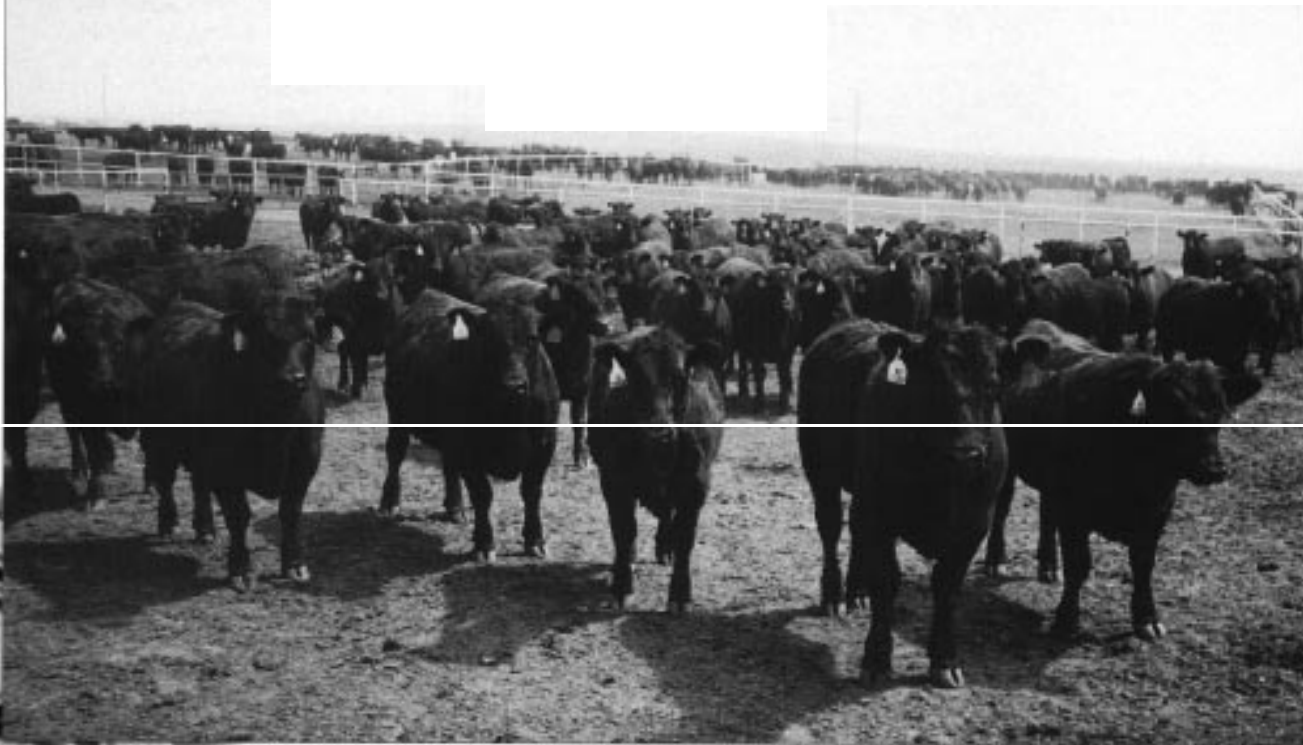


Predicting Progeny Profitability

Developing a multiple-trait selection index, the Angus Sire Alliance is identifying the profitability of Angus bulls.

BY ANGIE STUMP DENTON



The first set of Angus Sire Alliance progeny was finished at Supreme Cattle Feeders, Liberal, Kan. The contemporary groups were assigned lots prior to delivery. Steers remained in those groups until harvested

For decades Angus breeders have been trying to find better ways to identify bulls that fill the needs of commercial producers. A program initiated in 1996 by Circle A Ranch of Iberia, Mo., is helping seedstock producers get the data to predict the value of their bulls.

The Angus Sire Alliance is designed to predict profitability differences among sires.

Participating in the program "is an excellent way for registered producers to show they sincerely want to improve commercial bulls," says Mark Akin, Circle A Ranch general manager. Participating in the Alliance proves you are trying to produce bulls that will increase your commercial customers' returns and the edge they are looking for in the marketplace, he says.

"Currently commercial cattlemen, if using expected progeny differences (EPDs), have to juggle through numerous traits with little guidance as to what traits should receive selection emphasis," says William Herring, University of Missouri-Columbia (MU) assistant professor of breeding and genetics.

For example, the American Angus Association publishes EPDs for 14 production and carcass traits. Herring asks, "What

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Ultrasound measurements for fat thickness, ribeye area and marbling were taken when the Angus Sire Alliance progeny steers averaged a year of age. All steers from a given contemporary group were slaughtered on the same day, when the group averaged 0.5 inch fat thickness at the 12/13th rib as determined by ultrasound.

traits should receive the most emphasis among various production systems?"

Herring, Vern Pierce, MU assistant professor of agricultural economics, and L.L. Bertyshek, University of Georgia professor of breeding and genetics, helped the Alliance develop its profitability index.

"This approach is an attempt to objectively define the appropriate selection emphasis for each trait, given that the goal of the selection program is to maximize profit," Herring explains. "This concept could be extended to allow commercial cow-calf producers, if equipped with the appropriate records, to customize their own selection program based on their specific production system. This would then allow them to select candidates (bulls) that would maximize profit in their program."

The idea for creating the Angus Sire Alliance was Dave Gust's, owner of Circle A Ranch. "I believe in mathematics," Gust says. "Cattlemen can't continue to pick bulls because of low birth weights or because they're in vogue."

Circle A is a registered Angus herd but also includes 6,000 commercial Angus cows on its four ranches located at Iberia, Mo.; Stockton, Mo.; Huntsville, Mo.; and Lineville, Iowa.

Gust and his staff manage the Alliance using their commercial cow herd as a proving ground for sires. "It gives seedstock producers who can't test their own bulls an opportunity to compete and collect carcass data," Akin says.

Circle A incurs all expenses for feed, labor and vaccinations. It also retains ownership on all heifer and steer progeny.

The testing process takes more than two years, to complete from conception to slaughter. Results of the first Angus Sire Alliance were announced at the Circle A Ranch fall production sale in September.

Alliance membership

To participate in the program Angus breeders must pay a membership fee of \$8,500, which allows them to nominate one bull. Of that payment, \$3,500 is allocated to Circle A for management purposes.

The remainder goes into an interest-

bearing account. After progeny data is collected and the bulls are ranked according to profitability, the money is split between the owners of the first- and second-place bulls, which essentially is payment for two-thirds interest in each of the two bulls.

The owners of the first- and second-place bulls this year each received \$33,000.

The remaining interest (on the membership money held in the bank for two years) will be used to advertise the top two bulls after the winners are announced.

When bull owners join the Alliance, they agree to sell two-thirds interest to the Alliance if the bull places first or second. The Alliance (that year's members) retains one-third of the ownership and another third will go to Circle A Ranch.

Artificial insemination (AI) studs have the opportunity to lease the top two bulls. According to Matt Maurer, Circle A Ranch marketing and customer service manager, all semen sales will then be managed through the highest-bidding stud.

Membership benefits

Aristocrat Angus, Platteville, Colo., has been collecting performance data since the early 1970s. "Participating in the Alliance will help us continue to improve carcass traits in our herd," says Ben Houston, who participated in the 1996 program.

Houston says another benefit of membership is the availability of semen. Angus Sire Alliance members have the option to get 20 units of semen on each of the bull candidates to use in their own herds. The participants can get semen on one bull or all of the nominated bulls.

A three-year Alliance member, Dick Beck of Springfield Angus, Louisburg, N.C., says the membership fee is an investment in his farm's breeding program.

"We consider it an investment or a prepaid semen price," he explains. Beck and his partner, Phil Goodson, plan to use the top two Angus Sire Alliance bulls in their breeding program each year. Because the Alliance retains a one-third ownership of the winning bulls, each member can get semen on those two bulls at cost.

Another way Alliance members benefit is from semen sales of the top two bulls. Maurer says members will receive their percentage of the revenue generated from semen sales of the top two bulls in their membership year.

Sire criteria

Each member can enter one Angus bull in the Alliance per year. Maurer says the

optimum age of nominated bulls is 18 months to 3 years. Test sires must meet the following requirements (can be interim EPDs):

Birth EPD — maximum +5.0

Weaning EPD — minimum +25

Yearling EPD — minimum +41

Milk EPD — minimum +9

Alliance members deliver nominated sires to the Circle A Ranch headquarters in Iberia between April 1 and April 15. The Alliance member must also supply 50 straws of semen on the candidate.

Circle A staff follow the protocol recommended by the American Angus Association in mating for evaluation of carcass traits. Each nominated sire is placed with 50 cows for a 65-day breeding season. Another 50 cows are also AI-bred to each candidate.

For comparison purposes, other cows are AI-bred to six reference sires that ardhg-accuracy carcass bulls.

Alliance progeny

There were 675 steers evaluated during the first year of the Alliance. Progeny information collected included birth, weaning, backgrounding and yearling weights and carcass data. All data collected was sent to the Angus Herd Improvement Records (AHIR) department for use in National Cattle Evaluation (NCE).

After weaning, steers were backgrounded for 104 days before being transported to Supreme Cattle Feeders, Liberal, Kan.

Before shipping, contemporary groups were assigned to one of five feedyard pens. A contemporary group was defined as a group of steers that had been together since birth and that had been given equal opportunity to perform.

When the steers averaged a year of age, ultrasound measurements for fat thickness, ribeye area and marbling were taken by an ultrasound technician certified by the Animal Ultrasound Practitioners (AUP) Association. Steers remained in their initial pens until slaughter.

All steers from a given contemporary group were slaughtered on the same day. Steers were harvested when a contemporary group averaged 0.5 inch fat thickness at the 12/13th rib as determined by real-time ultrasound. Carcass data collected included hot carcass weight; marbling score; fat thickness; ribeye area; and percentage kidney, pelvic and heart (KPH) fat.

The heifer mates were developed at



JLB Exacto 416, nominated by Springfield Angus, Brost Angus Farm and Anderson Circle Ranch, won top honors in the 1996 Angus Sire Alliance with a profitability index of \$35.50. Pictured accepting the award are Chuck Brost (left) and Phil Goodson (right). Presenting the award is Dave Gust (center).

Nominators believed the bull had carcass value and wanted to find a mechanism to test him fast, yet accurately, and develop a high accuracy for his carcass traits, says Dick Beck, Springfield Angus.



Winning second place in the 1996 Angus Sire Alliance was GDAR Traveler SVF 234, owned by Gartner-Denowh Angus Ranch, Sidney, Mont.; Sunny Valley Farms, Yorkville, Ill.; and Circle A Ranch, Iberia, Mo. The owners received \$33,000 for two-thirds interest of the bull. Pictures at the awards presentation (l to r) are Dave Gust, Mark Akin, Matt Maurer and Chris Earl.

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Lineville, Iowa, and then artificially inseminated. The conception rate of the heifer mates showed no fertility problems among test sires.

Although the results of the 1996 program have been announced, Akin says they plan to continue tracking Sire Alliance daughters as they get into production.

The Alliance formula

The task of the Angus Sire Alliance is to rank the sires for a production system, giving fair and balanced credit to phenotypic expectations of the seedstock on the profits of the production system in which their progeny are raised. The system used in the Angus Sire Alliance model was a moderate-sized cow-calf operation that retains ownership through the feedlot phase.

The difference between two bulls' index values indicates the expected difference in profit between progeny of those two sires given the production and economic values used in the model.

"Simply put," says Herring, "we have estimated the relative economic values (REVs) for the traits outlined in the study for the described production system. After calculating EPDs for those traits and combining them with the relative economic values, we have ranked the sires.

"As we see alternative marketing systems develop—for example, beef cooperatives—this system of selection could be altered "to accommodate the needs of those producers that participate in those programs."

Table 1 shows the progeny profitability differences of the bulls nominated in 1996. (See accompanying sidebar for more information about how the profitability index was derived.)

Of the 19 candidates, there existed a range of \$31.51 from the top-ranking bull to the lowest-ranking bull. According to Herring, if the two bulls were used again in a production system similar to the one

described in this economic simulation, a difference in profitability of \$31.51/calf would be expected.

Table 1: Rankings of progeny profitability differences for Sire Alliance sires.

| Rank | Sire | Profitability, \$ |
|------|---|-------------------|
| 1 | JLB Exacto 416 | 35.50 |
| 2 | GDAR Traveler SVF 234 | 31.48 |
| 3 | JAC's Oscar 4193 | 25.57 |
| 4 | CAR DON Precision B274 | 22.18 |
| 5 | Wilkes 6 Bar D Prompter 82 | 20.84 |
| 6 | GAR Bando 1521 | 20.32 |
| | Average reference sire profitability | |
| 7 | G | 15.70 |
| 8 | H | 15.54 |
| 9 | I | 14.49 |
| 10 | J | 14.17 |
| 11 | K | 13.89 |
| 12 | L | 12.67 |
| 13 | M | 11.15 |
| 14 | N | 11.00 |
| 15 | O | 10.88 |
| 16 | P | 7.96 |
| 17 | Q | 7.22 |
| 18 | R | 6.19 |
| 19 | S | 3.99 |

Looking to the future

With one year of results announced, two other groups of bulls are already on test. He says since the award ceremony in September, they've already had 13 bulls nominated for the 1999 program.

Maurer says Alliance members seemed satisfied with the inaugural program. The winning sire, JLB Exacto 416, was bred by junior Angus breeder Jamie Beck, Louisburg, N.C., and is owned by Springfield Angus; Anderson Circle Ranch, Harrodsburg, Ky.; and Brost Angus Farm, Oxford, Ind.

Taking home second-place honors were Gartner-Denowh Angus Ranch, Sidney, Mont.; Sunny Valley Farms, Yorkville, Ill.; and Circle A Ranch, Iberia, Mo., on their nominated sire, GDAR Traveler SVF 234.

"Even if a bull we nominated hadn't won, we still feel the investment is worthwhile," says Beck. He explains that it allows them to provide their customers the genetics they are demanding. It allows them to make more-accurate breeding decisions, have confidence in the information available on the bull, and after the test they can use the bull as a reference sire because of his high accuracy levels.



Results of the 1996 Angus Sire Alliance Were announced at Circle A Ranch Sept 18. During the presentation William Herring and Vern Pierce, both of the University of Missouri-Columbia (MU) and developers of the Alliance index, explained the process.

Relative economic values (REVs) were defined as the marginal change in expected profit per progeny from increasing the trait in question by one unit. To estimate REVs, a bio-economic simulation was performed using the computer software SIMUMATE 3.0. There were 76 production and economic variables used in the model for the straight-bred Angus system.

The simulation weights the contribution of a sire to the value of; the production system, giving consideration to:

1. The value of carcass characteristics of his progeny; and
2. Balancing the cost and revenue trade-offs in providing those characteristics.

Several economic assumptions are necessary in both the development and interpretation of the bio-economic model and REVs:

- 1 Seedstock selection decisions need to be based on the effect of a sire

on the final profitability of his progeny in a specific production system. The system used in the Angus Sire Alliance model was a moderate-sized cow-calf operation that retains ownership through the feedlot phase.

2. The economic portion of the simulation designed to measure the overall effect of a sire on a specific herd.
3. The level of expression of each phenotypic trait, and thus the economic importance of the level of that trait, will differ in value for a production system based on relative returns of that trait for the production systems used.
4. Contributions of single-trait EPDs to profit are weighted to reflect the relative effect on system profits from a unit change in any one EPD.

The model requires a number of assumptions about expected costs and returns for a production system.

- Income over variable costs of production and fixed-cost estimates for a cow-calf operation were derived from enterprise budgets developed during the last 10 years by MU Extension.

- Cull-cow price estimates were determined from the U.S. Department of Agriculture (USDA) *Market News*' 10-year average from Sioux Falls and the Food and Agriculture Policy Research Institute's (FAPRI) 10-year forecast for utility cows.

- Feeder-steer price estimates were determined from 10-year average Oklahoma City price estimates and a forecasted 10-year average based on USDA Market News reports.

- Carcass quality grade, yield grade and off-grade price estimates were based on national carcass premiums and discounts for slaughter steers and heifers as reported by the USDA *Market News* service

- Backgrounding and feeding cost estimates were based on 10-year averages for monthly performance.



William Herring, along with his colleague, Vern Pierce, explained the Angus Sire Alliance Index prior to the Circle A Ranch Sale Sept. 18.

cost of gain and break-even prices reported by Kansas State University.

REVs were estimated approximating the partial derivatives of the profit equation with respect to each variable. In this case these variables included birth weight, weaning weight, postweaning average daily gain (ADG), marbling score; yield grade and female fertility. The estimation procedure included simulating the base herd, then comparing outputs to subsequent simulations, driving the variable of interest up by one unit and comparing the differences in profit.

The REVs were standardized by the genetic standard deviation; to evaluate relative selection emphasis, removing scale differences among traits. Based on this data, yield grade and weaning weight received the most emphasis, followed by postweaning ADG, marbling and birth weight with similar levels of emphasis.

The economic weights are rewarding bulls that excel in as many areas as possible.

After combining REVs and EPDs to produce the final index, values were adjusted by a constant, so the lowest value was rescaled to zero. The difference between two bulls' index

values indicates the expected difference in profit between progeny of those two sires given the production and economic values used in the model.

According to Herring, if these bulls provide a snapshot of at least the average genetic profile that exists within the Angus breed it is evident that wide differences exist in profit potential. In fact, by using such an approach as the one utilized by the Angus Sire Alliance, it can easily be seen that attaching added value to certain herd sire prospects is warranted if the genetics of the prospect can be accurately described. Herring and his colleagues advise commercial cattlemen to, utilize a more systematic approach than single-trait selection to genetically alter profit.

"As margins continue to shrink, we will have to think more about 'systems' of beef production that are profitable," Herring says. "Producers cannot be expected to select solely for end-product traits while sacrificing reproduction and production traits that largely impact profit. Programs such as these offer the opportunity to move from single-trait selection to selection for profit."