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Using Carcass EPDs to Produce for Target Windows

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Abstract

The beef cattle industry is moving in the direction of a value-based marketing system. Within such a system, carcasses will be individually in value based on the amount of waste fat, salable lean meat, and quality attributes such as marbling and tenderness. The beef cattle industry has come to rely on growth and maternal EPDs as valuable tools in bull selection. In the future, more emphasis will be placed on using only bulls that will get a producer's calves into target carcass windows. An understanding of how to apply EPDs beyond just predicting sire differences and into predicting target windows of acceptability will become important. The purpose of this study was to investigate the extent to which carcass expected progeny differences (EPD) can be used to predict progeny phenotype.

Disciplines

Animal Sciences

Using Carcass EPDs to Produce for Target Windows

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Summary

The beef cattle industry is moving in the direction of a value-based marketing system. Within such a system, carcasses will be individually in value based on the amount of waste fat, salable lean meat, and quality attributes such as marbling and tenderness. The beef cattle industry has come to rely on growth and maternal EPDs as valuable tools in bull selection. In the future, more emphasis will be placed on using only bulls that will get a producer's calves into target carcass windows. An understanding of how to apply EPDs beyond just predicting sire differences and into predicting target windows of acceptability will become important. The purpose of this study was to investigate the extent to which carcass expected progeny differences (EPD) can be used to predict progeny phenotype.

Introduction

This marketing system will give rise to more definitive target windows for various carcass parameters such as carcass weight, external fat cover, ribeye area, and amount of marbling than currently exist under today's marketing system of buying and selling on averages. As these target windows become more closely defined over time, are there opportunities for commercial beef producers to improve their odds in having the "right type" of cattle? Much of the opportunity will have to do with nutrition and implant management strategies and knowing when to market fed cattle. The other part of the opportunity will be in selecting the correct genetics.

Methods and Materials

The American Angus Association carcass data base was used for this study. The data base consists of more than 19,000 steer and heifer carcass used in this Association's semi-annual sire evaluation for carcass merit. The carcass traits of major significance and evaluation include hot carcass weight, 12-13th rib external fat thickness, 12-13th ribeye area, and the USDA Marbling Score. The hot carcass weight, fat thickness, and ribeye area are those traits most influencing actual retail product and percent retail product. The USDA Marbling Score is a measure of palatability of the product in terms of flavor, juiciness, and tenderness. There are 1,060 Angus sires represented in the data base. The EPDs for each of the four traits are derived using a multiple-trait sire model which incorporates a sire-maternal grandsire relationship matrix.

In the strict sense, EPDs represent or predict genetic differences among sires. That is two sires with EPDs for a given carcass trait will, when with a group of similar cows, produce progeny whose carcass measurements for that trait will on the average differ by the amount of the EPD difference. The EPDs do not predict the actual phenotypic values for the progeny. However, do the EPDs in any way reflect what might be expected from a phenotypic standpoint?

Carcass phenotype is greatly influenced by environment, management, and slaughter end-point, so the best that one can do with the EPD value is to determine if its level is sufficient (all else being optimum--environment, management, and slaughter end-point) to allow the animal to hit a target window. That is, some sires do not pass on the genetics for their progeny to hit a 850 pound carcass weight at a reasonable age (14-16 months) nor compositional end-point (.2 -.4 inches of backfat). On the other extreme, some sires' progeny will not have carcasses weighing 650 pounds when slaughtered at a reasonable age and composition end-point.

A sampling of the Angus sires evaluated for carcass traits was used to look at EPDs and phenotypic levels. The sampling contained only those sires with EPDs basedon at least 10 progeny and compared with at least two other sires within a single contemporary group. The analysis was to determine the phenotypic average of a sire's progeny within each contemporary group and then plot this value against the sire's EPD for the trait in question. The results are a series of scatter plots from which some inferences may be made from EPD and phenotypic target level.

Results and Discussion

Scatter diagrams of EPD level vs. phenotypic performance are shown in Figures 1-4 for the traits of hot carcass weight, ribeye area, fat thickness, and marbling score. In general, there is a positive trend in phenotype as the EPD level increases. However, as one should expect, a wide phenotypic range is possible for each given level of EPD. The information presented in these diagrams may be interpreted two ways: 1) For a given level of EPD, what is the possible outcome in terms of phenotype? or 2) For a target phenotype level, what EPDs could work? One example will be used as an illustration.

Assume that the bull of interest has a carcass weight EPD of -10 pounds. What is the possible outcome in terms of actual progeny carcass weights? From Figure 1, draw a vertical line from -10 and find the two points at which it intersects the two diagonal

lines. At the intersections, draw lines to the carcass weight axis, then read the two bounding numbers. In this example, the numbers are 640 and 800 pounds. This means, that using a sire with a carcass weight EPD of -10 pounds, it would be possible to get actual average progeny carcass weights ranging from 650 to 800 pounds.

Assume now that you want to select a bull that will give you carcass weights averaging 750 pounds. What EPDs for carcass weight will do this for you?

Bulls with EPDs ranging from a low of -29 to a high of +20 have the potential of producing progeny with average hot carcass weights of 750 pounds. One must always remember the other side of the genetic equation: that the cow determines half of the calf's genetic merit. So if your cows are small go for the higher EPD level to obtain the needed balance. Tables 1 and 2 can be used to show other interpretations of the EPD vs target windows relationships.

Table 1.   Interpretation of carcass EPDs and target windows (*given EPD level*).

Trait	Given EPD[1]	Possible target window range
Carcass Wt	- 10 lb	670 to 800 lb
Fat thickness	- .02 in	.38 to .64 in
Ribeye area	+.20 sq. in	11.2 to 13.5 sq. in
Marbling score	.00	4.8 to 6.4 (high Select to ave Choice)

[1]EPDs determined from 480 days age at slaughter end point.

Table 2.   Interpretation of carcass EPDs and target windows (*given target end-point*).

Trait	Target end point	EPD[1] range
Carcass wt	750 lb	-30 to + 20 lb
Fat thickness	.4 in	Less than +.01 in
Ribeye area	13.5 sq. in	Greater than -.02 sq. in
Marbling score		Greater than -.3

[1]EPDs determined from 480 days age at slaughter end-point.
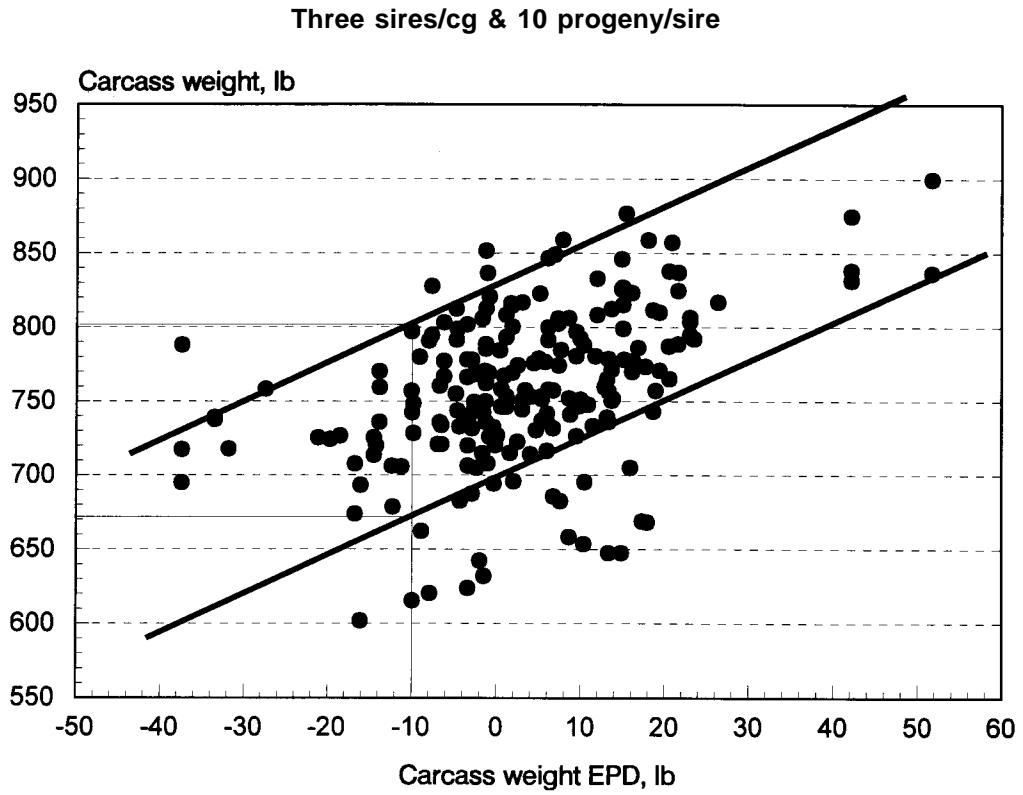
Figure 1. Carcass wt. EPD vs. phenotype.

Three sires/cg & 10 progeny/sire

Carcass weight, lb

Carcass weight EPD, lb

Figure 2. Fat thickness EPD vs. phenotype.

Three sires/cg & 10 progeny/sire

Fat thickness, inches

Fat thickness EPD, inches
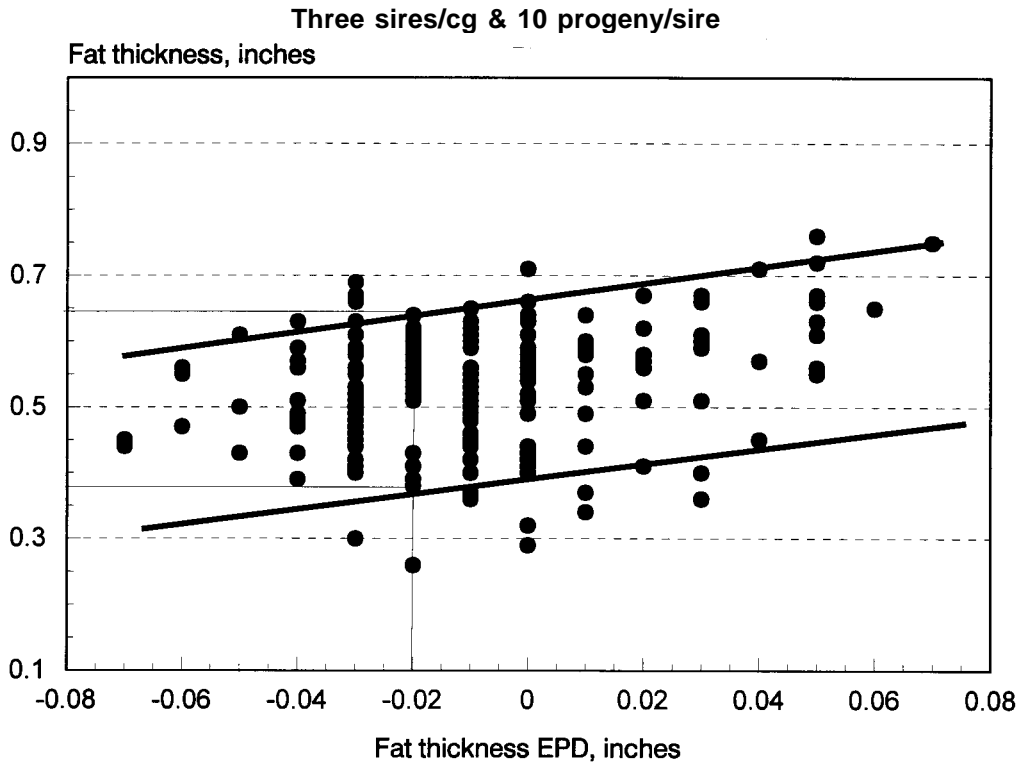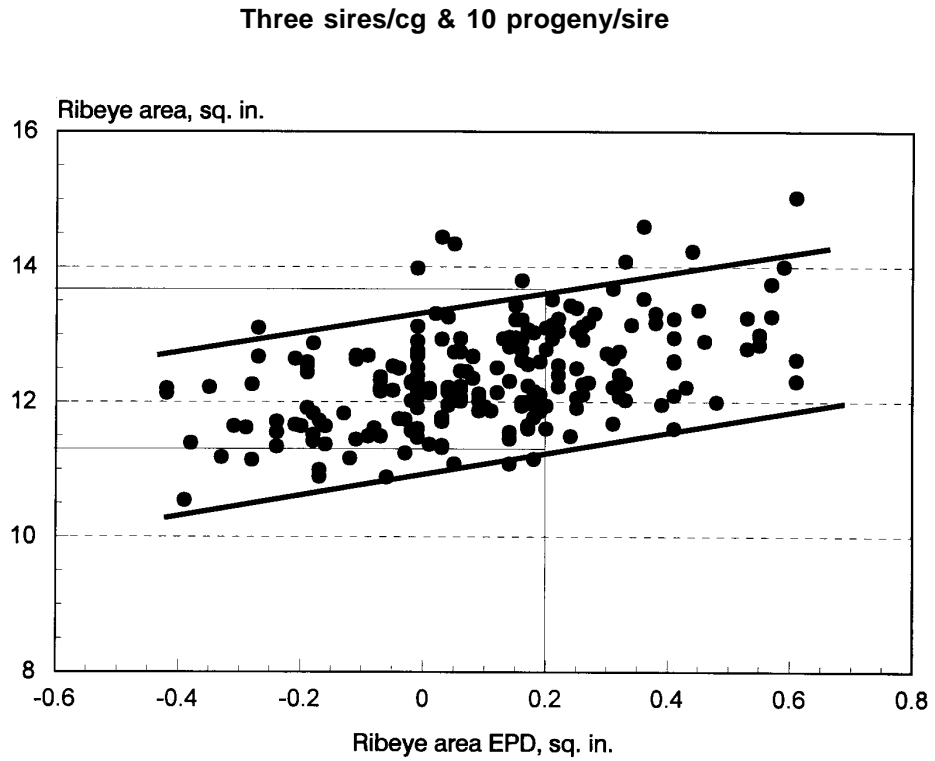
Figure 3. Ribeye area EPD vs. phenotype.

Three sires/cg & 10 progeny/sire

Figure 4. Marbling score EPD vs. phenotype.

Three sires/cg & 10 progeny/sire