At the recent Kansas State University Cattlemen’s Day, Heather Bradford and Dan Moser shared their research findings regarding udder quality. Here are highlights of their report:

Udder quality is an important trait for beef producers because udders affect cow longevity and calf performance. The objective was to estimate the genetic parameters for udder quality in Hereford cattle.

The Beef Improvement Federation (BIF) recommends collecting subjective scores on udder suspension and teat size. Jack Ward, chief operating officer and director of breed improvement, can be reached at jward@hereford.org.

### Genetic Parameters for Udder Quality

#### Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Trait</th>
<th>n</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Score</td>
<td>126,753</td>
<td>7.25</td>
<td>1.44</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Suspension</td>
<td>61,758</td>
<td>7.25</td>
<td>1.36</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Teat Size</td>
<td>61,765</td>
<td>7.06</td>
<td>1.43</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Distribution of udder scores

- **Measurement**
  - BIF recommends scoring udder suspension and teat size (BIF, 2010).
  - Suspension quantifies the support and attachment of the udder.
  - Teat size measures both teat length and diameter.
  - AHA collected overall udder scores prior to the BIF recommendations.
  - Overall score combines suspension and teat size into a single score.
  - Scores should be recorded at calving by a single evaluator within a herd.
  - Scores range from 1 to 9 with scores of 9 being most desirable.

- **Methods**
  - Data prior to August 2008 were recorded as an overall score.
  - Data after August 2008 were recorded as suspension and teat size.
  - Records since 2004 were used in the analysis.
  - Contemporary group was the combination of herd, calving year and calving season (spring or fall).
  - Contemporary groups with less than 25 head were removed from the data.
  - AHA provided 188,524 records on 78,556 animals.
  - AHA also provided three-generation pedigree with 196,540 animals.
  - Data were modeled using fixed effects of contemporary group and age.
  - Modeling also included random effects of additive genetic and permanent environment.
  - Variances were estimated with ASREML 3.0.

#### Poster facts

**Introduction**
- No U.S. beef breed association currently publishes udder quality expected progeny differences (EPDs).
- Breeders can use only phenotypic selection to improve udder quality.
- Dairy producers have selected effectively for udder quality.

**Cow longevity**
- Udder quality continuously decreases with increasing age.
- 20% of cows over 6 were culled for udder problems (Arthur et al., 1992).
- Udder quality is positively correlated with productive life.

**Calf performance**
- Large teats and loose suspension were linked to increased labor cost, increased calf mortality and decreased pre-weaning weight gain (Wythe, 1970; Frische, 1982; Sapp et al., 2004).
- Cows with small teats and tight udders did not produce enough milk to support a calf’s genetic potential for growth (Sapp et al., 2004).
Prior to these guidelines, the American Hereford Association (AHA) recorded an overall score, which combines all udder characteristics into a single score. In all cases, scores ranged from 1 to 9 with a score of 9 considered ideal. Records on 78,556 animals and a 3-generation pedigree with 196,540 animals were obtained from the AHA. These records contained repeated observations for overall score (n=126,753), suspension (n=61,758) and teat size (n=61,765). Data were modeled using a multiple-trait animal mixed model with random effects of additive genetic and permanent environment and with fixed effects of age and contemporary group (herd-year-season). Variances were estimated with ASREML 3.0.

Heritability (standard error) of overall score, suspension and teat size was 0.32 (0.01), 0.31 (0.01) and 0.28 (0.01) respectively. These results show udder quality is moderately heritable, agreeing with previous research. The phenotypic correlation (standard error) between teat size and suspension, overall score and teat size, and overall score and suspension was 0.64 (0.00), 0.31 (0.01) and 0.31 (0.01) respectively.

Of the records for suspension and teat size, 57% had the same score for both traits. The genetic correlation (standard error) between teat size and suspension, overall score and teat size, and overall score and suspension was 0.83 (0.01), 0.72 (0.02) and 0.70 (0.02) respectively. The genetic correlations between traits were extremely strong, indicating that these records were different measures of the same trait. Collecting data for the two strongly correlated traits may have been unnecessary because submitting a single score was easier for breeders. 

### BIF suspension and teat size scoring system

<table>
<thead>
<tr>
<th>Score</th>
<th>Udder Suspension Description</th>
<th>Teat Size Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Very tight</td>
<td>Very small</td>
</tr>
<tr>
<td>7</td>
<td>Tight</td>
<td>Small</td>
</tr>
<tr>
<td>5</td>
<td>Intermediate/moderate</td>
<td>Intermediate/moderate</td>
</tr>
<tr>
<td>3</td>
<td>Pendulous</td>
<td>Large</td>
</tr>
<tr>
<td>1</td>
<td>Very pendulous, broken floor</td>
<td>Very large, balloon-shaped</td>
</tr>
</tbody>
</table>