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THE INFLUENCE OF SUCKLER COW GENETICS AND TERMINAL SIRE ON PERFORMANCE OF THE SUCKLER HERD

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OVERALL SUMMARY OF PROJECT

As a result of major concerns in the industry about the variability of beef production from the suckler herd, a major on-farm study was initiated by the Agricultural Research Institute of Northern Ireland to evaluate the potential for beef production from the diverse range of cow and sire genotypes within the Northern Ireland suckler herd. The study was carried out on 43 farms across Northern Ireland with data on a range of maternal and progeny traits collected from each farm. The former included details of calving difficulty (dystocia), calf mortality, cow temperament and fertility, while data on carcass weight and grading characteristics were recorded from slaughtered progeny. A visual assessment of conformation score of live cows was also undertaken on ten of the farms in the study.

Overall, 41 main suckler cow genotypes and 7 terminal sire breeds were recorded across the farms in the study. Eighty-six percent of carcasses achieved fat class grades of 3 or 4L and 66% were awarded the premium 'E', 'U' and 'R' conformation grades.

The results indicate that neither cow genotype nor sire breed affected calf survival, though Limousin and Blonde d'Aquitaine cows were identified as having poor temperament. Cows of Angus genotype had fewest calving problems, while cows with a high proportion of Belgian Blue genes had a high level of dystocia. Fertility, assessed as reappearance rate, was poor with only 51% of cows in the study producing another calf by 390 days of their previous calving. However, there was evidence of higher levels of fertility with cows containing 50% of each of two breeds compared to cows of 3/4 or more of one particular breed. Furthermore, replacements bred from the dairy herd had similar levels of fertility to most other breeds. In terms of carcass data, progeny of cows with Angus or Hereford genes, particularly those crossed with Holstein-Friesian, had lighter, lower value carcasses with poorer conformation and higher fat classifications, while inclusion of Continental genes in the cow improved carcass weight and value. Furthermore, progeny of Continental x Holstein-Friesian cows had similar carcass weights and values to those of 3/4 or more Continental cows. Limousin x Holstein-Friesian and Simmental x Charolais dams produced progeny with high value carcasses whilst maintaining good reappearance rates, while overall, difference in cow genotype altered carcass weight and value by up to 17kg and £33 respectively. An important finding from the study was that irrespective of cow genotype, selection of cows with better conformation improved carcass conformation and value of the progeny by up to £14/animal.

Breed of terminal sire used had much greater effects on herd performance than effects of cow genotype. Use of Angus sires resulted in the lowest incidence of calving difficulties and improved cow reappearance rate. However, progeny of Angus sires, as well as those of Salers sires, were lighter, fatter, less well-conformed, and had lower valued carcasses than progeny of other sire breeds. In contrast, use of Belgian Blue sires resulted in a high incidence of calving problems and reduced subsequent dam reappearance rate, but produced heavy, well-conformed progeny with high carcass values. Charolais and Blonde d'Aquitaine sires were notable in that they also produced high value carcasses, but did not have a negative impact on either calving difficulty or subsequent dam fertility. However, availability of bonus schemes for particular sire breeds (e.g. Angus) had a major impact on final progeny carcass value. Overall, use of different sire breeds resulted in variations in carcass weight and value of 28kg and £62 respectively.

INTRODUCTION

The Northern Ireland suckler beef herd currently incorporates a very diverse range of suckler cow genotypes, as well as terminal sire breeds, and consequently produces a varied product in terms of carcass weight, fatness, conformation and age at slaughter. However, there is an increasing need, particularly in the post-decoupling era, for the beef industry to tailor its product to the specific markets which it wishes to supply. Current pricing structures inherent within the industry ensure that carcass characteristics have a direct influence on carcass value and hence producer returns.

When considering the issue of suckler cow replacements, the use of traditional dairy x beef breed suckler cows has declined in Northern Ireland, due to concerns regarding the possible detrimental effects on cow fertility and progeny carcass conformation, resulting from the increasing influence of Holstein genetics in the dairy industry. Over the same period, the number of heifers being retained from within suckler herds for use as cow replacements has increased, such that the breed profile of the Northern Ireland suckler herd has been substantially altered. However, there is limited information on the breeding characteristics of this diverse range of breeds and crosses as suckler cows, and the performance of progeny produced from different terminal sire breeds used with these animals.

Hence, a major study was initiated by the Agricultural Research Institute of Northern Ireland to evaluate the potential of suckler cow genotypes and terminal sire breeds for beef production. This booklet summarizes the findings from this study and considers practical implications for the beef industry.

OUTLINE OF STUDY

A large-scale, on-farm study involving 43 suckler farms, spread geographically across Northern Ireland, was established to evaluate breed differences in terms of maternal and progeny traits. In the context of suckler cow evaluations, the term genotype is more appropriate than that of breed, given that the cows assessed in the study were predominantly cross bred rather than specific pure bred animals of a particular breed.

Selection of farms to participate in the study aimed to ensure that each of the herds comprised a range of genotypes. This ensured that animals of the different genotypes were evaluated alongside each other, and hence facilitated an assessment of genotype differences across farms to prevent individual farm practices from distorting results. Herd size ranged from 36 to 287 cows, with an average of 111 cows per farm.

Measurements and parameters recorded on each farm

Each farmer recorded general information on cow genotype and calving details of progeny born, as well as carcass data from the progeny at slaughter. Calving data recorded included date of calving, calf mortality, calving difficulty (dystocia) and cow temperament. Cow fertility was assessed as reappearance rate, a measure of whether or not a cow had produced another calf by 390, 450 or 720 days of their previous calving. Carcass data, including weight, conformation and fat classifications, from animals that had been initially recorded at birth were collected. Age at slaughter and

carcass value (assessed using a price-grade structure applicable in Northern Ireland) were subsequently determined.

On ten of the farms in the study, visual assessment of conformation score of live cows was undertaken by staff from the Agricultural Research Institute according to the European Carcass Classification Scheme (EUROP scale). These data were subsequently used to evaluate the effects of cow conformation on a range of maternal and progeny characteristics.

Data on cow genotype were recorded, along with whether cows were pure- or cross-bred. In the latter example, a two-breed cross cow was recorded as such (e.g. Angus x Holstein-Friesian cow), while a cow known to be three-quarter or more of a certain breed (e.g. Angus) was recorded as this breed. Cows known to be 100% pure bred were recorded as such.

The influence of cow genotype on suckler herd performance was evaluated

REVIEW OF FINDINGS

The data recorded in this study indicate the diverse nature of the Northern Ireland suckler industry at farm level, with 41 main suckler cow genotypes (Table 1) and seven main terminal sire breeds being recorded across the forty-three farms. The seven main terminal sire breeds were : Angus, Belgian Blue, Blonde d'Aquitaine, Charolais, Limousin, Salers and Simmental. Data from over 4000 calvings were recorded.

Table 1 Details of the main dam genotypes recorded in the study

Dam genotype	
Aberdeen Angus	Hereford x Simmental
Angus x Holstein-Friesian	Holstein-Friesian
Belgian Blue	Limousin
Belgian Blue x Angus	Limousin x Angus
Belgian Blue x Holstein-Friesian	Limousin x Charolais
Belgian Blue x Limousin	Limousin x Holstein-Friesian
Belgian Blue x Simmental	Limousin x Simmental
Blonde d'Aquitaine	Romagnola x Holstein-Friesian
Blonde d'Aquitaine x Angus	Salers
Blonde d'Aquitaine x Belgian Blue	Salers x Charolais
Blonde d'Aquitaine x Charolais	Salers x Holstein-Friesian
Blonde d'Aquitaine x Holstein-Friesian	Shorthorn
Blonde d'Aquitaine x Limousin	Shorthorn x Angus
Blonde d'Aquitaine x Simmental	Shorthorn x Charolais
Charolais	Shorthorn x Limousin
Charolais x Angus	Shorthorn x Simmental
Charolais x Holstein-Friesian	Simmental
Hereford	Simmental x Angus
Hereford x Angus	Simmental x Charolais
Hereford x Charolais	Simmental x Holstein-Friesian
Hereford x Holstein-Friesian	

Carcass grading data showed that, overall, 86% of the carcasses in the study achieved the 'desirable' fat class grades of either 3 or 4L (57 and 29% respectively). Carcass conformation grades represented a broad spectrum of the EUROP scale, with R being the most common grade achieved (49% of all carcasses), while overall 66% of carcasses were awarded the 'premium' E, U and R conformation grades. Only 1% of carcasses achieved the premium E conformation grade and 0.4% of carcasses were recorded as having the poorest (O- and P) conformation grades.

The distribution of carcasses across all conformation grades in the study is presented in Figure 1.

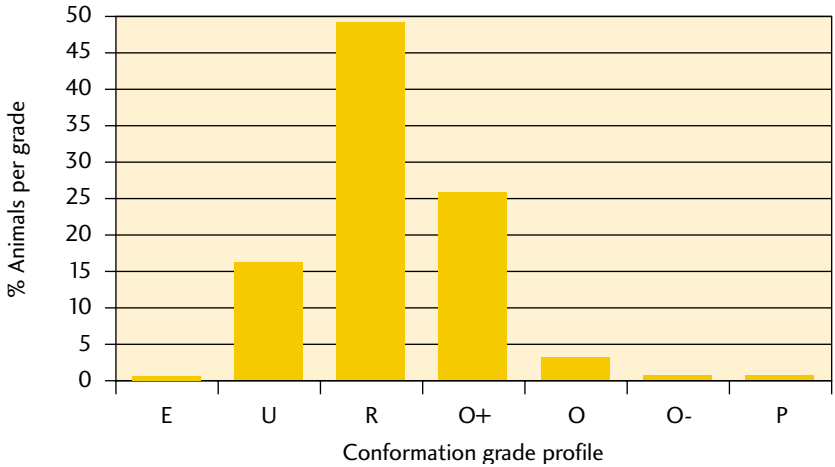

Figure 1 Conformation grade profile of carcasses of finished progeny

Cow effects on suckler herd performance

Given the small farm size and low profitability of suckler herds in Northern Ireland, many suckler farmers (more than 55%) are part time. This results in a reduction in labour availability and the time that labour is present on the farm. Consequently, factors within a system which influence labour requirement (e.g. extent of calving difficulties, cow temperament, fertility) are extremely important.

General data on cow genotype

Calf survival
There was no effect of cow genotype on calf mortality at 48 hours post-calving. However, survival rates decreased as the level of calving difficulty increased, highlighting the importance of ease of calving in dam selection.

Cow temperament
Cows of Limousin and Blonde d'Aquitaine breeding had poorer temperament than any of the other main dam breeds in the study, whilst Hereford and Holstein-Friesian cows had the most favourable temperament scores. Simmental cows also tended to have poorer temperament than several other breeds.

Dystocia
Cows with 50% or more genes of traditional British breeds tended to experience fewest calving problems, while those with 50% or more Belgian Blue genes tended to have difficult calvings. Overall, less than 6% of all Angus cross cows were recorded as having difficult calvings (dystocia score > 200) compared to 20% of Belgian Blue cross cows.

Continental x Holstein-Friesian cows produce progeny with similar carcass weight and value to ¾ or more Continental cows

Fertility

The number of calves born and reared per cow per year is the most important variable affecting biological and economic efficiency of the suckler herd. However, in the current study only 51% of cows had produced another calf by 390 days of their previous calving. The majority of cows which had not re-calved by 390 days remained on farm, and by 720 days post calving, 86% of all cows were recorded as having re-calved (Figure 2). The remaining 14% of cows were most likely removed from the herd. However, the potential distorting effects of European Union Subsidy Payments in place during the data collection period must be considered in the interpretation of this data, and the large price differential between cull and replacement animals in recent years has not encouraged active culling of barren cows.

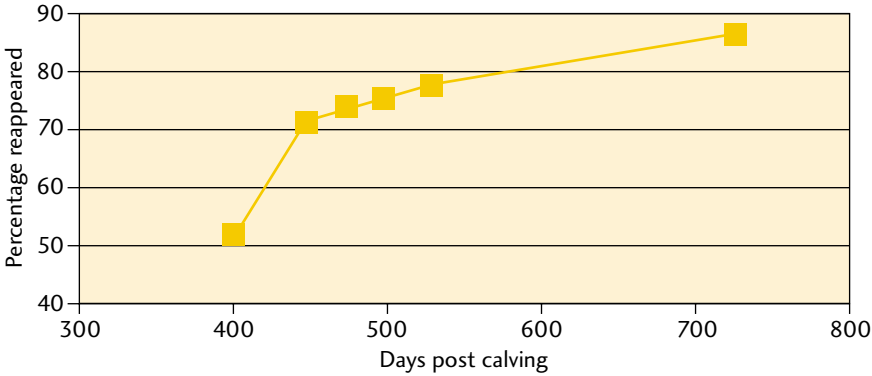

Figure 2 Reappearance of cows over time in the study

Whilst the figure recorded for reappearance rate in the present study (51%) is extremely low, it is suggested that when factors such as culling rate, barren cow rate and length of the breeding season are taken into account, the target reappearance rate by 390 days should be closer to 78% rather than 100%. Consequently, the data from the present study suggest that two-thirds of the maximum possible reappearance rate is being achieved on Northern Ireland beef farms.

Results of the study also provide evidence of lower fertility in pure bred compared to cross bred cows, with reappearance rates of 51 and 21% respectively at 390 days, and 70 and 37% respectively at 450 days post-calving, for cross bred and pure bred cows respectively. This observation reflects the enhancement of fertility due to heterosis, although other non-physiological factors may also influence apparent fertility recorded in pure bred herds. Nevertheless, the data indicate that considerable benefits may be obtained by the continued use of predominantly cross bred cows in Northern Ireland.

(A) Effect of source of cow genotype on suckler herd performance

Traditionally suckler cow replacements were sourced as beef cross heifers from the dairy herd. However, concerns relating to the increasing Holsteinisation of the dairy herd having potential detrimental effects on suckler cow fertility and conformation of the subsequent progeny has reduced the desire by many producers to source replacements from the dairy herd. This has resulted in an increased interest in retaining home-bred beef heifers, particularly from Continental breeds, for use as replacements.

In the analysis of the current results, cows were classified into one of four categories according to whether they originated in the dairy or suckler herds, and whether they consisted of early or late maturing beef genetics, as follows :

i) Early maturing dairy-bred cows (Angus or Hereford x Holstein-Friesian)

ii) Late maturing dairy-bred cows (Continental x Holstein-Friesian)

iii) Early maturing suckler-bred cows (Angus or Hereford x Continental)

iv) ¾ Continental bred cows or greater than ¾ bred Continental

Maternal characteristics

The influence of source of cow genotype on dystocia (calving difficulty) and fertility parameters is presented in Table 2.

Dystocia

Cows of Angus or Hereford x Continental breeding tended to experience fewest calving difficulties. However, differences recorded between the four cow genotype groups were small overall and the practical significance of the range recorded is therefore limited.

Fertility

Source of cow genotype had no effect on reappearance rate at 390 days post calving, indicating a similar level of fertility in the four genotype groups. When assessed at 450 days post calving, only 65% of 3/4 or more Continental cows had produced another calf, lower than that of the other cow genotype groups and indicating poorer fertility with these cows.

Table 2 The influence of source of cow genotype on dystocia and fertility

Cow genotype group	Dystocia score[1]	Reappearance rate (%) at:	
		390 days	450 days
Angus or Hereford x Holstein-Friesian	149	49	70
Continental x Holstein-Friesian	153	49	70
Angus or Hereford x Continental	140	54	75
3/4 Continental or more	151	47	65
Mean	**148**	**50**	**70**

[1] 100 = Unassisted, 500 = Caesarean section

Progeny characteristics

The influence of source of cow genotype on carcass parameters is presented in Table 3.

Carcass weight

Carcass weight differed by only 6 kg between progeny of the four cow groups, with progeny from cows of Angus or Hereford x Holstein-Friesian breeding producing carcasses which tended to be lighter (313 kg) than those of the other cow groups. However, carcass weights of progeny of Continental x Holstein-Friesian and 3/4 or more Continental cows were similar.

Carcass grading

Overall, carcass fat class scores differed by only 0.14 units between progeny of the four cow groups. Highest carcass fat class scores were recorded with progeny of Angus or Hereford x Holstein-Friesian cows, highlighting the earlier maturing nature of these breed types relative to that of the Continental breeds.

Carcass conformation recorded between progeny of the four cow groups differed by only 0.13 units, indicating that differences in progeny conformation due to cow genotype are, on average, relatively minor in practical terms. However, progeny of ¾ or more Continental and Angus or Hereford x Continental cows tended to have better conformed carcasses than progeny of cows with Holstein-Friesian genetics.

Only 67% of progeny of Angus or Hereford x Holstein-Friesian cows achieved the premium conformation grades (grades E, U or R), whereas 74% of progeny from ¾ or more Continental cows achieved these grades.

Carcass value

Carcass value differed by £15 between progeny of the four cow groups, with lowest values being obtained from progeny of Angus or Hereford x Holstein-Friesian cows, reflecting the lighter carcass weights and poorer grading characteristics of progeny of this breed type. However, an important observation was that progeny from Continental x Holstein-Friesian, Angus or Hereford x Continental and ¾ or more Continental cow genotypes produced similar carcass values.

Summary

Differences in source of cow genotype altered carcass value by £15. The use of early maturing beef x Holstein-Friesian cows produced progeny which had lighter, less well conformed carcasses with higher fat classification and lower carcass value than progeny of the other cow genotypes. Continental x Holstein-Friesian cows produced progeny with similar carcass weights and values to those of ¾ or more Continental cows.

Table 3 The effect of source of cow genotype on progeny characteristics

Cow genotype group	Carcass weight (kg)	Carcass fat class[1]	Carcass conformation[2]	Proportion EUR grades	Carcass value (£)[3]
Angus or Hereford x Holstein-Friesian	313	3.03	3.16	67	518
Continental x Holstein-Friesian	319	2.95	3.20	69	531
Angus or Hereford x Continental	315	2.91	3.28	74	528
$^3/_4$ or more Continental	319	2.89	3.29	74	533
Mean	**317**	**2.95**	**3.23**	**71**	**528**

[1] 5 point scale: 1 = leanest, 5 = fattest
[2] EUROP = 5, 4, 3, 2, 1 respectively
[3] based on price-grade structure in Northern Ireland (June 2003)

(B) Individual cow genotype performance

The performance of specific cow genotypes in terms of maternal and progeny characteristics is a further factor of considerable interest to the industry. The effect of ten of the most common cow genotypes on maternal and progeny carcass characteristics are presented in Tables 4 and 5 respectively.

Maternal characteristics

The influence of dam genotype on dystocia (calving difficulty) and fertility parameters is presented in Table 4.

Dystocia
Angus and Limousin cows tended to experience fewest calving difficulties of the genotypes evaluated. Meanwhile, cows with Simmental breeding tended to have a higher incidence of calving problems than other cows.

Fertility
The data indicate a trend for higher reappearance rates at 390 and 450 days with cows recorded as having 50% of each of two breeds, compared to those recorded as 3/4 or more of one particular breed, indicating a potentially greater beneficial effect of heterosis in cross bred (F1) cows. Limousin, Angus, Charolais and Simmental cows tended to have lower reappearance rates at 450 days post calving relative to Simmental x Charolais, Limousin x Simmental, Limousin x Holstein-Friesian and Angus x Holstein-Friesian cows.

Table 4 The influence of cow genotype on dystocia and fertility

Cow genotype	Dystocia score [1]	Reappearance rate (%) at:	
		390 days	450 days
Angus	149	45	66
Limousin	152	46	65
Hereford x Holstein-Friesian	156	54	70
Charolais	159	48	66
Limousin x Holstein-Friesian	159	53	73
Angus x Holstein-Friesian	162	52	73
Simmental x Charolais	162	55	74
Simmental x Holstein-Friesian	164	49	70
Limousin x Simmental	165	55	73
Simmental	168	50	67
Mean	**160**	**51**	**70**

[1] 100 = Unassisted, 500 = Caesarean section

Progeny characteristics

Carcass characteristics of progeny from the cow genotypes are presented in Table 5.

Carcass weight
Overall, carcass weight differed by 17kg between progeny of the ten most common cow genotypes. Limousin x Simmental and Angus x Holstein-Friesian dams tended to produce progeny with lightest carcasses, while progeny of Charolais, Limousin x Holstein-Friesian, Limousin, and Simmental x Charolais cows tended to be heaviest.

Carcass grading
Carcass fat classification differed by 0.24 units between progeny of the ten cow genotypes, with Angus x Holstein-Friesian cows in particular tending to produce progeny with high fat class scores. In contrast, Limousin, Limousin x Simmental, and Charolais cows produced progeny with amongst the lowest carcass fat scores.

Simmental x Holstein-Friesian, Angus, and Hereford x Holstein-Friesian cows produced progeny with amongst the most poorly conformed carcasses. In contrast, progeny of Simmental x Charolais, Limousin, Charolais and Limousin x Holstein-Friesian cows ranked amongst the highest in terms of carcass conformation. Overall, carcass conformation differed by 0.26 units between progeny of the ten cow genotypes.

These differences in conformation resulted in a high proportion of carcasses from progeny of Simmental x Charolais, Limousin, Charolais, and Limousin x Holstein-Friesian cows achieving the premium E, U or R grades, while a much lower proportion of progeny of Simmental x Holstein-Friesian, Angus and Angus x Holstein-Friesian cows achieved these premium grades.

Carcass value
Progeny carcass value varied by £33 between the ten cow genotypes evaluated. The combined influence of high carcass weights and improved carcass grading characteristics, particularly in terms of carcass conformation score, resulted in progeny of Simmental x Charolais and Limousin dams, as well as those of Charolais and Limousin x Holstein-Friesian dams achieving amongst the highest carcass values. In contrast, lowest returns were obtained with progeny of Limousin x Simmental and Angus x Holstein-Friesian cows.

Angus cross cows were easy calved, but progeny carcass quality was poorer

Summary

Cow genotype altered carcass weight and carcass value by 17kg and £33 respectively. Angus x Holstein-Friesian and Limousin x Holstein-Friesian, as well as Limousin x Simmental and Simmental x Charolais cows tended to have highest reappearance rates at 450 days post calving. Furthermore, Limousin x Holstein-Friesian and Simmental x Charolais cows produced progeny with high value carcasses whilst maintaining good reappearance rates. Angus cows ranked favourably for dystocia score but much less favourably for carcass characteristics, while the beneficial effects of incorporating Continental genes in the cow was evident, with progeny of predominantly Continental cows achieving the highest carcass values.

Table 5 Effect of cow genotype on progeny carcass characteristics

Cow genotype	Carcass weight (kg)	Carcass fat class[1]	Carcass conformation[2]	Proportion EUR grades	Carcass value (£)[3]
Limousin x Simmental	309	2.91	3.28	68	518
Angus x Holstein-Friesian	315	3.13	3.25	64	525
Simmental x Holstein-Friesian	318	3.04	3.15	58	531
Hereford x Holstein-Friesian	319	3.05	3.19	66	532
Angus	320	3.08	3.16	63	533
Simmental	320	3.02	3.24	66	537
Charolais	322	2.95	3.35	74	542
Limousin x Holstein-Friesian	322	3.03	3.31	72	540
Limousin	325	2.89	3.37	72	547
Simmental x Charolais	326	3.06	3.41	76	551
Mean	**320**	**3.02**	**3.27**	**68**	**536**

[1] 5 point scale: 1 = leanest, 5 = fattest
[2] EUROP = 5, 4, 3, 2, 1 respectively
[3] based on price-grade structure in Northern Ireland (June 2003)

(C) Effects of cow conformation on dystocia and progeny traits

The effect of cow conformation (irrespective of genotype) on dystocia (calving difficulty) and progeny carcass characteristics was also assessed in the current study. A total of 1379 cows on ten farms, from which progeny carcass data were collated, were assessed for conformation using the EUROP scale. The influence of cow conformation on dystocia and progeny factors is presented in Table 6.

Dystocia scores were similar across the range of cow conformation scores assessed in the study, indicating that more highly conformed cows (up to R grade - the highest cow conformation category recorded in the study) do not increase susceptibility to calving problems relative to less well conformed cows. Cows with higher conformation scores tended to produce progeny with higher carcass weights, though differences recorded were not significant. However, conformation of the progeny improved as dam conformation increased from P to R grades.

Table 6 The effect of cow conformation on dystocia and progeny factors

Cow conformation	Dystocia score	Carcass weight (kg)	Carcass conformation[1]	Carcass value (£)[2]
R	137	319	3.31	533
O+	130	318	3.19	531
O	124	314	3.11	523
O-	130	314	3.06	521
P	138	313	3.06	519
Mean	**132**	**316**	**3.15**	**525**

[1] EUROP = 5, 4, 3, 2, 1 respectively
[2] based on price-grade structure in Northern Ireland (June 2003)

More highly conformed cows produced better quality progeny, irrespective of cow genotype

Summary

The results of the present study indicate that selection of superior female breeding stock, based on a simple visual assessment of conformation, increases the average conformation and carcass value of the next slaughter generation by up to 0.25 units and £14 respectively.

THE INFLUENCE OF BREED OF TERMINAL SIRE ON SUCKLER HERD PERFORMANCE

The breed of terminal sire used in any suckler system is one of the most important management decisions a farmer will make. This reflects the fact that the terminal sire contributes 50% of the total genetic make-up of the progeny, whereas an individual breed contributing to the genotype of a cross bred cow passes a much smaller proportion of its genes to the progeny. Hence, choice of terminal sire can have a major impact on the overall performance and profitability of suckler systems. The influence of breed of terminal sire on maternal characteristics is presented in Tables 7 and 8, and on progeny characteristics in Table 9. Sire breeds evaluated were Angus, Belgian Blue, Blonde d'Aquitaine, Charolais, Limousin, Salers and Simmental.

Maternal characteristics

The influence of sire breed on dystocia (calving difficulty) and fertility parameters is presented in Tables 7 and 8 respectively.

Dystocia

Choice of terminal sire may affect dystocia through effects on the size and shape of the calf at birth.

Table 7 The influence of sire breed on dystocia

Sire breed	Dystocia score[1]
Angus	146
Blonde d'Aquitaine	149
Limousin	150
Charolais	154
Simmental	158
Salers	164
Belgian Blue	169
Mean	**156**

[1] 100 = Unassisted, 500 = Caesarean section

Cows calving to Angus sires tended to experience fewer calving difficulties than those calving to the other main Continental sires which tended to have relatively similar levels of dystocia. However, cows calving to Belgian Blue sires were most difficult to calve, with 19% of Belgian Blue sired calves being recorded as experiencing calving difficulties (dystocia score > 200), compared to only 8% of total calf births.

Fertility

When assessed at 390 days post calving, cows calving to Belgian Blue and Limousin sires ranked lowest for reappearance rates, with only 40 and 44% respectively having produced another calf within this period. Cows calving to the other sire breeds had similar levels of fertility. When assessed at 450 days post calving, reappearance rates showed a similar trend to that recorded between sire breeds at 390 days. However, the benefits to cow fertility from using Angus sires became more pronounced, with 78% of cows having produced another calf within this period.

Table 8 The influence of sire breed on fertility

Sire breed	Reappearance rate (%) at:	
	390 d	450 d
Belgian Blue	40	63
Limousin	44	65
Simmental	47	66
Charolais	50	66
Salers	50	69
Blonde d'Aquitaine	52	75
Angus	53	78
Mean	**48**	**69**

The positive effect of Angus sires on reappearance rate may reflect, in part, the shorter gestation length and lower calf birth weight of the Angus breed relative to many other breeds. In contrast, the poor ranking of cows mated to Belgian Blue sires for reappearance rate may be a reflection of the high levels of dystocia recorded amongst this group. However, it is unclear why the Limousin sire breed resulted in poor reappearance rates, particularly given that this sire breed did not present calving problems and is unlikely to have longer gestation lengths than the other breeds evaluated.

Calf mortality

Sire breed had no effect on calf mortality and overall, approximately 80% of all calf deaths were recorded as occurring within 48 hours of birth.

Breed of terminal sire has a major impact on performance of a suckler herd

Progeny characteristics

The effect of terminal sire on progeny carcass characteristics is presented in Table 9.

Carcass weight
Terminal sire altered progeny carcass weights by 28kg, with use of Angus and Salers sires resulting in progeny with lowest carcass weights of the breeds evaluated. Progeny of Limousin and Simmental sires ranked mid-range for carcass weight, while Charolais and Blonde d'Aquitaine sires produced progeny with amongst the highest carcass weights. However, progeny of Belgian Blue sires had heaviest carcass weights

Carcass grading
Carcass fat class differed by 0.61 units between progeny of the seven sire breeds, much greater than differences recorded between cow genotypes. Progeny of Angus sires were notable in that they had higher fat scores than progeny of all other sire breeds, though use of Salers sires also resulted in progeny with high fat scores, indicating the early maturing characteristics of these breeds. Charolais, Limousin and Simmental terminal sires produced progeny which ranked intermediate for fat scores, while leanest carcasses were those from Blonde d'Aquitaine and Belgian Blue sire breeds.

Overall, sire breed altered carcass conformation by 0.60 units. Salers sires produced progeny with the poorest conformed carcasses, though progeny of Angus sires were also poorly conformed relative to the other breeds. Progeny of Charolais, Blonde d'Aquitaine and Limousin sires had similar conformation scores. Belgian Blue sires were particularly notable in that they produced progeny with higher conformation scores than all other sire breeds.

When evaluated in terms of the proportion of progeny from each sire breed achieving the premium E, U or R conformation grades, progeny of Salers (55%) and Angus (63%) sires ranked lowest. In contrast, a large proportion (83%) of progeny of Belgian Blue sires achieved the premium grades.

Carcass value

The combined effects of differences in carcass weight and carcass grading classifications (fat and conformation) resulted in major differences in carcass value between the progeny of individual sire breeds of up to £62 per animal slaughtered. However, the main determinant of carcass value in the study was carcass weight, such that progeny of Salers and Angus sires achieved lower returns than progeny of the other sire breeds. Progeny of Simmental and Limousin sires realised similar carcass values, both of which were lower than those of Charolais and Blonde d'Aquitaine sires. However, highest value carcasses were those from progeny of Belgian Blue sires.

Influence of current sire bonus schemes on carcass value

At present, progeny of registered pedigree Angus sires receive a bonus payment which varies according to the conformation and fat grades of the carcass at slaughter, subject to carcass weights falling within specified weight bands. The availability of such bonuses is an important aspect to consider when evaluating performance of particular sire breeds, as the financial implications to the producer may be significant. In the present study, re-calculation of carcass values to account for available bonuses increased carcass values of Angus sired progeny to £550, similar to that of progeny of Charolais and Blonde d'Aquitaine sires. This demonstrates the potential financial benefits available to producers using Angus as the terminal sire breed under prevailing conditions.

Progeny carcass value differed by up to £62 between the sire breeds evaluated

Summary

Use of Belgian Blue sires, whilst producing progeny with high carcass weights, conformation scores and financial value, resulted in a high degree of calving difficulty and reduced subsequent cow reappearance rate. However, use of Charolais and Blonde d'Aquitaine terminal sires, while also producing heavy, well-conformed, high value carcasses, did not increase dystocia scores or decrease reappearance rate at 390 days post calving. In contrast, Angus and Salers sires produced progeny which had lighter, fatter, less well conformed, lower valued carcasses. However, Angus sires were favourable in terms of maternal characteristics (dystocia and fertility parameters). Furthermore, the availability of bonus payments for particular breeds (eg. Angus) can have major financial benefits to producers.

Table 9 The influence of terminal sire breed on progeny characteristics

Sire breed	Carcass weight (kg)	Carcass fat class[1]	Carcass conformation[2]	Proportion EUR grades	Carcass value (£)[3]
Angus	306	3.34	3.12	63	505
Salers	307	3.16	2.98	55	504
Limousin	318	2.98	3.34	71	535
Simmental	318	2.99	3.24	65	531
Charolais	324	2.94	3.29	70	544
Blonde d'Aquitaine	327	2.73	3.30	68	550
Belgian Blue	334	2.84	3.58	83	566
Mean	**319**	**3.00**	**3.26**	**68**	**534**

[1] 5 point scale: 1 = leanest, 5 = fattest
[2] EUROP = 5, 4, 3, 2, 1 respectively
[3] based on price-grade structure in Northern Ireland (June 2003)

SUMMARY AND IMPLICATIONS FOR THE INDUSTRY

- The Northern Ireland suckler herd comprises a very diverse range of genotypes. On the 43 farms in the present study, 41 main suckler cow genotypes were identified. Furthermore, 7 terminal sire breeds were used, consequently producing progeny with widely differing carcass characteristics. Eighty-six per cent of carcasses achieved fat class grades 3 and 4L, while 66% were awarded E, U or R conformation grades.

Suckler Cow Genotype

- Dam genotype had no effect on calf survival
- Limousin and Blonde d'Aquitaine dams had poorest temperament
- Fewest calving difficulties were recorded with Angus cross cows, while real problems were identified with use of cows with a high proportion of Belgian Blue genes
- Overall, reappearance rate (cow fertility) was poor, with only 51% of cows producing another calf by 390 days post-calving. However, reappearance rates tended to be higher with cows containing 50% of each of two breeds compared to cows of 3/4 or more of one particular breed. There was no evidence of lower reappearance rates with cows containing Holstein-Friesian genes
- Cows with Angus or Hereford genes, particularly those crossed with Holstein-Friesian, produced progeny with lighter, lower value carcasses, with poorer conformation and higher fat classifications
- Continental x Holstein-Friesian cows produced progeny with similar carcass weight and value to 3/4 or more Continental cows
- Difference in individual cow genotype altered progeny carcass weight and value by up to 17kg and £33 respectively in the study. Limousin x Holstein-Friesian and Simmental x Charolais cows produced progeny with high carcass values whilst maintaining good levels of fertility
- Selection of cows of superior conformation improved progeny carcass conformation and value by up to £14/animal.

Terminal Sire

- Cows calving to Angus sires had favourable dystocia and reappearance, whilst use of Belgian Blue sires resulted in a high incidence of calving problems and reduced subsequent cow reappearance rate
- Breed of terminal sire altered progeny carcass weight and value by up to 28kg and £62 respectively
- Belgian Blue sires produced heavy, well-conformed, high value carcasses
- Charolais and Blonde d'Aquitaine sires produced high value carcasses, whilst having no negative impact on calving difficulty or reappearance rate

- Progeny of Angus and Salers sires were lighter, fatter, less well conformed and had lower valued carcasses than progeny of other sire breeds
- Availability of bonus schemes for particular breeds (eg. Angus) can have a major impact on progeny carcass value

A full scientific report detailing the experimental tests and statistical analysis carried out in the present studies is available from AgriSearch.

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DISCLAIMER

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AGRISEARCH BOOKLETS

1 SHEEP
The Effects of Genetics of Lowland Cross-Bred Ewes and Terminal Sires on Lamb Output and Carcass Quality
Objective: Cross-bred ewes compared in terms of food consumption, prolificacy, lamb conformation.

2 DAIRY
A Comparison of Four Grassland-Based Systems of Milk Production for Winter Calving High Genetic Merit Dairy Cows
Objective: Cost effective methods of feeding high GM cows.

3 DAIRY
Dairy Herd Fertility - Examination of Effects of Increasing Genetic Merit and other Herd Factors on Reproductive Performance
Objective: Establishing on-farm management routines to improve reproductive performance.

4 SHEEP
Developing Low Cost 'Natural-Care' Systems of Sheep Production
Objective: Comparing outdoor/indoor lambing systems in terms of performance and costs, considering shelter and feed strategies.

5 BEEF
An Examination of Factors affecting the Cleanliness of Housed Beef Cattle
Objective: Effects of dietary and housing factors on dirtiness of cattle.

6 BEEF
The Effects of Housing System on Performance, Behaviour and Welfare of Beef Cattle
Objective: To evaluate the welfare, behaviour and performance of beef cattle accommodated on a range of floor types over winter.

7 DAIRY
Developing Improved Heifer Rearing Systems
Objective: Considerations of calving weight and nutrition to improve performance of dairy herd replacements.

8 BEEF
The Influence of Suckler Cow Genetics and Terminal Sire on Performance of the Suckler Herd
Objective: To evaluate the potential of suckler cow and terminal sire genotypes for beef production under Northern Ireland conditions.

For further information or to request a copy of the full scientific report detailing the experimental tests and statistical analysis contact:

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