Table 11. Average change in trait per year for the Oklahoma National Barrow Show Performance Contest

Breed	ADG	% Ham	LEA	BF	Lgth
	lb	%	sq. in.	in.	in.
Duroc	.004	.146	−.436*	−.043	.460
Hampshire	.038	.127	−.413	−.045	.276
Crossbred	.026	.115	−.420	−.039	.412
Overall avg	.023	.130	−.423*	−.042	.383**

*Avg change per test is significantly different from zero, P<.05.
**Avg change per test is significantly different from zero, P<.01.

Preliminary Development of Yield Grade and Dressing Percentage Prediction Equations for Beef Steers

L. E. Walters and R. L. Hintz

Story in Brief

Equations to predict yield grade and dressing percentage from average daily gain, days on feed and final weight information for beef steers were developed. The equations could serve as a tool to help determine when to slaughter a pen of cattle to achieve the desired yield grade and/or dressing percentage. When tested against a small amount of data, the yield grade equation did a reasonable job in predicting yield grade. On the average, the predicted yield grade was within .13 of the actual yield grade values. However, both equations need further testing and examination to assess their accuracy.

Introduction

There has been an increased demand for leaner beef. The amount of lean beef from an animal may be indicated by the animal's yield grade and/or dressing percentage. Thus, identification of variables in beef production that influence yield grade and dressing percentage would be useful in producing leaner beef with higher cutability. The animals and time involved in conducting experiments to obtain data so that prediction equations for yield grade and dressing percentage can be developed are costly. Another approach is to assimilate data which have already been reported to establish mathematical relationships among variables influencing yield grade and dressing percentage. The purpose of this report is to present equations for predicting yield grade and dressing percentage.

Materials and Methods

The approach in this study was to use data reported by the U.S. Meat Animal Research Center (MARC)[1] to develop prediction equations for yield grade and dressing percentage. The dressing percentage reported in the MARC data was equal to hot

[1]Cattle Germ Plasm Evaluation Program Progress Reports 1-5, 1974-1977, U.S. Meat Animal Research Center, U.S.D.A., Clay Center, Nebraska.

carcass weight divided by final weight on feed and water (without shrink). The steers in these MARC studies were placed on feed at weaning. Breed, final weight, days on feed and average daily gain were used to develop prediction equations for yield grade and dressing percentage. Independent data other than the MARC data were used to test the accuracy of the yield grade prediction equation.

Results and Discussion

The following equation is the average of equations developed for Angus, Hereford and Hereford-Angus cross steers:

$$\text{Yield grade} = -7.1527 + .0068 \times \text{DAY} - .000237 \times \text{DAY}^2 + .000000263 \times \text{DAY}^3 + .0042 \times \text{FWT} + .2257 \times \text{ADG}$$

DAY = days on feed.
FWT = final weight.
ADG = average daily gain.

The predicted yield grades agree with reported values (Table 1). Based on these preliminary data, on the average, the predicted yield grade values were found to deviate from actual values by 0.13 yield grade.

The following equation is the average of equations developed for Angus, Hereford and Hereford-Angus cross steers:

$$\text{Dressing percentage} = 52.0903 - .0102 \times \text{DAY} + .0000269 \times \text{DAY}^2 - .00000008 \times \text{DAY}^3 + .0123 \times \text{FWT} - .7741 \times \text{ADG}$$

DAY = days on feed.
FWT = final weight.
ADG = average daily gain.

The equation explained 60 percent of the variation in dressing percentage.

The usefulness of these equations can best be explained with an illustration using hypothetical data. Suppose we purchase a pen of Angus, Hereford and/or Hereford-Angus cross steers weighing 700 lb with 4 percent shipping shrink and put them on feed. After 84 days on feed with an average daily gain of 3.26 lb, these steers will weigh about 946 lb. The predicted average yield grade and dressing percentage are 1.6 and 60.5, respectively (Table 2). We can use the equations to estimate the expected yield grade and dressing percentage if the cattle were slaughtered after longer feeding periods. Therefore, the equations serve as a tool to help determine when to slaughter a pen of cattle to achieve the desired yield grade and/or dressing percentage.

The accuracy of the yield grade equation only has been tested against a small amount of data (Table 1). Both equations need to be tested with several independent data sets to determine their accuracy and limitations. Further research in this area will hopefully refine and improve these prediction equations.

Table 1. Predicted vs. reported yield grade on Hereford steers

Data source	Days on feed	Final weight	Average daily gain	Yield grade	Predicted yield value
(2)[a]	112	1103	3.29	3.1	2.9
	112	1065	3.66	3.1	2.9
	112	1061	3.22	2.6	2.7
(3)[b]	237	975	2.34	3.3	3.3

[a]W. L. Braman, J. Anim. Sci., 1973, 37:1010.
[b]L. L. Wilson, J. Anim. Sci., 1963, 22:699.

Table 2. Predicted yield grade and dressing percentage from hypothetical data on Angus, Hereford and Hereford-Angus cross steers

Hypothetical data			Predicted	
Days on feed	Average daily gain (lb)	Final weights (lb)	Dressing percentage	Yield grade
84	3.26	946	60.5	1.6
112	3.19	1029	61.4	2.8
140	3.09	1105	62.2	3.6
168	2.98	1173	62.9	4.2
181	2.92	1201	63.2	4.4

The Growth of Three Fiber Types in Beef Longissimus Muscle as Influenced by Breed and Age

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Story in Brief

Changes in the areas of α-white, α-red and β-red fibers from the Longissimus dorsi muscles of Angus and Charolais calves slaughtered at 25, 240 and 650 days of age were determined. At 25 days all three fiber types from the Angus calves were notably larger than those from the Charolais. This size difference was maintained throughout the growing periods. For the α-white fibers, however, the breed difference lessened with increased age. In the Angus, the β-red fibers were slightly larger at 25 days than the α-reds; yet as the growing period was extended, the α-reds became significantly larger than the β-reds. These findings may explain how the musculature of beef animals maintains its increased energy need during growth. There was a progressive increase, favoring the Charolais, in percent fiber area, the α-reds of both breeds showing the greatest percent increase. The α-white fibers of the Charolais had a greater net increase per day, suggesting a faster overall muscle growth rate for this breed. During the latter part of the growth phase (240 to 650 days), the β-red fibers of the Angus enlarged at a significantly faster rate per day, which could be related to the Angus' capacity to "marble."

Introduction

The ultimate muscle size or mass in beef animals may be due largely to the extent of radial growth or increase in area of the basic structural units of muscle, the individual muscle fibers.

Beef muscle is not uniform in its fiber composition; rather, it is believed to contain a heterogenous mixture of at least three types of fibers, which may be distinguished by their different metabolic characteristics. Research data to determine the influence of breed type on the extent and rate of enlargement of the different muscle fiber types during growth is limited. Thus, the present study was conducted to evaluate changes occurring in the size of three types of muscle fibers, α-white, α-red and β-red, taken from the Longissimus dorsi of Angus and Charolais calves at three stages of maturity.