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December 2016

M I S S I S S I P P I
BCIA
BEEF CATTLE IMPROVEMENT ASSOCIATION

- January 16— Spring BCIA Sale Nominations Due
- February 1-3— NCBA Convention, Nashville, TN
- February 10-11—MCA Convention, Jackson, MS
- March 1—BCIA Annual Meeting and Supper
- March 2– BCIA and Hinds Community College Bull Sale, Raymond
- March 9—BQA, Prentiss
- March 14—BQA, MSU, Starkville
- March 16-18– MSU AI School, Starkville
- April 9—BQA, Meridian
- April 21—Beef Cattle Boot Camp, MSU

Inside this issue:

Fall BCIA Bull and Heifer Sale Re-cap

The Mississippi Beef Cattle Improvement Association wrapped up its Fall Bull & Heifer Sale on November 10, 2016 at Hinds Community College. The MBCIA Fall Sale featured 15 performance-backed bulls from breeders across the state. Thank you to all of the consignors and buyers for supporting the Fall 2016 Mississippi BCIA Bull & Heifer Sale.

	All bulls	Angus	Charolais	Red Angus	Open Heifers	Bred Heifers
Number sold	15	11	3	1	4	28
Gross receipts	$33,500	$25,600	$5,900	$2,000	$3,875	$32,200
Average price	$2,233	$2,327	$1,967	$2,000	$969	$1,150
High selling lot price	$4,000	$4,000	$2,500	$2,000	$1,100	$1,800

The top-selling lot was Lot 1, Kiani T Rex 714, an Angus bull that sold for $4,000. Kiani T Rex 714 was consigned by Arrow B of Terry, Mississippi. He was purchased by Walter Milner of Ridgeland. Other breeders marketing bulls in the MBCIA sale included Good Cattle Company, MAFES - Prairie Research Unit, McMillan Angus Farms, Phil Slay Farms, Ponderosa Farms, Ryals Brothers, Sloan Farm, Thames Angus Farms, Wes Parker Farms and Wedworth Farms. Sale receipts on 15 bulls totaled $33,500 for a sale average price of $2,233.

The top selling female was consigned by Gary & Robby Powell. 4M/MG Farm purchased lot 34, Pioneer Blackbird for $1,800. Other producers marketing bred heifers included: Bozeman Cattle Co. and Thames Angus Farms. Prairie Research Unit consigned the four open heifers.

The objective of the Mississippi BCIA Bull Sale program is to encourage production and identification of genetically superior bulls by purebred breeders and to encourage the purchase and use of these bulls by commercial producers. Bulls offered through this sale have passed a breeding soundness exam, met minimum growth and scrotal circumference requirements, and are backed with extensive performance information.

The MBCIA Fall Bull and Heifer Sale is currently held on the second Thursday in November. The Mississippi BCIA looks forward, once again, to joining forces with the Hinds Community College Bull Test on another successful bull sale in Raymond, Mississippi on March 2, 2017. **Breeders interested in nominating bulls to the Spring BCIA Bull Sale should complete and submit the enclosed nomination forms to the MBCIA office by January 16, 2017.**

Genetic Correlations and Antagonisms

Megan Rolf - Kansas State University (accessed from ebeef.org)

It is important to remember that selection decisions in livestock often impact other traits which may not otherwise be under selection. These unintended consequences are a result of relationships that exist between traits, which can be described by a genetic correlation.

What is a genetic correlation?

A genetic correlation provides information on whether two heritable traits share genes and they range from 1 to -1. In reality, correlations are rarely 1 or -1. They are generally somewhere between these values. If two traits are not correlated, they are controlled by different genes within the genome and their genetic correlation is zero (Figure 1, panel A). Uncorrelated traits should be completely independent and selecting for increased genetic merit in one trait should have no impact on the other trait. If they are correlated, it means that selection on one trait will cause changes in the other. If one considers traits that are genetically correlated, such as weaning weight and yearling weight, this concept is fairly straightforward, because genes that control growth at one stage of an animal's life would be logical candidates to impact growth at a later stage in their lives. The genetic correlation could be very large (closer to 1 or -1 than 0) as is the case between growth traits, with most genes being shared between the two traits with fewer genes that can be selected for independently (Figure 1, panel C), or very small (near zero), where few genes are shared between the traits and the majority of the genes that impact trait one are independent of trait two (Figure 1, panel B). When selecting for a trait that is highly correlated to another trait, we can expect substantial changes in the other trait simply due to the strong genetic correlation between the trait we are selecting on and the trait to which it is correlated. For two traits with a low genetic correlation, selection on one of the traits has an impact on the other, but to a lesser degree.

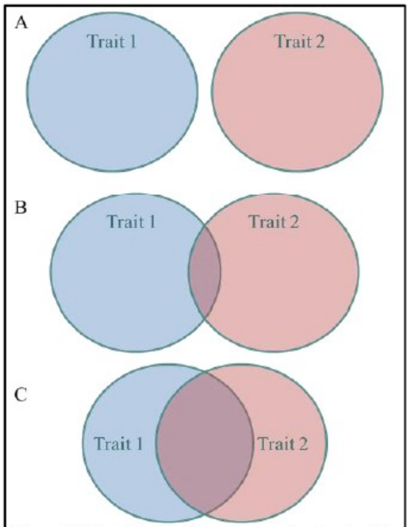

Figure 1: Pictorial definition of uncorrelated traits (A), traits with a small genetic correlation (B), and traits with a large genetic correlation (C). The intersect (overlap) of each set of circles represents genes that influence both traits (shared variation).

Classifying Genetic Correlations

Genetic correlations are classified by the strength of the relationship (low from 0 to ± 0.2, moderate from > ± 0.2 to ± 0.6, and high > ± 0.6 to ± 1.0) between two traits and its directionality. These two things, strength and directionality, determine if a genetic correlation is advantageous or not. Genetic correlations can be either positive or negative, which reflects the direction of the relationship between the two traits. Genetic correlations can also be classified as to whether one finds their relationship desirable or not desirable.

A positive genetic correlation (Figure 2) simply means that as one trait increases, the other trait also tends to increase. Even though the word positive tends to provide a favorable connotation, a positive genetic correlation doesn't necessarily mean that the relationship is favorable. A negative genetic correlation (Figure 2) indicates that as one trait increases, the other trait tends to decrease. Negative seems to imply that the relationship is not advantageous, but that is not necessarily the case. It only tells us the direction of that relationship. A genetic correlation is favorable when selection on one trait produces a desirable outcome in another trait. As a result, a trait can have a positive favorable correlation, or a negative favorable correlation. Traits that are cheap or easy to measure but that have favorable genetic correlations with economically important traits that are more difficult or expensive to measure can be utilized as indicator traits. Traits can also have unfavorable genetic correlations. Unfavorable genetic correlations are sometimes referred to as genetic antagonisms. Genetic antagonisms cause decreases in genetic merit for some traits when single-trait selection is practiced or when failing to consider selection responses in correlated traits that are not directly under selection.

Examples of Genetically Correlated Traits

Genetic correlations between traits are fairly common. Table 1 lists some traits that are genetically correlated. An example of two traits that are positively correlated include growth traits, such as weaning weight and yearling weight. As selection is practiced to increase weaning weight, yearling weight tends to also increase even though selection is not being directly practiced on yearling weight. Growth traits also encompass birth weight, which has a positive yet antagonistic relationship with weaning weight. When selecting for larger weaning weights, there tends to be an increase in birth weight if selection is not practiced for both traits simultaneously. Birth weight is also genetically correlated with calving ease. As birth weight goes up, calving ease tends to decrease. The genetic correlation between calving ease direct and birth weight in American

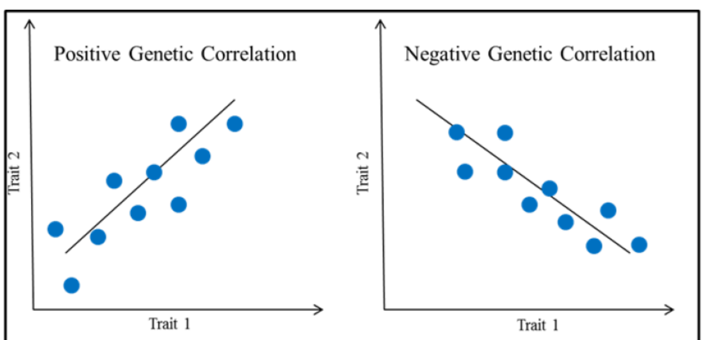

Figure 2: Traits may have a positive genetic correlation (left) or a negative genetic correlation (right).

Angus (www.angus.org/Nce/Heritabilities.aspx) is -0.65, which means that birth weight explains 42% of the genetic variation in calving ease (-0.65*-0.65=0.42), with the remainder being determined by other factors unique to calving ease. Calving ease direct and calving ease maternal also share a small, negative genetic correlation. These two calving ease traits have an antagonistic relationship, which means that direct calving ease should be used when selecting bulls to use on heifers, but that maternal calving ease should be the preferred selection metric for choosing sires of replacement females.

As one might expect, carcass attributes that tend to aggregate a variety of phenotypes, such as quality grade and yield grade, are correlated to their component traits. For example, marbling and quality grade have a positive favorable correlation, and yield grade and ribeye area have a negative favorable correlation. Carcass traits also share favorable genetic correlations with ultrasound measurements of carcass merit, which means that ultrasound measures on yearling seedstock animals can be utilized as indicator traits for genetic evaluation of carcass merit.

Genetic correlations also exist for traits within the cowherd. For example, milk production and maintenance energy have an antagonistic relationship. Antagonistic relationships also exist between growth traits and mature size. As increased growth is selected for in calves within a herd that keeps replacement females, mature size can inadvertently increase, which increases maintenance energy in the cowherd. These examples all show that selection rarely happens in a vacuum, so it is important to be aware of all of the traits that are relevant in a particular herd and jointly select for merit in all the economically relevant traits in the breeding objective to overcome the effects of genetic antagonisms.

Causes of Genetic Correlations

Genetic correlations can have several different causes. The first of those is pleiotropy, the case where one gene impacts multiple traits. Sometimes this gene acts favorably on two or more traits, and sometimes it creates an antagonism.

An example of this is the DGAT1 gene. One of the alleles (form of a gene) for DGAT1 increases milk fat, but has a negative impact on milk yield. In a population highly selected for milk yield, we would expect this allele to be at low frequency. In a population highly select for milk fat, we would expect the opposite to be true. These types of relationships that contribute to genetic correlations cannot be “broken” or separated because it’s a single gene impacting two or more traits. However, genetic correlations can also be caused by genes that are close together on the same chromosome. Because they are close together on the same chromosome, they tend to be inherited together. As a favorable allele for one trait is selected for, the alleles next to it also get selected for and tend to be inherited together. These types of genetic correlations (or genetic antagonisms) can be “broken” or separated over time by selecting for genetic merit in the two traits simultaneously. Another option is to utilize selection indexes, which can break up genetic antagonisms, or unfavorable genetic correlations, over time due to their emphasis on appropriate weighting for all traits (including those with antagonistic relationships) in one selection tool.

Table 1: Examples of genetically correlated traits

Directionality	Trait 1	Trait 2	Magnitude
Positive	Milk production	Total Energy Intake	Moderate
Positive	Fat Thickness	Yield Grade	High
Positive	Carcass Weight	Birth Weight	Moderate
Positive	Yearling Weight	Mature Size	Moderate to High
Positive	Calving Interval	Milk yield	High
Negative	Birth Weight	Direct Calving Ease	High
Negative	Direct Calving Ease	Maternal Calving Ease	Low to Moderate
Negative	Average daily gain	Feed to Gain ratio	Moderate to High
Uncorrelated	Age at Puberty	Retail Product (%)	Negligible
Uncorrelated	Weaning Weight	Bone Percentage	Negligible

Summary

Knowledge of which traits are antagonistic can be utilized to manage the impact of selection decisions on other correlated traits. However, it is important to remember that although genetic correlations can sometimes create the need to exercise more care in selection to alleviate unintended consequences, these correlations can sometimes be utilized to our benefit. Understanding the magnitude and direction of genetic correlations can assist in selection decisions. Utilizing balanced selection for multiple EPDs in a breeding objective or using an appropriate selection index will ensure that genetic antagonisms don’t become a limiting factor for genetic progress.

December 2016 — Management Calendar

GENERAL

With the grass residue being of very limited quality and winter forage stands behind schedule, many producers will be required to supplement Protein and Energy. Winter annual pastures should be maintained least four inches of stubble height. Limit grazing for a few hours per day is a good way to efficiently utilize winter forages and can provide acceptable protein supplementation to residual summer forages. Overgrazing can reduce winter forage availability over the grazing season and should be avoided. There is still time to test the quality of stored forages, if not already done, and order winter supplements. Watch body condition, and group the herd into winter-feeding groups such as mature cows with average condition, thin mature cows, and first-calf heifers. Match forage and feeding programs to the nutritional needs of each group.

SPRING CALVING—January, February, March

Continue developing replacement heifers to reach 2/3 of mature weight by breeding time in early spring. Separate bred heifers from the cows, and provide adequate supplemental nutrition as fall forage quality declines. Monitor body condition closely for the entire herd, and supplement thin cows and heifers as needed. Nutritional requirements increase about 10 to 15% in the last 30 to 45 days prior to calving. Maintain a good nutritional program targeting a body condition score of 5 (moderate condition) at calving for cows and 6 (high moderate) condition at calving for heifers. Do not underfeed in an attempt to reduce calf birth weight. Gather calving supplies such as calving record books, ear tags, obstetric equipment, disinfectants, and colostrum. Check bred heifers frequently. They should begin calving in December if bred ahead of the mature cow herd. Check expected calving dates on cows, and observe closely as calving approaches.

FALL CALVING—October, November, December

Take yearling measurements and calculate adjusted weights and ratios if not already completed. Continue observing heavy bred females frequently. After calving, move pairs to clean pasture and watch calves for scours. Consult with a veterinarian for advise on scours prevention and treatment. Tag, castrate, dehorn, and implant calves as appropriate, and maintain good calving records. Calculate fall calving percentage when the fall calving season is completed. Cow nutrient needs increase dramatically after calving. Make sure lactating cows are in good condition for breeding. Start breeding heifers about a month before the mature cow herd. They should weigh at least 65% of their expected mature weight. Heifers will also need to be in good condition at breeding for a high percentage to settle. It may be time to start feeding the best quality hay now and supplement according to forage test results. Implement the breeding program by turning out bulls that complement herd females and marketing objectives and have passed a breeding soundness examination.

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Membership Application

Name:________________________________

Address:______________________________

City:__________________________________

County:____________ State:______ Zip:______

Phone:____________ Email:________________

(Check one) Seedstock:____ Commercial:____

Cattle breed(s):__________________________

Completed applications and $5 annual dues or $100 lifetime dues payable to Mississippi BCIA should be mailed to:

Mississippi Beef Cattle Improvement Association
Box 9815, Mississippi State, MS 39762