



By the Numbers

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Selection for growth and mature cow size

Calf performance is important to breeders who sell cattle by the pound. However, selection for increased early growth can affect mature cow size. Performance data on cows with mature weight records were analyzed to determine the relationships between growth traits measured early in life and mature cow size.

American Angus Association data

Weight and height data on 75,959 cows with mature weight records from contemporary groups of at least 20 head were used to estimate genetic parameters between mature and growth traits. A three-generation pedigree with 171,475 animals was included in the analysis to account for genetic relationships.

Descriptive statistics for this data set are presented in Table 1. All weights and

heights are the adjusted values that are used in the national cattle evaluation (NCE). Specifically, mature traits are adjusted to six years of age and a body condition score (BCS) of 6. The average adjusted mature size measures on the Angus cows in this analysis were 1,373 pounds (lb.) and 53.0 inches (in.).

Genetic parameters

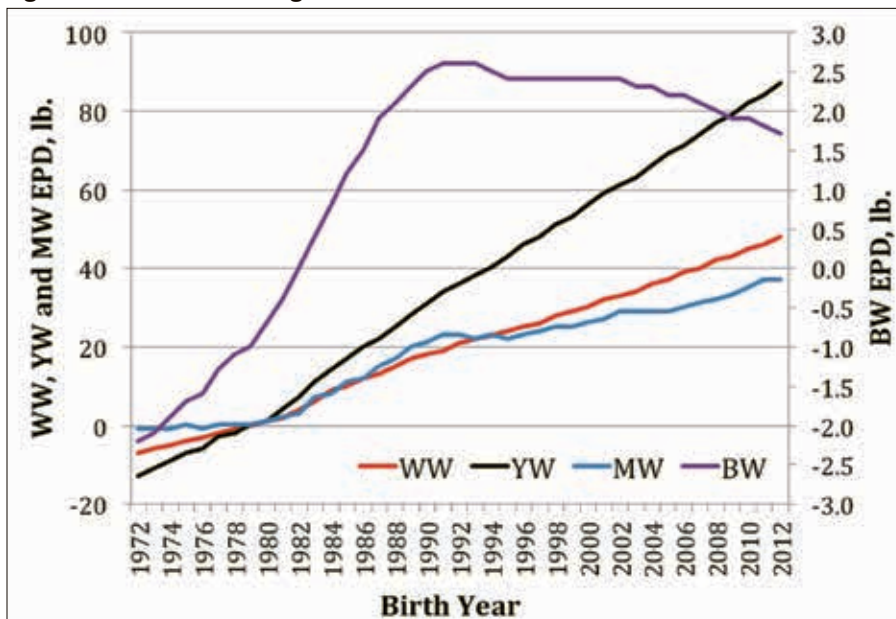
Table 2 lists the heritabilities currently

Table 1: Descriptive statistics for weight and height traits

Trait	No.	Mean	SD ¹	Min.	Max.	Contemporary groups
Birth wt., lb.	60,328	79	9	40	129	6,801
Weaning wt., lb.	62,075	568	68	285	1,039	6,971
Postweaning gain, lb.	53,564	239	78	32	710	5,802
Yearling ht., in.	29,620	46.0	1.7	38.1	54.1	3,181
Mature wt., lb.	75,959	1,373	171	745	2,300	1,817
Mature ht., in.	46,561	53.0	1.9	42.1	62.8	1,184

¹Standard deviation.

Fig. 1: Genetic trend for weight traits^a



^a<http://www.angus.org/Nce/GeneticTrends.aspx>.

used in the weekly Angus NCE for the traits included in the analysis. The heritability estimates from this subset of animals were comparable to those in Table 2. Generally, weight traits are moderately heritable, and height traits are highly heritable. Parameters of this magnitude indicate selection for these traits can be effective in a breeding program.

Table 3 presents the genetic correlations estimated between growth and mature traits. Of all the growth traits, weaning weight had the strongest genetic correlation with mature weight. Birth and mature weight had a moderate positive genetic relationship, meaning animals that were heavier at birth tended to have heavier mature weights, as well.

Mature weight had strong genetic correlations with the yearling measures of height and postweaning gain. Cattle with the genetic potential for larger mature weight also had genetic associations with taller yearling height and greater postweaning gain. This is an undesirable correlation for any beef producers raising cattle with limited feed resources to support larger mature cows.

Mature height had strong positive genetic associations with birth weight, weaning weight and postweaning gain. The correlation between mature height and weight used in the weekly NCE is 0.75. Genetically larger-framed cows had genetics for heavier weights at all stages of production. In addition, the

Table 2: Heritabilities used in Fall 2013 NCE^a

Trait	Heritability
Birth wt. direct	0.42
Weaning wt. direct	0.20
Postweaning gain	0.20
Yearling ht.	0.50
Mature wt.	0.37
Mature ht.	0.64

^a<http://www.angus.org/Nce/Heritabilities.aspx/>.

Table 3: Genetic correlations between growth and mature traits

Trait	Mature wt.	Mature ht.
Birth wt. direct	0.39	0.43
Weaning wt. direct	0.74	0.73
Postweaning gain	0.63	0.54
Yearling ht.	0.65	0.91

correlation between mature and yearling heights was very strong, indicating that these traits are controlled by many of the same genes.

Good news with selection

In more recent years, some selection pressure has been placed against mature weight while still selecting for lighter birth weight and higher-growth cattle. As a result, the genetic trend for mature weight is not as steep as those for weaning and yearling weights. Despite the strong positive genetic correlation between postweaning gain and mature weight, Angus producers have

had some success identifying animals that combine high growth and moderate mature size.

The breed genetic trends for yearling and mature height are relatively flat, and there has been little genetic change for these traits. Fig. 1 depicts the breed genetic trend for weight traits. Angus breeders have selected cattle for lighter birth weights and increased growth during the past 30 years.

Selection decisions

Based on this analysis, single-trait selection for strictly high-growth animals will potentially result in an increase in mature

weight and height. Producers who do not have the feed resources to support cows of a larger mature size would benefit from multi-trait selection for increased growth while maintaining a constant mature size. Conversely, breeders wanting to reduce mature cow size can place some selection emphasis on growth to help maintain optimum calf performance for their marketing avenue.



Editor's Note: Heather Bradford was the 2013 intern for Angus Genetics Inc.