

EVALUATING UK BEEF BULLS USED IN DAIRY CROSSING FOR CALVING EASE AND CALF QUALITY

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SUMMARY

New procedures have recently introduced in the UK to evaluate beef bulls used to inseminate dairy cows. Univariate threshold model analyses are used to predict the Transmitting Ability for both calving ease and calf quality. These assessments are based on survey data for calving difficulty and calf conformation as recorded in commercial dairy farms, using heritability estimates from within the same data set.

INTRODUCTION

Calving difficulties are a major cost to the dairy herd, through increased risk to the survival of both calf and cow, and through adverse effects on reproductive performance and possibly also production (see Meijering, 1984). Most major dairying countries have introduced procedures for evaluating dairy and sometimes also beef sires (see Renand et al, 1990) for calving ease, so that farmers can choose low risk bulls, especially for use over their heifers. However, both the methods of analysis used, and the form in which results are presented vary between countries.

The UK dairy industry offers a number of individual features as regards calving survey analyses.

(a) There is a high proportion of beef crossing in dairy herds, with a long term average of 40 per cent of inseminations to beef bulls. While the major breeds used were previously the Hereford and the Aberdeen Angus, the dominant breeds are now the Limousin, Belgian Blue and Charolais.

(b) A high proportion of the dairy crossbred calves are sold soon after birth, generally at less than three weeks of age. The Ministry of Agriculture, Fisheries and Food (MAFF) operates a livestock market reporting service covering the major auction centres in England and Wales, and this has shown important price differentials between what it classes as First and Second quality calves at this age. For 1993, the average differential across all breed crosses was £56 sterling. Dairy farmers, intent on maximising returns, should thus be concerned with sire evaluations for calf quality, as well as for calving ease.

(c) Unfortunately, there is as yet no system for the routine recording of calving ease and related calving observations in UK dairy herds. Information is only obtained for test inseminations by commercial breeding organisations, and hence the number of calving observations per herd is very low.

This paper will briefly describe sire evaluation procedures for calving ease and calf quality, recently introduced by Genus in the UK for beef bulls under test in dairy herds. More detailed analyses will be presented elsewhere. Genus was formerly the Farm Services Division of the Milk Marketing Board (MMB). The calf quality assessments are based on calf conformation observations recorded as part of the calving survey.

MATERIALS AND METHODS

Since the 1960s, the MMB, and latterly Genus, have conducted a progeny testing scheme for beef bulls. The first phase of the scheme involves a calving survey on commercial dairy farms, with the aim of obtaining information on a minimum of 200 effective calving records per test bull.

Calving survey

Shortly before the expected date of calving, dairy farmers who have used test semen in their herds are sent a calving survey form. This requests information on insemination and calving dates, the age of the cow, the number of calves born and their sex, whether the calving was induced, and whether the calf was alive 48 hours after birth.

Information is also recorded on five traits for which bulls are then evaluated - gestation length, calving ease, calf mortality, calf size and conformation. Only the analyses on calving ease and calf conformation will be discussed here.

For calving ease, three categories were possible, No Difficulty (1), Slight Difficulty (2), or Serious Difficulty (3). Since 1989 they were also asked to specifically note caesarean deliveries, but these have been included with the serious difficulties in these analyses. For calf conformation, farmers were asked to grade the calf as Above average (1), Average (2), or Below average (3).

Data

Data were available from 1982 onwards, although only from 1989 are they complete. Prior to analysis, the data were screened to eliminate records for cows that were not Holstein Friesians, and from twin or induced births. In addition, records that had gestations that were more than 15 days, approximately three standard deviations (Philipsson, 1976), away from the modal value for each breed*sex*cow age subclass were also excluded.

After these exclusions, a total of 88135 calving records on 323 sires were analysed at the end of 1993. These represented calvings from eight sire breeds, namely Aberdeen Angus (2886 records, 12 sires), Belgian Blue (5391 records, 24 sires), Blonde d'Aquitaine (2271 records, 8 sires), Charolais (25810 records, 105 sires), Hereford (30070 records, 93 sires), Limousin (15420 records, 55 sires), Piedmontese (2423 records, 7 sires), and Simmental (3864 records, 19 sires).

Based on the whole data set, the incidence of calving with no difficulty was 75%, with 21.6% showing Slight Difficulty and 2.9% with Serious Difficulty. As regards calf conformation, 33.4% of calves were considered Above Average, 61.2% were Average and 5.3% were Below Average.

Statistical Analysis

The majority of analyses used the statistical package REG (Gilmour, 1992). Analyses were undertaken initially on the observed scores to identify major non-genetic sources of variation, and then repeated using a threshold model analysis, assuming an underlying normal distribution of liability. The final model fitted for both calving ease and conformation, both to predict genetic parameters and estimate sire genetic merit, included the effects of sire breed, a year*season effect, with two seasons per year, linear regressions on month of calving within each season, age of cow (heifer or adult), sex of calf, and the breed*sex, breed*age of cow, and sex*age of cow interactions. Heritability and correlation estimates for observed scores were also obtained using the REML programs of Meyer (1986).

RESULTS

Both sex and cow age effects were significant, for both calving ease and calf conformation ($P < .05$). Calving difficulty was greater for male calves than females, and for heifers rather than adult cows. Conversely, male calves lower conformation scores (i.e. better conformation) than female calves, while conformation was also better for calves from adult cows rather than from heifers.

Breed effects were significant for both calving ease and calf conformation ($P < .05$). These differences were still significant when sire effects were absorbed within breeds. Higher levels of difficult calvings were observed for sire breeds such as the Charolais, Blonde d'Aquitaine and Simmental, than for the Hereford and Aberdeen Angus. However, these continental breeds also produced calves with better than average conformation.

Heritability estimates on the observed scale and for the threshold model analyses are summarised in Table 1. Heritability estimates on the underlying scale were broadly similar for the different data sets, and were approximately twice as high for calving ease as for conformation.

Table 1: Heritability estimates for Calving ease and Calf conformation.

Data Set	Calving Ease		Conformation	
	Threshold	Observed	Threshold	Observed
Charolais	0.20	0.11	0.08	0.04
Limousin	0.09	0.04	0.12	0.08
Hereford	0.15	0.07	0.07	0.05
All Breeds	0.15	0.09	0.08	0.06

Correlations between calving ease and calf conformation were negative, i.e. bulls which produced few difficult calvings tended to have calves with poor conformation. For the full data set, the phenotypic correlation was -0.16, and the genetic -0.72.

The genetic merit of each bull for both calving ease and calf conformation was predicted as a Transmitting Ability, from univariate analyses which used the All Breeds heritability estimates. For calving ease, separate predictions are made for the expected incidence of difficult calvings for heifers or cows, using the population threshold for difficult calvings, plus the breed and sire deviations on the underlying scale, plus the heifer or cow deviations as appropriate. A similar procedure is used to predict the incidence of First Quality calves, using the calf conformation results. However, no distinction is made here between heifer and adult calvings, and the breed incidences of first and second quality calves, and hence the breed threshold value, was taken from the MAFF national market summary, rather than from within the analysis itself.

DISCUSSION

The procedures described here were developed so that dairy farmers had sire information available on both calving ease and calf quality, both of which affect returns. Providing information on both traits was also considered important because of their antagonistic relationship, such that simply choosing an easy calving sire is likely to produce poorer quality calves. This is an important consequence, given the perception in the UK that the quality of beef from the dairy herd has declined, because of the impact of the North American type Holstein.

The attractive features of these newly implemented procedures include the fact that the predictions are made using heritability estimates obtained within this data set, and that the results for each bull, giving predicted levels of difficult calvings or of First Quality calves, are in a form which farmers and sales staff can easily understand. In addition, the processing of the data is straightforward, with the monthly analysis of the total data set, including vetting of new records, the prediction of sire genetic merit, and the presentation of the results for selection and marketing purposes, taking less than half a day.

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