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**BREED EVALUATION FOR EFFICIENCY OF FEED  
UTILIZATION FOR FIRST CALF PRODUCTION**

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Summary

Individual feed intake was measured in drylot on first-calf females for a 1-year period through weaning of their first calf. Dam breeds included crossbred Simmental-Hereford, Angus-Hereford, Salers-Hereford and Tarentaise-Hereford produced in two-breed rotations and straightbred Hereford. Cow weights were heaviest for Simmental-Hereford and lowest for Tarentaise-Hereford and straightbred Hereford. Calf weaning weights were heaviest for Simmental-Hereford and lightest for straightbred Hereford and Angus-Hereford. Intake of cow feed TDN was highest for Simmental-Hereford cows and lowest for Tarentaise-Hereford and straightbred Hereford. Breed group rankings for total cow feed and calf creep feed TDN intake were the same as rankings for cow TDN intake. Efficiency of feed utilization was calculated as total TDN consumed by the cow and calf during the year divided by calf weaning weight. Breed group averages for efficiency ranged from 12.8 lb TDN/lb calf weaning weight for Tarentaise-Hereford to 13.8 lb TDN/lb calf weaning weight for Angus-Hereford. A large amount of variation among individual cows for the efficiency ratio was noted. These results indicate some differences among breed types for efficiency of feed utilization for first calf production, although variation among individuals was also important.

(Key Words: Beef Cows, Breed Evaluation, Efficiency.)

Introduction

Because of the low reproductive rate of the cow compared to competing meat species, maintenance of the breeding herd comprises a major portion the total feed energy required to produce edible beef. Approximately 65 to 75% of the total feed energy utilized for beef production is used by the cow herd. Because cow feed represents such a large overhead to cost of production, it is important to identify and evaluate factors potentially affecting efficiency of feed utilization by the cow herd. Data used in the present study were obtained from a project designed to evaluate genetic aspects of efficiency of feed utilization by beef cattle. The objective of the present study was to characterize dam breed types for efficiency of feed utilization for first calf production.

Materials and Methods

First-calf females and their calves were maintained in a drylot management system where individual feed intake could be measured. Pregnant heifers were placed in the drylot in October at an average age of 1.6 years. Each heifer remained in the drylot 1 year, through weaning of her first calf the following October. A different group of females were evaluated each year over a 7-year period. Breed types evaluated included crossbred Angus-Hereford, Simmental-Hereford, Tarentaise-Hereford and Salers-Hereford produced in rotational crossbreeding systems and straightbred Hereford.

Under the drylot management system, cows were placed in individual feeding stalls twice daily and provided limited amounts of pelleted hay, chopped hay and grain. Feeding levels were adjusted for each individual at 28-day intervals to provide gains assumed to be desirable for typical replacement female development and to provide acceptable rebreeding performance. Calves were allowed overnight access to individual creep feeders with intent to replace forage which calves would have consumed under pasture conditions. Feed energy intake was

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expressed as pounds of total digestible nutrients (TDN). To prevent cross-nursing, calves were kept separate from their dams, except when cows were in their individual feeding stalls.

### Results and Discussion

Straightbred Hereford and crossbred Salers-Hereford were included in only 3 years of the study, so numbers of cow-calf pairs for these breed groups were considerably fewer than for other breed groups. Tarentaise-Hereford were included in 5 years of the study, while Simmental-Hereford and Angus-Hereford crosses were included in all seven years. For most traits evaluated, breed group means were adjusted for differences in calf sex, age of calf, year to year variation and sire of the calf. Only 2-year-old cows were evaluated in this particular study, so weaning weights were not adjusted for age of dam.

Cow weights are presented by dam breed group in Table 1. Cow weights at calving and at weaning were heaviest for Simmental-Hereford, intermediate for Angus-Hereford and Salers-Hereford and lowest for Tarentaise-Hereford and straightbred Hereford.

TABLE 1. RAW MEANS FOR COW AGE AT CALVING AND LEAST-SQUARES MEANS FOR COW WEIGHT AT CALVING AND COW WEIGHT AT WEANING

Dam breed group	No. of cow-calf pairs	Cow age at calving, days	Cow weight at calving, lb	Cow weight at weaning lb
Hereford	23	758	897 ± 32.4 <sup>c</sup>	994 ± 29.8 <sup>c</sup>
Simmental-Hereford	119	732	1010 ± 23.8 <sup>a</sup>	1087 ± 23.9 <sup>a</sup>
Angus-Hereford	138	736	958 ± 23.7 <sup>b</sup>	1044 ± 23.8 <sup>b</sup>
Salers-Hereford	25	716	954 ± 32.1 <sup>bc</sup>	1038 ± 29.2 <sup>bc</sup>
Tarentaise-Hereford	62	728	922 ± 27.2 <sup>c</sup>	1002 ± 25.9 <sup>c</sup>

a,b,c Means in the same column not sharing a common superscript differ (P<.05).

Calf weaning weight, TDN intake of cow and calf and efficiency of TDN utilization are presented by dam breed group in Table 2. Calves from Simmental-Hereford cows were heaviest at weaning, although the difference between this group and the Tarentaise-Hereford group was not statistically significant. Calves from straightbred Hereford and Angus-Hereford cows had the lightest average weaning weights, although not significantly lighter than calves from Salers-Hereford cows.

Intake of calf creep feed TDN by calves from Salers-Hereford cows averaged 241 lb per calf. Intake of creep feed TDN did not vary significantly among the other breed groups, averaging 284 lb. Intake of cow feed TDN was significantly higher for Simmental-Hereford cows (averaged 5754 lb per cow for the year) than for all other breed groups, reflecting the higher weights and milk production of Simmental-Hereford. Intake of cow feed TDN was intermediate for Salers-Hereford and Angus-Hereford cows and lowest for Tarentaise-Hereford and straightbred Hereford. Breed group rankings for total cow and calf TDN intake were the same as rankings for cow TDN intake.

Neither calf weight nor calf weight/cow weight are necessarily good indicators of efficiency. Efficiency of feed utilization was calculated as total TDN consumed by the cow and calf during the year divided by calf weaning weight. Tarentaise-Hereford cows and their calves consumed an average of 12.8 lb TDN per lb of calf weaning weight. This average was significantly less than averages of all other groups except straightbred Hereford. Differences among breed group averages for straightbred Hereford, Salers-Hereford and Angus-Hereford were not statistically significant. When large numbers of animals are included, a relatively smaller difference is required for statistical significance. The Simmental-Hereford group average (13.4) was significantly different from the Angus-Hereford group average (13.8), even though a similar difference between straightbred Hereford and Angus-Hereford was not statistically significant.

TABLE 2. LEAST-SQUARES MEANS FOR CALF WEANING WEIGHT, COW AND CALF TDN INTAKE AND EFFICIENCY

Dam breed group	Calf weaning weight, lb	Calf creep feed TDN, lb	Cow feed TDN, lb	Total cow and calf TDN, lb	Efficiency lb/lb <sup>a</sup>
Hereford	424±13.8 <sup>cd</sup>	285±14.5 <sup>b</sup>	5348±86 <sup>d</sup>	5628±89 <sup>de</sup>	13.3±.42 <sup>bcd</sup>
Simmental-Hereford	458± 8.1 <sup>b</sup>	287± 7.9 <sup>b</sup>	5754±41 <sup>b</sup>	6038±43 <sup>b</sup>	13.4±.28 <sup>c</sup>
Angus-Hereford	424± 8.0 <sup>d</sup>	284± 7.9 <sup>b</sup>	5479±40 <sup>c</sup>	5763±42 <sup>ce</sup>	13.8±.28 <sup>d</sup>
Salers-Hereford	433±13.2 <sup>cd</sup>	241±13.6 <sup>c</sup>	5599±83 <sup>c</sup>	5840±85 <sup>c</sup>	13.5±.40 <sup>cd</sup>
Tarentaise-Hereford	443±10.2 <sup>bc</sup>	278±10.3 <sup>b</sup>	5356±60 <sup>d</sup>	5635±61 <sup>d</sup>	12.8±.33 <sup>b</sup>

<sup>a</sup> Efficiency = (total cow and calf TDN)/calf weaning weight.  
<sup>b,c,d</sup> Means in the same column not sharing a common superscript differ (P<.05).

While comparison of breeds is of interest, it is also important to recognize the wide variation among individual cows for efficiency of feed utilization. Cow efficiency ratio ranged from 10.4 to 19.3 lb TDN per lb calf weight weaned in this analysis. Of the 367 cow-calf pairs evaluated, 36 pairs had efficiency ratios of 11.5 or less, while 34 pairs had efficiency ratios of 16 or greater. A cow with an efficiency ratio of 16 would require the energy equivalent of over 2 tons of typical quality hay more than a cow with an efficiency ratio of 11.5 to supply the energy required to produce 500 lb of calf weaning weight. These figures indicate the potential usefulness of developing methods of predicting, at a young age, relative differences among heifers for future efficiency. Prediction formulas based on cow and calf weights at weaning have been developed, but use of these formulas requires that the cow has already weaned a calf.

These results indicate some differences among breed types for efficiency of feed utilization for first calf production, although variation among individuals is even more important. While efficiency in this paper refers to conversion of feed energy to calf weaning weight, it should be noted that evaluation of dam breed types for overall value should be based on additional factors including reproductive performance and calf price.