. Any ewes returning to service after AI were mated to Texel rams so that the parentage of all lambs born was unequivocal. Ewes were scanned on 7th December.

Ewes were housed approximately 6 weeks prior to lambing, and fed a ration of silage and concentrates according to their scanned litter size. 702 lambs were born in mid-February. The ewes lambed in two groups, each with a mix of sire 'type': group 1 lambed between the 4th and 12th February 2008, and group 2 lambed between the 11th and 19th February 2008.

All ewes and lambs were treated in the same way irrespective of sire. For each ewe lambing the following was recorded: date of lambing, total number of lambs born and number of lambs born alive. For each lamb born the following was recorded: birth order within litter, assistance given at lambing, lamb vigour, sucking assistance score and birth weight (within 24 hours of birth). The age and reason for death was recorded for any lamb that died within 48 hours of birth.

The methods used to score lambing assistance given, vigour score and sucking assistance score were based on those used by the Suffolk Sheep Society. The details of these are shown in Table 1.

Following lambing, ewes and lambs were moved to 'mothering up' pens for approximately 24 hours and then turned out to pasture as long as the lambs were sucking unaided.

Table 1. Details of scores recorded

Lambing assistance score	
0	No assistance
1	Ewe examined but not lambed/ewe lambed for management purposes only
2	Ewe assisted – easy lambing, minor assistance required
3	Ewe assisted – difficult lambing (i.e. hard pull, trick manipulation etc), serious assistance required
4	Vet's assistance required (inc Caesarean)
Vigour score (recorded 10 minutes after birth)	
0	Extremely active and vigorous lamb, has been or is standing on all 4 feet
1	Very active and vigorous lamb, standing on back legs and on knees
2	Active and vigorous lamb, on chest and holding head up
3	Weak lamb, lying flat, able to hold head up
4	Very weak lamb, unable to lift head, little movement
Sucking assistance score	
0	Lamb sucking well without assistance within 1 hour
1	Lamb sucking well without assistance within 2 hours
2	Lamb given sucking assistance / tubed once in first 24 hours after birth
3	Lamb given sucking assistance, tubed twice or more, needing help after 1 day old, but able to suck by 3 days old
4	Lamb still needing help to suck when more than 3 days old

Lambs were weighed and dag scored at approximately 8 weeks of age. The system used for dag scoring is shown in Figure 1.

The lambs were selected for slaughter at a target fat class of 3L. The live weight and need for dagging was recorded on the day before slaughter. The lambs were then housed overnight before travelling to the abattoir the following day. Each lamb's individual carcass weight, fat class (2, 3L, 3H etc) and conformation grade (E U R O P) was recorded at the abattoir. The carcass value in terms of price per kilogram was also recorded for each individual. The first batch of lambs was slaughtered on 8 May 2008 and the final batch on 12 September 2008.

Lambs that remained on the farm on 9 July 2008 were weaned. At weaning the live weight, condition score and a faecal egg count of each lamb were recorded. Individual faecal samples were collected from the rectum of each lamb (approximately 10g faeces per lamb). Samples were sent to the Innovis laboratory for analysis. Faecal egg counts were calculated using the FECPAK methodology which dilutes the sample down using water and saline and examines the diluted sample in a counting chamber under a microscope. This methodology has a sensitivity of 30 eggs per gram. Following weaning the lambs returned to grazing on silage aftermaths.

Any lambs that were not considered to have achieved an adequate slaughter condition or weight by 12 September 2008, were weighed and condition scored before being removed from the trial. These lambs (26) were subsequently sold as stores.

The lambs received no routine foot treatments throughout the course of the trial, but were treated on an individual basis as required. The need for individual treatment was extremely low. The lambs were drenched on 8 April with Cydectin, in the 1st week of May with Panacur, and at weaning (9 July) with Cydectin. All lambs were treated on 13 June with Vetrazin to prevent fly strike.

Financial variables

The relative costs of producing each lamb were estimated in terms of lambing costs and finishing costs. This was not intended to be a comprehensive costing but to provide a guide to the cost of producing one lamb relative to another.

Lambing costs

Lambing costs were allocated to lambs that required assistance at lambing to account for the additional labour required and to those requiring assistance to suck to account for both additional labour and the cost of artificial feed. An additional cost was allocated to lambs with poor vigour to account for the additional husbandry and monitoring that they required. The details of these estimated costs are shown in Table 2.

The cost of labour was estimated at £7 hour, based on statutory minimum wages for a craft grade employee in 2008 (Nix, 2007). The cost of artificial colostrum was estimated at £1 per feed based on the average of four popular brands.

One hours labour,rather than the full cost of a veterinary call out and caesarean section, was allocated against a lambing score of 4 as this was only required for two ewes, one of which was a set of quins, and would have had a disproportionate effect on the results.

Table 2. Estimated costs associated with scores recorded at lambing

		Additional labour (mins)	Other costs
Lambing assistance score			
0	No assistance	0	0
1	Assist for management purposes only	0	0
2	Minor assistance	15	0
3	Difficult lambing	30	0
4	Vet's assistance	60	0
Vigour score			
0	Extremely vigorous	0	0
1	Very vigorous	0	0
2	Vigorous	0	0
3	Weak	15	0
4	Very weak	15	0
Sucking assistance score			
0	Lamb sucking well within 1 hour	0	0
1	Lamb sucking well within 2 hours	0	0
2	Lamb given assistance once in first 24 hours	15	1 feed artificial colostrum
3	Lamb given assistance twice or more	60	2.5 feeds artificial colostrum
4	Lamb needing help to suck when more than 3 days old	180	6 feeds artificial colostrum

Finishing costs

Estimated finishing costs were assigned to individuals on the basis of the number of days required to attain slaughter condition after the date on which the first batch of lambs were slaughtered (8 May). These costs provide a means of comparing the relative cost of finishing individual lambs. Lambs that were not finished by 12 September were assigned the cost of finishing up to that date. A breakdown of the estimated costs is shown in Table 3.

The daily grazing cost was estimated on the basis of a forage variable cost of grazed grass of 0.36p/MJ of ME (Nix, 2007), and assuming a daily energy requirement of 8.2 MJ of ME for a 30 kg lamb growing at 250 – 300 g/day (NRC, 2006). The estimated labour cost was based on a shepherd inspecting the flock of lambs once a day (30 minutes per 100 lambs), and gathering and sorting and/or treating lambs once a fortnight (2 hours per 100 lambs). The cost of labour was estimated at £7 per hour as for the estimated lambing costs. It was assumed that lambs were treated with a drench effective against gastro-intestinal worms at 6 weekly intervals at a cost of 17.55p per dose, based on the average price of six popular brands for a 40kg lamb. The cost of fly strike prevention was based on treating a lamb in the crutch area with a spray on product costing 57p per lamb every 8 weeks.

Table 3. Components of the estimated daily finishing cost per lamb.

Component	Estimated cost per day (p)
Grazing	2.95
Labour	4.53
Treatment for GE worms	0.42
Fly strike prevention	1.02
Total	**8.92**

In addition an estimated cost of 20p per lamb was included for every lamb that required dagging before slaughter.

Carcass value
The actual carcass value for each lamb was recorded in terms of p/kg and total value. In addition the price above base price assigned to the individual carcass based on grade and weight was recorded, and the carcass value above base price was calculated by multiplying this by the carcass weight for each individual. These latter two measures allow a comparison of carcass value to be made that is largely independent of the substantial variation in base price throughout the season.

Statistical Analysis

Individual lamb live weights and ages were used to calculate average daily gains for various periods over the course of the trial. Adjusted eight week weights were calculated using linear interpolation.

For analysis of lambing assistance score values of 0 (no assistance) were reassigned the value of 1 (assistance for management purposes) so that all lambing events that did not *require* assistance were treated equally.

For analysis of carcass fat class and carcass conformation grade, actual scores were converted to the numerical scores shown in Table 4.

Data for continuous and semi-continuous (e.g. scores) measures were initially analysed to see if ewe age, lamb sex, the number of lambs born or reared, and birth date or age had a significant effect. Any of these significant effects were then included in the subsequent analysis including the effect of sire nested within sire type (NZ, High Index or Traditional). In addition, slaughter batch was included as a fixed effect in the analysis of live weight at slaughter, carcass weight, conformation grade, fat class and killing out percentage. As not all animals were slaughtered at the target fat class an additional analysis of live weight at slaughter, carcass weight, conformation grade, killing out percentage and age at slaughter was performed fitting carcass fat class as a covariate.

Table 4 Numerical score assigned to carcass fat class and conformation grades

Fat Class		Conformation	
Actual score	Numerical score	Actual score	Numerical score
1	1	E	5
2	2	U	4
3L	3	R	3
3H	3.5	O	2
4L	4	P	1

Financial data relating to estimated costs and returns were estimated on an individual lamb basis and analysed as continuous variables.

Before analysis the data relating to one set of quins, one ewe that aborted and one ewe that died before lambing were removed.

Figure 1. Dag Score Reference Guide

0	1	2	3	4
No faecal soiling	Very light soiling	Light soiling & dags around anus	Some soiling & dags on legs	Extensive soiling &dags to hocks

Results and Discussion

The number of ewes and lambs involved in the comparison, and a breakdown of the fate of lambs is shown in Table 5.

Table 5 Summary of the number of ewes and lambs throughout the trial

	Traditional Suffolks (UK-T)	NZ Suffolks (NZ)	High Index Suffolks (UK-HI)
Ewes inseminated	162	163	160
Ewes holding to AI	117	132	116
	72%	81%	73%
Mean litter size scanned	1.99	1.99	1.84
Ewes recorded at lambing	107	124	110
Mean litter size born	1.90	2.02	1.85
Total born	203	250	203
Singles	32	31	32
Twins	109	134	128
Triplets and Quads	62	85	43
Born alive	201	246	201
Stillbirths (%)	0.99	1.60	0.99
Lamb losses to 48 hours (%)	0.5	2.4	1.0
Lambs present at 8 weeks	180	207	181
Lamb losses to 8 weeks (%)	10.4	15.9	10.0
Lamb slaughtered	169	199	161
Lamb sold store	8	6	12

Although there appears to be a considerable difference in conception rate to AI between the different sire groups, caution should be taken in interpreting this result. The trial was not designed to compare the mating performance of the rams, and furthermore their management prior to semen collection was not standardised. This means that it is not possible to quantify the relative contribution of differences in the rearing management or the intrinsic effect of genotype on observed differences in performance. The team collecting semen reported that the New Zealand Suffolk lambs were trained for semen collection over a longer time period, were notably more active and were easier to collect good quality semen from than the other two groups.

There were no significant differences between the different sire groups in the proportion of lambs still born or lost within 48 hours or 8 weeks of birth. The slightly higher level of losses to both 48 hrs and 8 weeks in the NZ sired lambs is largely attributable to the higher frequency of higher multiple born lambs. Over all lambs, the proportion of lambs surviving to 8 weeks was 92% for single, 96% for twins, 70% for triplets and 31% for quads. Lambs that survived to 8 weeks had a higher mean birth weight (by 0.56 kg) compared to the mean of those that died, even after litter size had been accounted for. There was no significant difference between sire groups in the proportion of lambs attaining slaughter condition within the trial.

A summary of data collected at lambing time is shown in Table 6. Significantly more lambs sired by high index UK Suffolks (UK-HI) required assistance at birth than lambs sired by the New Zealand Suffolks (NZ). However, the mean level of assistance required was not significantly greater. One sire within the traditional Suffolks had a significantly higher proportion of lambs requiring assistance at birth (40%) compared to the other two sires (25%). There were no significant differences within either of the other two sire groups. Lambs that were assisted at birth were significantly heavier by an average of 0.5 kg than lambs that were not.

Reports of trials run by Agri-Food Biosciences Institute (ABFI), Hillsborough, Northern Ireland comparing the lambs of UK and UK cross New Zealand Suffolk sires, also report a lower proportion of the New Zealand cross lambs requiring assistance at birth (Annett, 2007). They also report a 0.3kg reduction in birth weight.

In this trial a lower difference in birth weight (0.16 kg) was observed which was not significant between the groups of sire but there was significant variation between individual sires (Figure 2). The difference between the sire of progeny with the highest mean birth weight (a traditional Suffolk) and the sire of progeny with the lowest mean birth weight (a New Zealand Suffolk) was significant ($P<0.05$).

Similarly, the vigour and ability to suck unaided of lambs showed significant variation between sires rather than between sire groups (Figures 3 and 4). This variation was independent of differences between the sires in birth weight and level of lambing assistance required. The differences between sires in terms of their progeny's ability to suck unaided were independent of lamb vigour. Although it is often claimed that New Zealand sired lambs are more vigorous at birth and quicker to suck, there have been no previous published studies in which this has been objectively quantified. The objective evidence from this study suggests that there is variation within all three Suffolk populations in these traits and potential for genetic improvement can be achieved through careful recording and selection.

The performance of the lambs to 8 weeks of age is summarised in Table 7. There were no significant differences between any of the sire groups with respect to the growth of their progeny to 8 weeks of age. The lambs sired by the New Zealand Suffolks had significantly lower mean dag scores than those sired by the UK high index Suffolks. There was also highly significant variation between the mean dag scores at 8 weeks of age of the progeny of individual sires within sire groups (Figure 5). One traditional UK Suffolk had lambs with a similar mean dag score to the New Zealand sired lambs and one had lambs with a significantly higher mean dag score. In view of this level of variation within groups and the small number of sires represented in this trial it would be wise to treat the comparison of sire types with considerable caution.

Table 6 Mean (± s.e.) performance of progeny of the three sire groups at lambing

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	Sire
Number born/ewe	1.9	± 0.19	2.1	± 0.07	1.9	± 0.07	n.s.	n.s.
Lambs requiring assistance at birth (%)	28		25		40		NZ < UK-HI	P<0.05
Lambing assistance score	1.6	± 0.06	1.5	± 0.06	1.7	± 0.06	NZ < UK-HI	n.s.
Lambing assistance score (adj. for birth weight)	1.4	± 0.07	1.3	± 0.07	1.5	± 0.07	NZ < UK-HI	n.s.
Birth weight (kg)	4.64	± 0.105	4.48	± 0.099	4.64	± 0.103	n.s..	P<0.05
Vigour score	1.3	± 0.07	1.4	± 0.06	1.4	± 0.07	n.s.	P<0.01
Sucking assistance score	0.4	± 0.07	0.4	± 0.06	0.4	± 0.06	n.s.	P<0.01

Table 7 Mean (± s.e.) performance to 8 weeks of progeny of the three sire groups

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	Sire
8 week weight (adjusted)	21.9	± 0.77	21.8	± 0.75	22.0	± 0.78	n.s.	n.s.
Average daily gain to 8 weeks (g/day)	305	± 11.8	305	± 11.5	307	± 11.9	n.s.	n.s.
8 week dag score	0.8	± 0.28	0.6	± 0.28	1.0	± 0.28	NZ < UK-HI	P<0.001

Figure 2 Mean birth weight of sire progeny groups

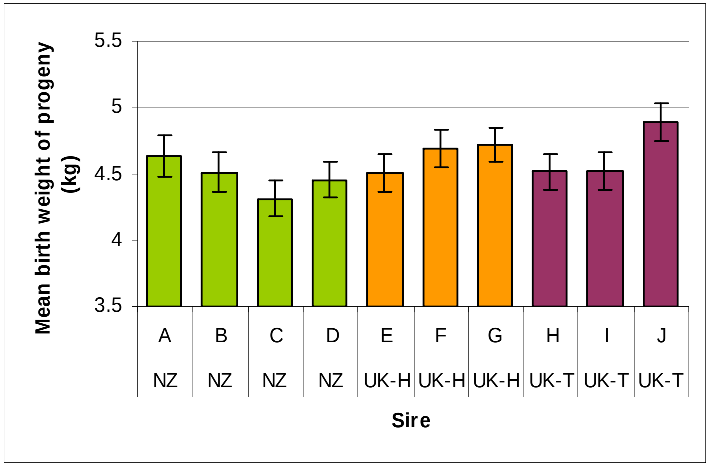


Figure 3 Mean vigour score of sire progeny groups

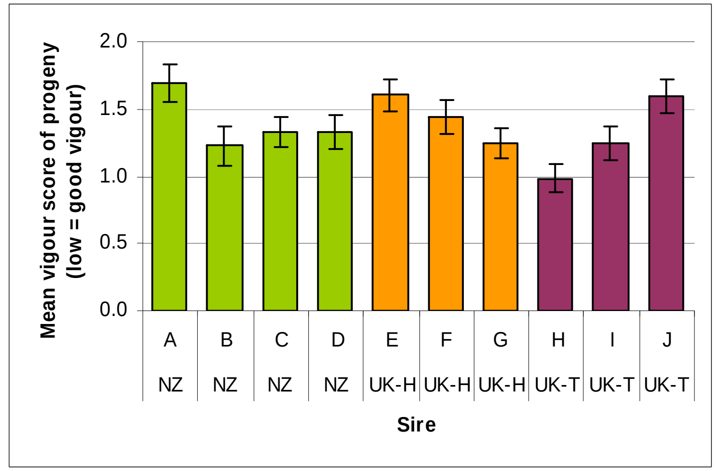


Figure 4 Mean sucking score of sire progeny groups

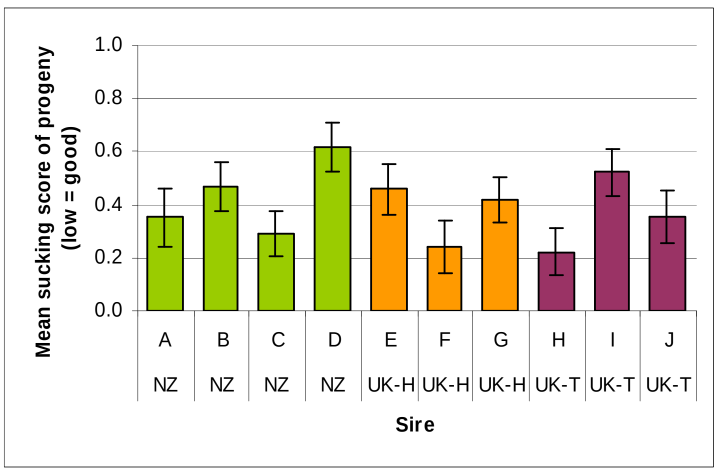
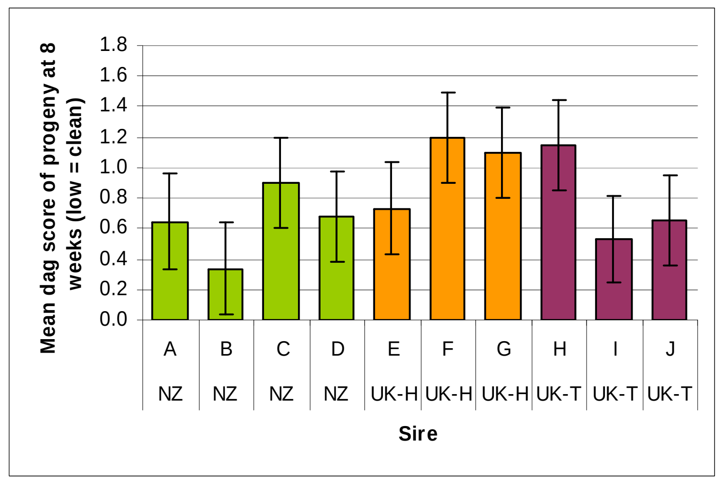


Figure 5 Mean dag score of sire progeny groups at 8 weeks

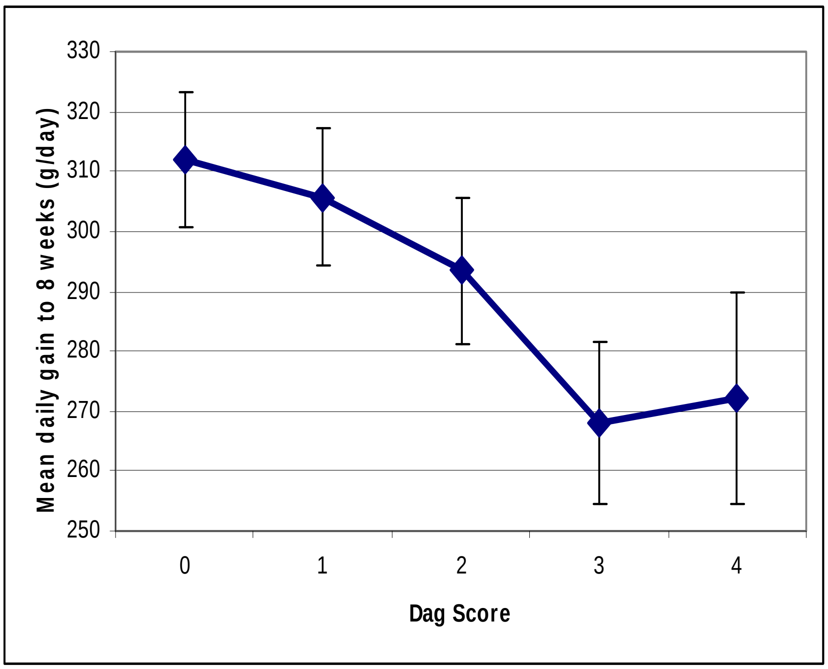


There was a significant negative relationship between daily gain to 8 weeks and dag score at 8 weeks. Clean lambs tended to have had a higher growth rate to 8 weeks (see Figure 6). For every increase in dag score up to a dag score of three, lamb growth rate decreased by on average 16 g/day. This relationship was the same for all sire types.

Lambs that were assisted at lambing had a significantly higher 8 weeks weight compared to lambs that required no assistance, maintaining their weight advantage at birth.

It is worth noting that in a comparison of high and low index terminal sires (Lewis *et al* 2005) the progeny of high index sires had a significantly higher growth rate to ten weeks of age than the progeny of low index sires. In this trial we did not see a similar effect but the results are not strictly comparable for two reasons: firstly this trial used a small number of sires and therefore differences between individual sires can have a large influence on the results and secondly the comparison of high index sires was with the progeny of traditional sires bought on 'looks' whose index values were not known.

Figure 6 Mean daily live weight gain to 8 weeks of lambs assigned different dag score



Lambs remaining on their mothers on 8 July 2008 were weaned. The data relating to these lambs are summarised in Table 8. A significantly higher proportion of New Zealand sired lambs were slaughtered prior to this date than the UK sired lambs. Although there were no significant differences between the sire groups in weaning weight or growth rate from birth to weaning, the New Zealand sired lambs had a significantly higher growth rate from 8 weeks of age to weaning, than the UK sired lambs. There was also significant variation beween sires within sire groups. The progeny of the traditional UK Suffolks had a significantly lower mean body condition score at weaning than the progeny of the New Zealand or high index sired lambs, indicating that they were leaner. Age of ewe also had a signficant effect on lamb condition score at weaning with the lambs of younger ewes (2 years) carrying significantly more condition than the lambs of older ewes (4 years). The progeny of the UK high index sires had a significantly lower mean faecal egg count, indicating that they carried a lower worm burden despite having been grazed togther with the progeny of the New Zealand and traditional UK sires. This result may seem surpirising taken together with the significantly higher average dag score of the lambs sired by the high index UK Suffolks. However, previous studies have shown that dag score is not a good indicator of worm burden. Roden (2004) found low phenotypic and genetic correlations between dag score and FEC in Suffolk lambs; similar results have been found by Watson *et al* (1986), Douch *et al* (1994) and Bisset *et al* (1994). The ability to maintain a good growth rate from 8 weeks to weaning and remain clean without a significantly lower FEC may indeed indicate that the New Zealand Suffolk sired lambs are more *resilient* to nematode infection rather than more *resistant* as has been claimed.

Details of the performance of all lambs through to slaughter are summarised in Table 9. The New Zealand sired lambs were slaughtered at a significantly higher average live weight than the UK high index sired lambs, and at a significantly younger age and lower fat cover than the traditional UK sired lambs. When differences in fat cover were accounted for, the progeny of both the New Zealand sired lambs and the UK high index sired lambs were significantly younger at slaughter than the traditional UK sired lambs. This difference is also reflected in the significantly lower growth rate to slaughter of the traditional UK sired lambs from both birth to slaughter and 8 weeks to slaughter.

The UK high index lambs had a significantly lower mean carcass weight than the other sire groups but this was largely attributable to one high index sire whose progeny had a low mean carcass weight and one traditional sire whose progeny had a high mean carcass weight. There were no significant differences in killing out percentage between the sire groups, even when differences in fat cover were taken into account. The carcasses of the New Zealand Suffolk lambs had significantly poorer conformation than those of the UK sired lambs. Consequently a signficantly lower proportion of these lambs reached the standard specification (16 – 20 kg, E,U or R, 2 & 3L) than the UK sired lambs. The distribution of carcass fat class and conformation grades for each sire type are shown in Figures 7 and 8. There was significant variation between individual sires within sire groups for fat class and conformation grade, nevertheless the four New Zealand sires ranked 6, 8,9 and 10 (out of a total of 10) in terms of progeny conformation.

Similar differences in carcass grades were found in the AFBI Hillsborough comparison of UK and New Zealand Cross Suffolks (Annett, 2007).

A greater proportion of lambs sired by UK high index rams required dagging before slaughter compared to the lambs sired by either the New Zealand or traditional UK sires. There was, however, considerable variation between individual sires in the proportion of their lambs that required dagging (Figure 10).

Table 8 Mean (± s.e.) performance to weaning of those progeny still present at weaning of the three sire groups

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	Sire
Number weaned	69	(40%)*	66	(32%)	82	(47%)	NZ< UK-H & UK-T	n.s.
Live weight at weaning (kg)	37.5	± 0.49	37.3	± 0.64	37.0	± 0.56	n.s.	n.s.
Average daily gain to weaning (g/day)	218	± 2.4	222	± 3.4	216	± 2.8	n.s.	n.s.
Average daily gain 8 weeks to weaning (g/day)	190	± 4.1	210	± 5.3	183	± 4.5	NZ > UK-T & UK-H	P<0.05
Condition score at weaning	2.8	± 0.07	3.2	± 0.10	3.1	± 0.08	NZ & UK-H > UK-T	P<0.05
FEC at weaning (Log EPG+1)	2.6	± 0.10	2.4	± 0.11	2.1	± 0.11	NZ & UK-T > UK-H	n.s.

* Figures in parenthese are the % of lambs reared through to slaughter/sale that remained at weaning

Table 9 Mean (± s.e.) performance to slaughter of all progeny of the three sire groups

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	**Sire**
Live weight at slaughter (kg)	41.5	± 0.78	42.2	± 0.79	41.2	± 0.79	NZ > UK-H	n.s.
Age at slaughter (days)	148.3	± 7.42	140.7	± 7.23	141.5	± 7.47	NZ < UK-T	n.s.
Age at slaughter (days) adj for fat	148.9	± 7.42	140.6	± 7.24	141.2	± 7.48	NZ& UK-H < UK-T	n.s.
Carcass weight (kg)	19.0	± 0.39	19.0	± 0.39	18.6	± 0.40	NZ & UK-T > UK-H	P<0.05
Carcass weight (kg) adj for fat	19.0	± 0.38	18.9	± 0.39	18.5	± 0.39	NZ & UK-T > UK-H	P<0.05
Killing out (%)	45.8	± 0.66	45.1	± 0.66	45.1	± 0.67	n.s.	n.s.
Carcass fat class (2=2, 3L=3, 3H=4)	2.9	± 0.13	3.1	± 0.13	3.0	± 0.13	NZ > UK-T	P<0.001
Carcass conformation class (E=5: P=1)	2.9	± 0.04	2.6	± 0.04	2.9	± 0.04	NZ < UK-T & UK-H	P<0.001
Average daily gain to slaughter (g/day)	249	± 4.0	266	± 3.9	262	± 4.1	NZ & UK-H > UK-T	n.s.
Average daily gain 8 weeks to slaughter (g/day)	269	± 11.8	285	± 11.5	277	± 11.9	NZ > UK-T	n.s.
Percentage of lambs dagged	40	-	39	-	53	-	NZ & UK-T < UK-H	P<0.001
Percentage of carcasses within specification (16 – 20 kg, EUR, 2 & 3L)	48	-	28	-	46	-	NZ < UK-H & UK-T	P<0.001

Figure 7 Distribution of carcass conformation grades by sire type

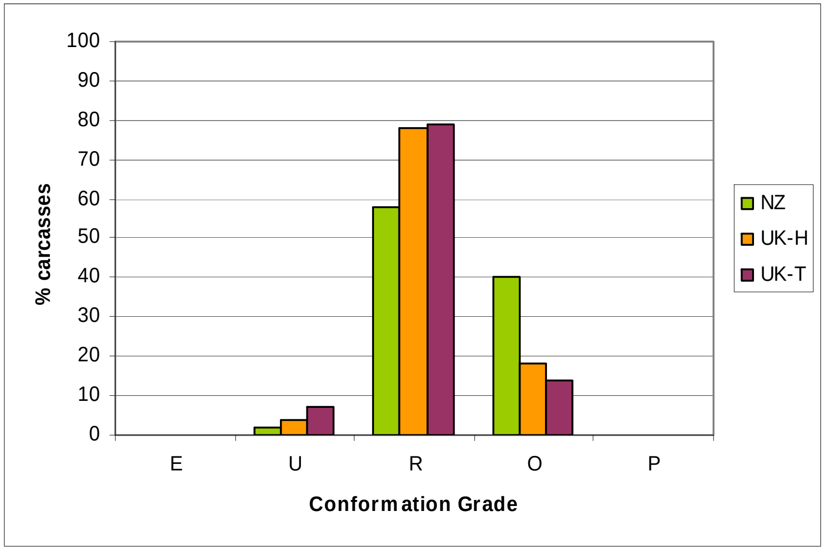


Figure 8 Distribution of carcass fat classes by sire type

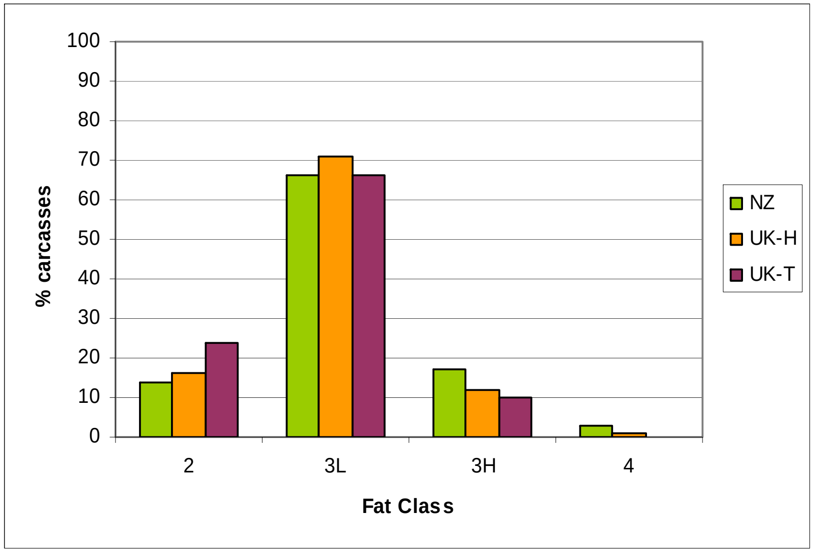


Table 10 Mean (± s.e.) live weight and condition score of lambs that failed to reach slaughter weight or finish within the trial

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	**Sire**
Live weight (kg)	42.9	± 0.59	36.6	± 0.76	35.8	± 0.66	NZ & UK-H < UK-T	P<0.05
Condition score	2.1	± 0.17	2.0	± 0.22	2.5	± 0.19	n.s.	n.s.

Those lambs that failed to attain sufficient weight or fat cover for slaughter by 12 September were sold as stores (see Table 10). Compared to lambs that were sold for slaughter the lambs sold as stores had a significantly lower growth rate throughout the pre-weaning period (approximately 10% lower). There was also a tendency (although not signficant, p=0.06), for these lambs to have on average required a greater level of assistance to suck than lambs that achieved slaughter weight and condition. 42% of those lambs sold as stores required assistance to suck, compared to 30% of those sold for slaughter. This suggests that a significant proportion of these lambs had a difficult start in life that had a longer term impact on their ability to thrive and grow.

The lambs sired by traditional UK Suffolks that were sold as stores were significantly heavier than those sired by the New Zealand Suffolks, and also had less condition than those sired by New Zealand or UK high index sires. This suggests that these lambs failed to reach slaughter grade because of lack of condition. However, the overall proportion of lambs that were sold as stores was very low, ranging from 2.9% to 6.9% across the three sire types.

A summary of the financial value of carcasses from the three sire types is shown in Table 11. The financial returns from carcasses was greatly influenced by the normal seasonal fluctuation in base price, which varied from 400p/kg to 265 p/kg (see Figure 9). Sire type had a significant effect on the value of the carcass above base price, with New Zealand sired lambs yielding signifcantly lower prices per kilogram (8 – 9p) than other lambs slaughtered at the same time. This difference equates to approximately £1.70 per carcass. However, the combination of the higher prices at the beginning of the slaughtering period, and the more rapid growth rate to slaughter of the New Zealand sired lambs meant that their overall value was not significantly lower than the UK sired lambs.

The average estimated marginal costs of producing the lambs are shown in Table 12. The New Zealand sired lambs had a significantly lower finishing cost due to a younger age at slaughter and also a significantly lower total cost compared to the lambs sired by traditional UK Suffolks. The progeny of the UK high index sired lambs had intermediate average estimated costs.

Figure 9 Base price at each date of slaughter

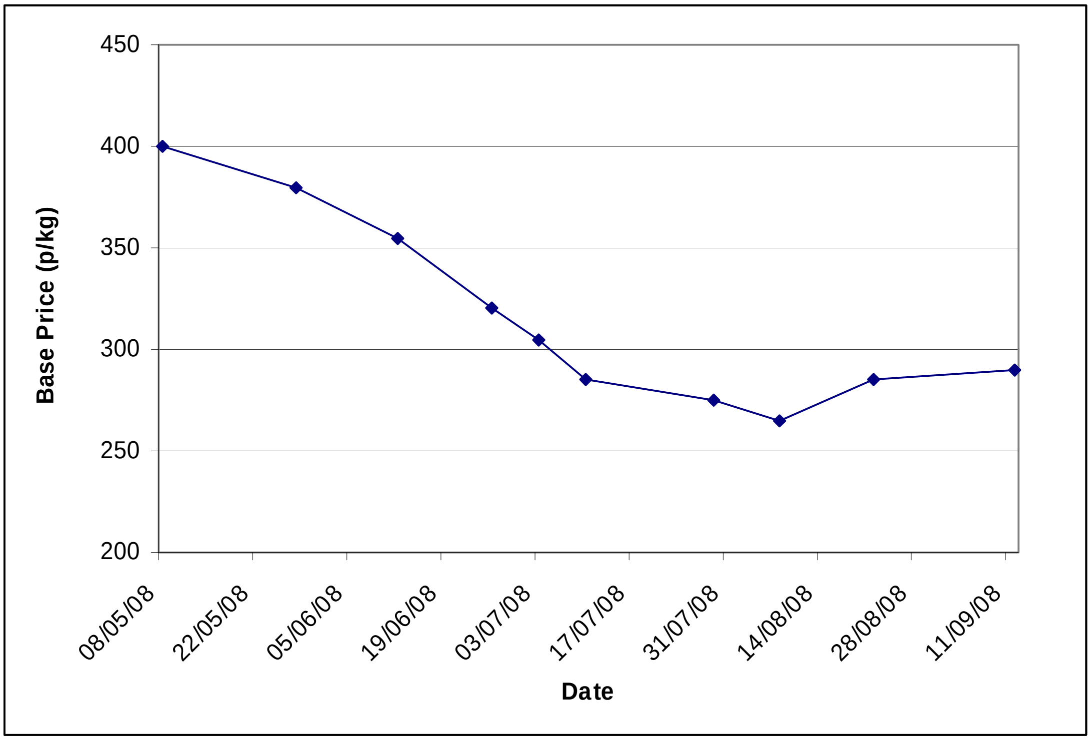


Figure 10 Probability of dagging before slaughter for the progeny of individual sires

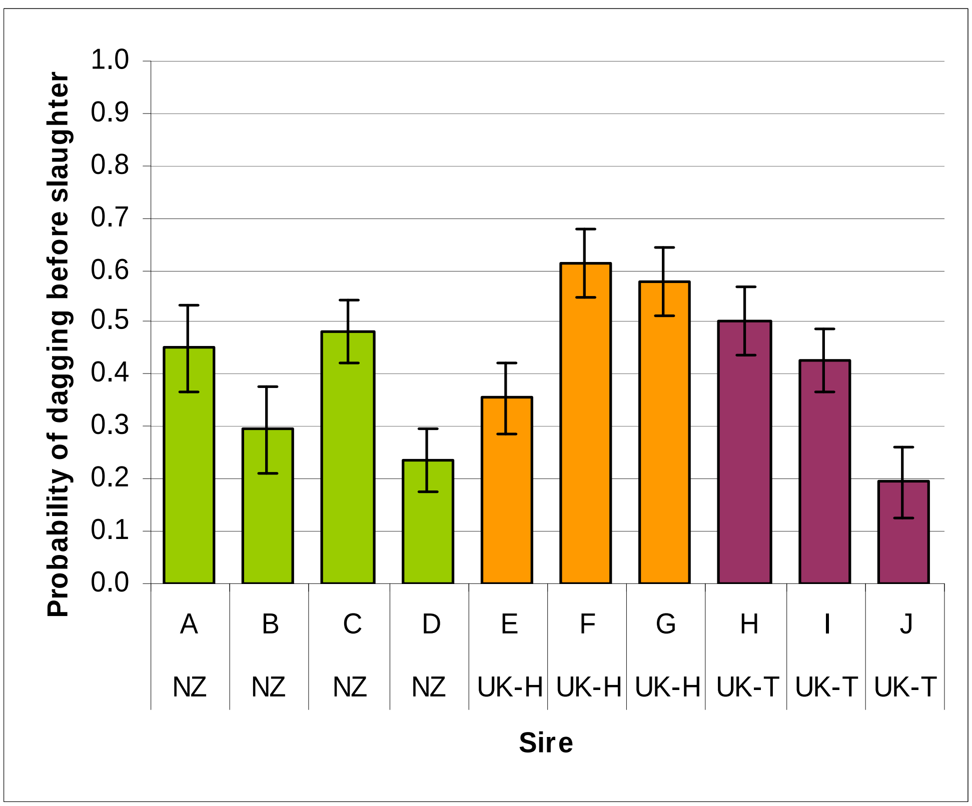


Table 11 Summary of financial returns from carcasses

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	Sire
Carcass value (p/kg)	334	± 10.17	330	± 10.15	338	± 10.36	n.s.	n.s.
Carcass value (£)	63.40	± 2.34	62.67	± 2.34	62.75	± 2.39	n.s.	n.s.
Value above base price (p/kg)	13.2	± 3.52	3.8	± 3.51	12.5	± 3.59	NZ < UK-H & UK-T	n.s.
Value above base price (£/carcass)	2.57	± 0.67	0.75	± 0.67	2.42	± 0.68	NZ < UK-H & UK-T	n.s.

Table 12 Summary of estimated marginal costs

	Traditional Suffolks (UK-T)		NZ Suffolks (NZ)		High Index Suffolks (UK-HI)		Significance	
							Sire Type	Sire
Lambing costs (£/lamb)	0.25	± 0.336	0.15	± 0.335	0.22	± 0.345	n.s.	n.s.
Finishing costs (£/lamb)	5.40	± 0.749	4.66	± 0.747	4.89	± 0.763	NZ < UK-T	n.s.
Total costs (£/lamb)	5.67	± 0.802	4.76	± 0.800	5.04	± 0.817	NZ < UK-T	n.s.

Conclusions

The New Zealand Suffolk sires used in this trial produced lambs that required less assistance at birth and grew more quickly from 8 weeks to slaughter than the UK sires used. Their lambs, however, produced carcasses with poorer conformation that were worth less than lambs slaughtered at the same time. The high index UK Suffolk sires used produced lambs that were more likely to require assistance at birth but reached slaughter condition at a similar age to the New Zealand Suffolks, and produced better conformed carcasses. They were, however, more likely to require dagging despite apearing to be more resistant to nematodes. The traditional UK Suffolk produced lambs took slightly longer to finish, and produced lean carcasses, but with good conformation.

For a number of traits studied e.g lamb vigour, sucking ability, dag score and carcass conformation and carcass fat class there were high levels of variation between individual sires within sire types. To make firm comparisons between the sire types for these traits, more sires need to be sampled. However, this variation also means that there is plenty of variation within all the populations to make genetic improvements through further careful objective recording and selection.

References

Bisset S A, Morris C A, Squire D R, Hickey S M and Wheeler M (1994) Genetics of resilience to nematode parasites in sheep. *New Zealand Journal of Agricultural Research* **27**: 521 – 534.

Douch P G C, Green R S, Morris C A, Bisset S A, Vlassoff A, Baker R L, Watson T G, Hurford A P and Wheeler M (1994) Genetic and phenotypic relationships between anti-*Trichostrongylus colubrifomis* antibody level, faecal egg count and body weight traits in grazing Romney sheep. *Livestock Production Science* **41**: 121 – 132.

Lewis R M, Haresign W, Davies M H, Roehe R, Bunger L and Simm G (2005). The role of sire referencing schemes in terminal sire sheep to improve the carcass quality of crossbred lambs. *Final Report to MLC*.

National Research Council (2006) Nutrient requirements of small ruminants. Sheep, goats, cervids and new world camelids. National Academies Press, Washington DC.

Nix J (2007) Farm Management Pocketbook 38th Edition. The Andersons Centre, UK.

Roden J A (2004) Dag scores in Suffolk sheep – A preliminary study. Report of a project funded by a Genesis-farady SPARK Award.

Watson T G, baker R L and Harvey T G (1986) Genetic variation in resistance or tolerance to internal nematode parasites in srains of sheep at Rotomahana. *Proceedings of the New Zealand Society of Animal Production* **46**: 23 – 26.