Udder Quality is Moderately Heritable in Hereford Cattle

H.L. Bradford, D.W. Moser, J.M. Bormann, and R.L. Weaber

Introduction

Udder quality is an important factor related to cow longevity and calf performance. Cows with tighter udder suspension and smaller teats tend to have greater longevity. When cows stay in the herd longer, fewer replacement heifers need to be developed to maintain herd size. Pendulous, poorly suspended udders and large teats are difficult for newborn calves to nurse, and additional labor might be required to assist those calves. Cows with poor udder quality can have increased calf mortality because the calf struggles to nurse and consumes colostrum later. Because many beef producers sell calves by the pound at weaning, poor udder quality can have a negative impact on profit.

The dairy industry has selected for udder quality for many years. Udder traits are generally moderately heritable in dairy cattle, but limited research has been done in beef cattle. Beef producers would benefit from genetic selection tools for improving udder quality, especially for herds where udder quality affects calf performance.

Our objective was to estimate the heritabilities and genetic correlations for udder quality traits in Hereford cattle. American Hereford Association members have been reporting udder scores for a number of years. The American Hereford Association initially began collecting an overall udder score, which combined all udder characteristics into a single score. In 2008, the Beef Improvement Federation developed udder scoring guidelines, including scores for both udder suspension and teat size. By August 2008, the American Hereford Association began using these new guidelines and collected udder suspension and teat size scores instead of the overall scores. All scores were recorded on a 1 to 9 scale, with scores of 9 considered ideal. Cows are scored at calving and could have multiple records throughout their lifetimes.

Experimental Procedures

Data were obtained from the American Hereford Association and included overall score, suspension, and teat size records along with a three-generation pedigree. A summary of udder quality data used is presented in Table 1. Records were for females ages 2 to 15 at parturition and scored since 2004. A multiple-trait animal model with random effects of additive genetic and permanent environment and fixed effects of cow age and contemporary group was used. Contemporary group was the combination of herd, calving year, and calving season.

Results and Discussion

The mean udder scores and variability for the traits are shown in Table 2. The heritabilities were 0.32 ± 0.01 for overall score, 0.31 ± 0.01 for suspension, and 0.28 ± 0.01 for teat size. All traits were moderately heritable, meaning progress can be made through genetic selection.

Genetic correlations between traits were 0.72 ± 0.02 for overall score and teat size, 0.70 ± 0.02 for overall score and suspension, and 0.83 ± 0.01 for suspension and teat size. The genetic correlations are all strong and positive; thus, selection for one trait should result in improvement in the other two traits as well. These results are consistent with previous research in beef cattle.

The genetic trend for suspension and teat size is displayed in Figure 1. There was little genetic change until 1990, but steady genetic improvement has occurred since then in both suspension and teat size as a result of phenotypic selection.

Implications
Udder quality was moderately heritable, with strong genetic correlations between udder traits, which means producers can use genetic selection to improve udder quality.

Acknowledgements
The authors thank the American Hereford Association for providing the data used in this study.

Table 1. Summary of udder quality data used in the analysis

Item	Number
Overall score	
Records	126,753
Animals	58,805
Suspension	
Records	61,765
Animals	33,299
Teat size	
Records	61,753
Animals	33,293
Total records	188,524
Contemporary groups	3,079
Pedigree animals	196,540

Table 2. Descriptive statistics for udder scores[1]

Trait	Mean	Standard deviation
Overall score	7.25	1.44
Suspension	7.25	1.36
Teat size	7.06	1.43

[1] Overall score (1 = least desirable; 9 = most desirable); teat size (1 = very large, balloon-shaped; 9 = very small); udder suspension (1 = very undesireable, pendulous; 9 = very tight).
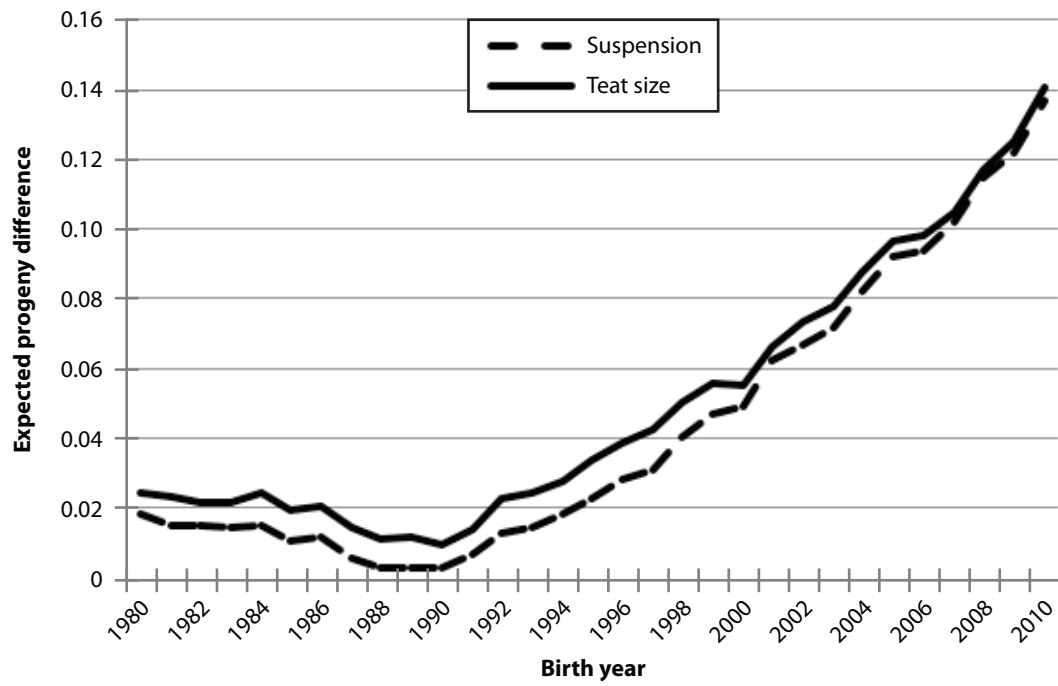
Figure 1. Genetic trend for udder traits in Hereford cattle.