



Angus Carcass Evaluation Explained

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A multiple-trait sire mixed model was used to determine sire expected progeny difference (EPD) for carcass weight, USDA marbling score, 12th rib fat thickness and ribeye area. Sire and maternal grandsire relationships are incorporated to increase prediction accuracies of the EPDs. A total of 959 Angus sires (with progeny carcass data) were evaluated from carcass data on 16,154 steer and heifer progeny.

The carcass data are phenotypically described in Table 1 of your Spring 1995 Sire Evaluation Report, with actual average measurements and the adjusted measurements. Carcasses were adjusted to 480 days of age-at-slaughter according to the equations given in Table 2.

Genetic and phenotypic correlations are given in Table 3 along with estimates of trait heritabilities. Ranges in EPD are summarized in Table 4. Carcass EPD possible change values are summarized in Table 5. Distributions of average sire progeny group carcass weights and carcass EPD are given in Figures 1-5. Genetic trends for the four carcass traits are given in Figures 6 and 7.

The numerical marbling score is a subjective scoring system relating to the amount of observable fat in the ribeye. The scoring system and its relationship to the USDA Quality Grading System is defined in Table 6. For a carcass to meet Certified Angus Beef Program standards, it must have a modest or higher marbling degree, be of 'A' maturity, be USDA Yield Grade 3 or leaner, and have a fine to medium marbling texture.

Using Carcass EPD

The objective of a carcass evaluation program is to give breeders the EPDs necessary to select for directional change in body composition (*percent retail product*) and (or) quality (marbling) in progeny carcasses. Achieving this objective has been difficult for several reasons, one of which is the inability of the beef industry to arrive at a highly accurate prediction formula for (*percent retail product*) using individual carcass traits that can be measured.

The USDA marbling score, a subjective score for the amount of intramuscular fat in the longissimus dorsi (ribeye), has also been shown not to be a precise predictor of intramuscular fat. Recent research at Iowa State University found the correlation between the marbling score and percent fat as determined by chemical process to be .73 for one group of animals (90 head) and .82 for another group of animals (91 head).

We must do the best possible within the constraints of cur-

rent technology. While the information provided in this summary is not perfect, it's valuable for use in changing body composition and quality in beef cattle. Recommendations on the use of each carcass EPD follows:

Carcass Weight EPD. In general, carcass weight is not a good predictor of *percent retail product*. Carcass weight is a good predictor of *total retail product*. Selecting sires with the higher EPD for carcass weight will result in progeny carcasses that produce more *total retail product* at a constant fat and age endpoint. Phenotypic changes in carcass weight within the Angus database are shown in Figure 7 along with age at slaughter. Age at slaughter has decreased significantly as carcass weight has increased significantly.

Marbling Score EPD. Although a less than accurate subjective measurement of intramuscular fat in the ribeye, the marbling score EPD can be used to select sires which will produce progeny with more marbling at a constant fat and age endpoint. The higher the marbling score EPD, the higher the amount of intramuscular fat in the ribeye.

It should be noted that the genetic correlation between marbling score and external backfat at the 12th rib is nearly zero. This means that breeders can select for increased marbling and not have to worry about selecting for increased external fat when taking animals to an age-constant endpoint. Figure 7 in your Sire Evaluation Report shows the phenotypic trends in external fat cover and marbling score by sire birth year groups in the Angus database.

Ribeye Area EPD. Cross-sectional area of the longissimus dorsi muscle (ribeye area) at the 12th rib has been shown to account for a significant amount of variation in *percent retail product* at a constant carcass weight endpoint. This means that given two sires with the same carcass weight EPD, the sire with the higher EPD for ribeye area will have progeny that yield more *percent retail product*.

There is an even higher positive genetic correlation (.72) between 12th rib ribeye area and pounds of total retail product. Heritability for ribeye area has been estimated at .30 from the Angus carcass database.

Do not use the ratio of ribeye area EPD to carcass weight EPD as a selection index nor as an indicator of differences in *percent retail product* or muscling. Selecting on this ratio will result in the indirect selection for changes in mature size. In general, the higher the ratio, the smaller the mature size.

Fat Thickness EPD. The 12th rib fat thickness heritability has been estimated to be .25 from the Angus carcass database. Research from MARC shows there is a high genetic relationship (.74) between external 12th rib fat thickness and *percent retail product*.