

Real-time Ultrasound Trait Age Adjustment Factors for Replacement Angus Heifers

A.S. Leaflet R1627

Doyle E. Wilson, professor of animal science,
Gene H. Rouse, professor of animal science, and
Craig Hays, centralized processing manager

Summary

Real-time ultrasound (RTU) images from replacement Angus heifers were analyzed to determine adjustment factors and genetic parameter estimates. The traits analyzed included ribeye area, 12-13th rib fat thickness, rump fat thickness, and % intramuscular fat. Adjustments were calculated for heifers averaging 805 lbs at time of scanning. The adjustments include age adjustment and weight per day of age adjustment factors.

Introduction

This report summarizes an analysis of the real-time ultrasound images that were collected during the first year of the American Angus Association Centralized Ultrasound Processing (AAACUP) research project. This is a two-year project, ending December 30, 1999. The objectives of this project include:

- (1) Developing a centralized processing center for expedient and quality controlled interpretation of real-time ultrasound (RTU) images collected from Angus yearling seed stock animals (bulls and heifers) and from Angus-sired steers involved in progeny testing programs with the American Angus Association, and
- (2) Developing the structure that will allow for transitioning of the centralized processing center into an industry-operated organization that meets the objectives and criteria for beef cattle performance and carcass improvement programs.

There were 12 technicians that participated with ISU and the American Angus Association (AAA) in the collection of RTU images primarily from yearling bulls, replacement heifers, feedlot steers and feedlot heifers. Body composition measurements from these and future RTU images will be used by AAA to generate expected progeny differences (EPD) for carcass traits. The purpose of this paper is to summarize the actual measurements and adjustment factors derived from the replacement heifer RTU images.

Methods and Materials

Description of Data

All of the images collected by the technician are stored on a ZIP™ disk and then sent to the AAACUP laboratory, Room 42, Kildee Hall, Iowa State University, Ames, IA. The technician is required to collect a rump fat image, a 12-13th rib cross-sectional image and four images of the *longissimus dorsi* muscle that include the 11, 12 and 13th ribs for each animal scanned. Upon receipt by the laboratory, ISU technicians make a rump fat thickness measurement (RUMP), a 12-13th rib fat thickness measurement (FAT), a ribeye area (REA) measurement and a % intramuscular fat measurement (%IMF) from the images. The technician also sends a barn sheet with the images. This barn sheet contains the individual animal identification and other information required for contemporary grouping. AAACUP personnel merge the measurements for each animal with the barn sheet information, and they then electronically forward the combined set of information to AAA for further processing. Breeders receive the actual ultrasound measures, age-adjusted measurements and contemporary group ratios from the AAA. All images collected in 1998 were with the Aloka 500 and a 17cm transducer. All of the RTU measurements were made using ISU developed software.

There were 1,276 RTU measurements made on replacement heifers available for use in this analysis. The summary statistics are given in Table 1 for heifer age, weight, weight per day of age (WDA), and RTU measurements. The weight measurement was recorded at time of scanning or within \pm seven days of when the scanning was done. The WDA trait was computed using the weight measurement divided by the age of the animal in days.

Statistical Analysis

General linear model procedures were used to develop regression formulas that could be used to adjust all of the records to a common end point. Both regressions on age and on weight/day of age were developed. Each model included a herd-year-season fixed effect and a covariate for either age or weight/day of age. The herd-year-season effect was defined as American Angus Association breeder code and lot scanning date. The lot scanning date is a contemporary group identification that could include groups of animals scanned on different but consecutive dates.

Both linear and linear-quadratic age effects were fitted for each of the traits. The quadratic effect was significant only for ribeye area ($Pr > F .08$); however, the model R^2

1999 Beef Research Report — Iowa State University

value remained unchanged at .60 when including an age quadratic effect for ribeye area. Only the linear regression model results are presented in Table 2.

Results and Discussion

The linear model estimates for age and WDA are presented in Table 2. Both regressions accounted for essentially the same amount of variation. It is important to point out that age regression models for the RTU traits being measured would be best fit using within-individual animal regressions rather than pooling the data as was done in this study. However, this does require serial scans (30 day intervals over a period of 60-90 days) on each animal. It would be hard for breeders to justify this added expense and time.

Implications

Scanning replacement heifers just prior to breeding could be a very important management tool for breeders. Extremely small ribeye heifers could be candidates for culling. Also, heifers with little external fat could be candidates for culling because low amounts of fat cover could indicate problems in fertility. Earlier scanning (3 mos. prior to breeding) of heifers could be used to check progress of development relative to body condition and the need to adjust ration energy levels, either up or down.

Acknowledgments

The authors gratefully acknowledge the American Angus Association for their financial support of this project. The authors also gratefully acknowledge the AAACUP field and lab technicians that made this program a success in 1998.

Table 1. Summary statistics for 671 Angus replacement heifers scanned in 1998 as a part of the AAACUP research project.

Trait	Mean	SD	Low	High
Age, days	395	50	250	607
Weight, lbs	805	125	425	1255
Weight/day of age, lbs/day	2.04	.25	1.45	3.36
Rump fat, in.	.26	.12	.02	.94
12-13 th rib fat, in.	.19	.09	.04	.59
Ribeye area, sq. in.	8.86	1.05	4.60	15.0
% Intramuscular fat	4.21	1.05	1.48	10.02

Table 2. Linear model estimates for age and WDA regressions for Angus replacement heifer ultrasound measures and computed traits.

Trait	Age			WDA		
	Regression	R ²	Pr>F	Regression	R ²	Pr>F
% IMF, %/d	.005339	.35	.0001	-.05178	.34	.0001
Ribeye area, sq. in./d	.019	.61	.0001	2.5319	.61	.0001
Rump fat, in./d	.0015	.59	.0001	.1695	.54	.0001
12-13 th rib fat, in./d	.000848	.54	.0001	.1401	.57	.0001