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A Carcass EPD for Percentage of Retail Product

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Abstract
A new carcass EPD has been developed for the American Angus Association's National Carcass Evaluation Program. A percentage of retail product EPD combines the traditional carcass traits (hot carcass weight, fat thickness, ribeye area and KPH) into a composite EPD. Although the heritabilitty for this trait (.25) is not the highest for the carcass traits, it is high enough for breeders to make significant change.

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Summary

A new carcass EPD has been developed for the American Angus Association's National Carcass Evaluation Program. A percentage of retail product EPD combines the traditional carcass traits (hot carcass weight, fat thickness, ribeye area and KPH) into a composite EPD. Although the heritabilitty for this trait (.25) is not the highest for the carcass traits, it is high enough for breeders to make significant change.

Introduction

Both seed stock and commercial beef cattle producers are looking for ways to improve carcass merit as they gear up for value-based marketing. Primary carcass traits that will be evaluated under a value-based marketing scenario will most likely include: carcass weight, quality (marbling), and percentage of retail product (yield). Carcasses that fall outside of windows of acceptability for these traits will be discounted. In order to assist the beef cattle industry in its pursuit of more control over producing carcasses that fit within windows of acceptability, selection tools are needed. Expected progeny difference (EPD) for these traits will fit part of the "tool kit" requirement.

Methods

A multiple-trait sire mixed model was used to determine sire EPD for carcass weight, USDA marbling score, 12th rib fat thickness, ribeye area and percentage of retail product. Sire and maternal grandsire relationships are incorporated to increase prediction accuracies of the EPD. A total of 1,343 sires (with progeny carcass data) were evaluated from carcass data on 25,539 steer and heifer progeny.

The EPD is expressed as a percentage. It should be noted that the formula is heavily influenced by the fat thickness measurement. The total carcass percentage of retail product (0 trim) is computed by the following formula (M. Dikeman, Kansas State Univ.):

Percent retail product, % = 65.69 - 9.931 * fat thickness, in. + 1.2259 * ribeye area, in.
.013166 * carcass wt., lbs. - 1.29 * KPH, %.

Results and Discussion

Genetic and phenotypic correlations for the evaluated carcass traits are given in Table 1 along with estimates of trait heritabilities. Several items of interest can be found in this table, but only a couple will be mentioned here. First, the five carcass traits evaluated are moderately heritable, meaning that effective selection pressure can be applied by selecting bulls that are superior for the traits of interest. Second, there is very low, possibly nonexistent, genetic correlation (-.05) between the marbling trait and the external fat trait. This means producers can select for increased marbling and not worry about increasing fat thickness. And third, there is a high genetic correlation (-.85) between the percentage of retail product trait and the fat thickness trait. This means if one wants to improve genetic merit for percentage of retail product, then the best way to do this is to select bulls that have the low and negative EPD for fat thickness.

Figure 1 presents a distribution of the spread in percentage of retail product for Angus sires evaluated for carcass merit. The values range from a low of 56.8% (these are excessively fat carcasses that would be 5+ on yield grade) to a high of around 68% (these are lean carcasses with yield grades equivalent to 1.0). The majority of the sires have produced progeny carcasses in the range of 60 to 65% with an average of around 63.2% (approximately a 3.0 yield grade).

Figure 2 shows a trend line for the percentage of retail product trait by sire birth year. Although the trend is only slightly negative, it is a discouraging trend because it says that breeders testing young sires for carcass merit are keeping the steers on feed far to long and are obtaining excessively fat carcasses (see Figure 3). The steers should be slaughtered when the average fat thickness within the pen is no more than .3 inches. The whole idea behind testing sires for carcass merit in today's environment should be to identify sires whose progeny will deposit marbling at an early age and with a minimum of outside fat cover. Attempts to push the marbling EPD higher by keeping the steers on feed longer will fail, because the genetic correlation between these two traits is zero.

Figure 4 shows the genetic trend line of percentage of retail product in the Angus breed. There was good improvement in this trait at one time, but the positive change has leveled off and there is even the indication of a negative trend. The good news is that there are bulls in the Angus breed that excel for percentage of retail product as evidenced by the bar chart in Figure 5.

Implications

Some producers have expressed concern that breeders will select too high on this trait and adversely impact reproductive performance of the female. EPDs are tools for genetic improvement. There are going to be optimums for this trait as there are for every other EPD. These optimums are going to vary from producer to producer and from region to region. Reproductive performance should not be adversely affected if breeders maintain a balanced approach in their selection decisions.

Acknowledgments

The author expresses his appreciation to the American Angus Association for the use of their carcass data base to conduct this study.

Table 1. Carcass trait heritabilities and correlations.

Trait	CWT	MS	REA	FT	PRP
Carcass weight (CWT)	.33[1]	-.04[2]	.49	.23	-.21
Marbling score (MS)	.10[3]	.39	-.09	-.05	.01
Ribeye area (REA)	.40	-.03	.28	-.12	.52
Fat thickness (FT)	.25	.15	-.10	.27	-.85
Percentage of Retail Product (PRP)	-.27	-.16	.53	-.80	.25

1 Diagonal elements represent trait heritabilities.
2 Upper off-diagonals are genetic correlations.
3 Lower off-diagonals are phenotypic correlations.

Figure 1. Mean percentage of retail product for sires with carcass data.

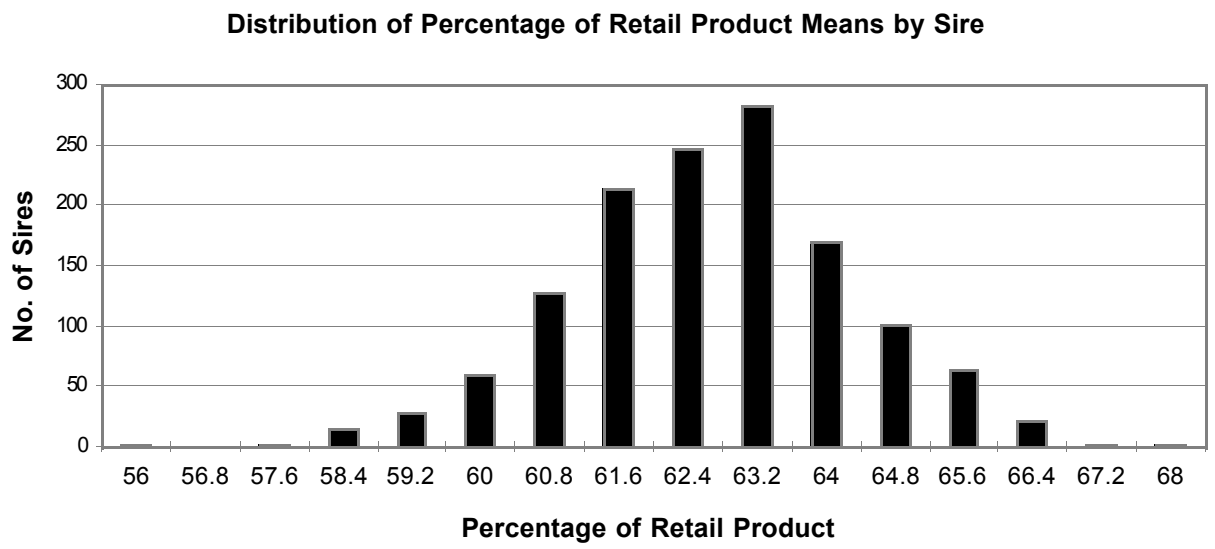

Figure 2. A trend line for changes in percentage of retail product over time for sires with progeny carcass data.

Figure 3. A trend line for changes in external fat thickness over time for sires with progeny carcass data.

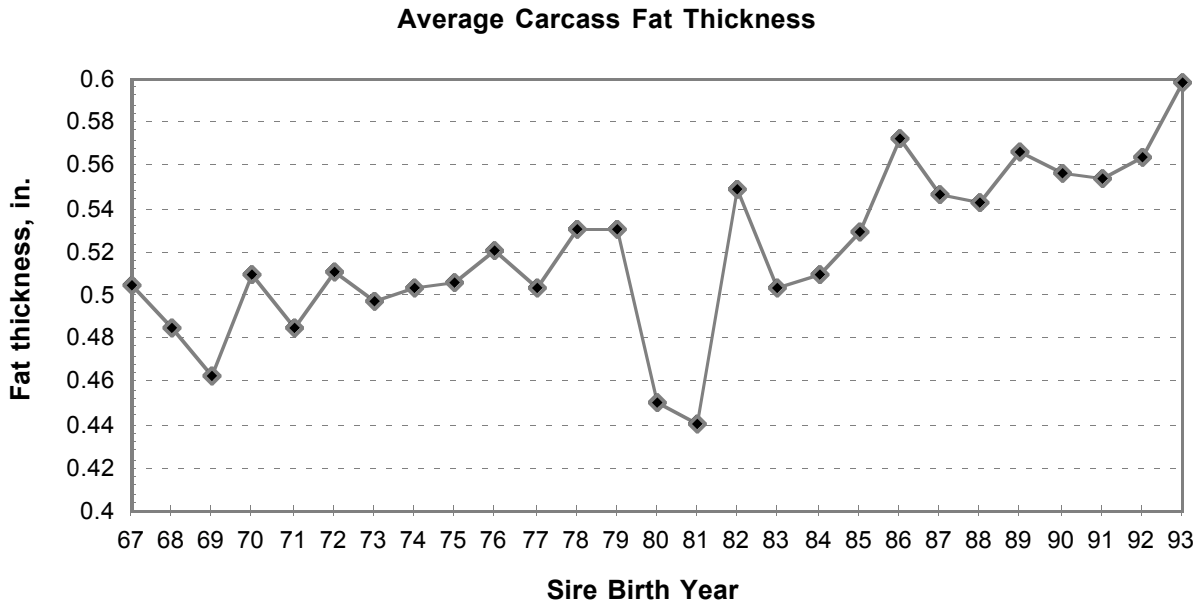

Figure 4. Genetic trend for percentage of retail product in the Angus breed.

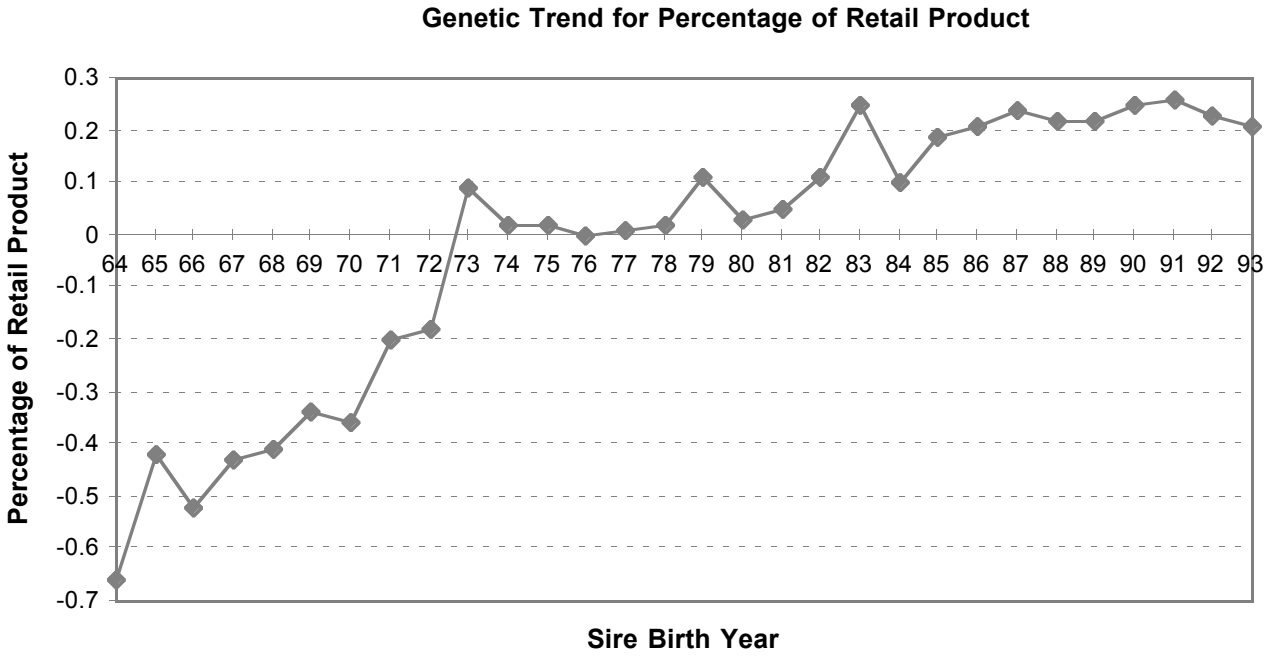

Figure 5. Distribution of EPD for percentage of retail product in the Angus breed.