BY THE NUMBERS

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Predicting the Due Date

Behind the scenes of Angus gestation length.

Each spring and fall, beef cattle producers across America anxiously wait for their first calf of the calving season to arrive. In recent years, some have noticed calves may be arriving sooner than expected.

Historically the cattle industry has deemed gestation length in Angus cattle to be 283 days, but recent research suggests the average gestation length for Angus cattle is shorter. This idea may affect how producers predict due dates and plan their calving seasons.

Data collected by American Angus Association membership from 2000 to 2020 created a representative data set including 101,787 animals. The raw average gestation length for Angus cattle in this data was 278.6 days, with a normally distributed range from 264 to 292 days.

This number is noticeably different from the 283-day expectation. What has caused this decrease in gestation length over the years? It appears selection for low birth weight and calving ease bulls takes responsibility for this observed change. Angus bulls have commonly been used to reduce calving difficulty, and it appears that this practice is in part responsible for shorter gestation lengths.

Genetic factors

Analysis of this gestation length data allowed for estimation of genetic parameters including estimates of heritability and genetic correlations. Gestation length was found to be highly heritable (0.56), suggesting the trait is controlled by genetic components and has a large response to selection.

In the case of beef cattle selection, gestation length has been indirectly affected through the direct selection of birth weight and calving ease. Gestation length had a moderate genetic correlation with both birth weight and calving ease. Birth weight increased by 0.67 pounds (lb.) per day of gestation.

Birth weight and calving ease score are also highly correlated, which implies that as birth weight increases, calving becomes more difficult. This infers direct selection for lower birth weight and higher calving ease is indirectly selecting for shorter gestation. In other words, shorter gestations are associated with lighter calves that arrive with less assistance.

Selection for calving ease and/or low birth weight bulls over successive generations has resulted in a decrease in average gestation length for the Angus breed, as shown by the genetic trends in Figure 1.

With calving ease being the true trait of interest, the genetic correlation between calving ease and gestation length deems gestation length as a possible indicator trait for calving ease. Gestation length data could potentially improve the precision of genetic selection tools through incorporation into calving ease evaluations as a correlated trait.

Non-genetic factors:

Sex

Looking further into this gestation length data, several observations were seen that may interest beef cattle producers.

After accounting for all other influential factors, differences between sexes were significant. Bull calves gestate 1.2 days longer than heifer calves with gestation lengths of 280.0 and 278.8, respectively.

This idea complies with the trend for bull calves to have higher birth weights than heifer calves. Bull calves were on average 6 lb. heavier at birth than heifer calves, in part due to longer days in gestation.

Dam age

Age of dam also influences the length of gestation in Angus cattle. Gestation is significantly shorter in younger cows when compared to mature cows (see Figure 2).

One should expect their first- and second-calf heifers to calve one or two days before their mature herd. Gestation length on average remains reasonably consistent once cows

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have reached their mature size and maximum production at around 5 years old.

Birth season

Season of birth also affects herd gestation length. According to this data set, 55% of calves are born in winter (December, January, February), 18% are born in autumn (September, October, November), 15% are born in spring (March, April, May) and 12% are born in summer (June, July, August).

The longest gestations observed were for spring-born calves with an average of 281.3 days. The shortest gestations accompanied higher temperatures for summer-born calves, with an average of 277.2 days. Winter and autumn gestations fell intermediately with lengths of 280.3 and 279.8, respectively.

The approximate four-day gestation length difference between summer and spring calving speaks to the effects that climate conditions have on physiologic processes such as gestation length.

Regionality

Rowan et al. (2020) divided the continental United States into nine regions based on temperature, precipitation and elevation to investigate environmental effects on cattle genotypes and phenotypes (see Figure 3).

These regions also intend to group similar beef cattle production systems. Examining the data using these regions did not reveal notable differences in gestation length across regions after accounting for the season of birth.

Only a mere 1.2-day difference between the regions with the longest and shortest average gestation lengths was witnessed. Gestation length does not appear to be experiencing distinct regional adaptations.

There was, however, a 4.7 lb. difference in birth weight between the Southeast with the lightest average birth weight and the Arid Prairie with the heaviest birth weight after accounting for season.

Ultimately, many factors can affect a calf's gestation length, including genetic composition. If an operation is retaining replacement heifers, genetic material is accumulating and replicating within the herd.

With this in mind, producers should not be surprised to have calves born sooner than expected. If using a single bull for a breeding season, a more uniform gestation length may be observed across the herd due to the sire's genetic influence. Selection for extreme gestation length is not advised.

Instead, a biological limit must exist for healthy gestation lengths, so producers should be aware of this when making selection decisions. Mating decisions should aim to produce easier calvings and successful calves in the market of interest. AJ

Editor's note: Reference includes Rowan, T.N., Durbin, H.J., Seabury, C.M., Schnabel, R.D. and Decker, J.E., 2020. Powerful detection of polygenic selection and environmental adaptation in US beef cattle. bioRxiv.

Figure 1: ***Genetic trends by birth year***

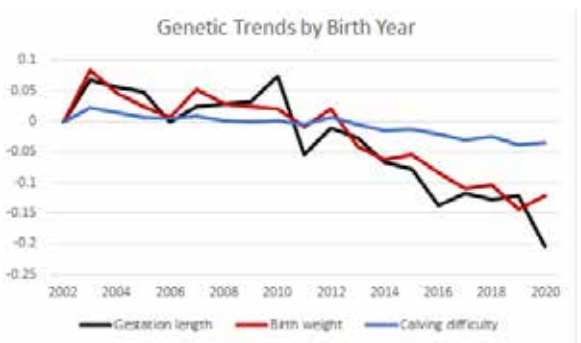

Figure 2: ***Age of dam influence on gestation length in Angus cattle***

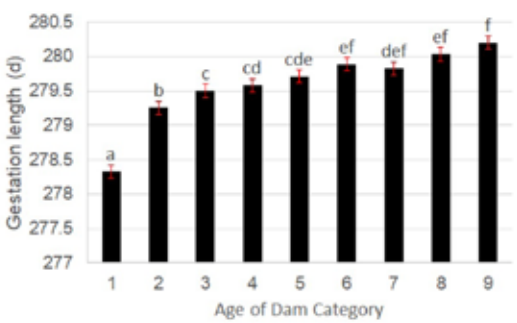

Figure 3: ***U.S. regions based on temperature, precipitation and elevation***