

SORTING GATE

Selecting cattle for greater elevations

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Cow-calf operations come in all different shapes and sizes, and from vastly different environments east

to west. Managing and selecting cattle that will thrive in different environments is crucial for a profitable operation. For cattle managed in high-elevation environments, selecting against high-altitude disease (HAD) is imperative for the herd's success.

Commonly called "brisket disease," HAD generally affects cattle managed at or above 5,000 feet (ft.) elevation. The stress of these lower-oxygenated environments causes blood vessels in the lungs to constrict, increasing blood pressure. This increased pressure leads to leaky heart valves, resulting in brisket edema and eventual death if the animal is not moved to a lower altitude.

Typically, cattle managed at 5,000 ft. or lower are not affected by HAD because oxygen is plentiful, and the stress on the heart and lungs is less.

Fighting HAD

For researchers at Colorado State University (CSU), though, this disease has been a topic of conversation for decades as they have tried to understand the onset of the disease and how to select animals that can survive in these environments.

A testing method has been employed for more than 40 years to find animals more suitable for these living conditions. The method aims to collect pressure measurements within the heart's pulmonary artery. These pulmonary arterial pressure (PAP) tests are conducted by certified veterinarians who run a catheter down the jugular and into the pulmonary artery where a pressure measurement is taken.

These scores, measured in millimeters of Mercury (mmHg), normally range anywhere from 30 mmHg to 180 mmHg, with lower scores being more favorable.

The PAP procedure has been helping high-altitude operations avoid the unfavorable onset of HAD by finding high-risk individuals earlier in life. High-risk cattle are sent to live at lower elevations and are not selected to be parents of the next generation.

In order to take high-altitude PAP measurements on individual groups, animals need to be living at elevations of 5,500 ft. or greater for at least a four- to six-week period before scores are collected. This warm-up period allows cattle to adjust to the environmental settings for accurate assessments to take place.

Selection

Since the introduction of the PAP measurement technique, a significant number of PAP scores have been recorded. Using these data, much research has taken place to learn more about the trait.

This research has found PAP is moderately heritable, meaning change through genetic selection is possible. Because of this, a PAP expected progeny difference (EPD) would be valued to find the cattle genetically more suited to produce offspring better equipped to live at altitude.

Through collaboration with CSU, the American Angus Association and Angus Genetics Inc. (AGI), the Angus breed was able to release a research high-elevation PAP EPD. In total, 4,700 high-elevation and 1,500 moderate-elevation PAP scores were used in this initial research run.

High-elevation PAP scores are scores taken at or above 5,500 ft.; whereas, moderate-elevation scores are recorded between 4,000 ft. and

The screenshot shows the Angus Genetics website interface. At the top, there are navigation tabs: Member Services, Management, Marketing, Commercial, News, Events, Shop, and About. Below the navigation is a search bar and a 'News & Announcements' section. The news section includes a headline about the 2019 Pathfinder Report and a link to the PAP Research EPD. Below the news is a table titled 'PAP Research EPD' with columns for 'Animal', 'PAP (mmHg)', 'PAP EPD', 'PAP Accuracy', and 'PAP Heritability'. The table lists various animals and their corresponding values. A red arrow points from the news text to the table.

Animal	PAP (mmHg)	PAP EPD	PAP Accuracy	PAP Heritability
10000001	100	0.00	0.00	0.00
10000002	100	0.00	0.00	0.00
10000003	100	0.00	0.00	0.00
10000004	100	0.00	0.00	0.00
10000005	100	0.00	0.00	0.00
10000006	100	0.00	0.00	0.00
10000007	100	0.00	0.00	0.00
10000008	100	0.00	0.00	0.00
10000009	100	0.00	0.00	0.00
10000010	100	0.00	0.00	0.00
10000011	100	0.00	0.00	0.00
10000012	100	0.00	0.00	0.00
10000013	100	0.00	0.00	0.00
10000014	100	0.00	0.00	0.00
10000015	100	0.00	0.00	0.00
10000016	100	0.00	0.00	0.00
10000017	100	0.00	0.00	0.00
10000018	100	0.00	0.00	0.00
10000019	100	0.00	0.00	0.00
10000020	100	0.00	0.00	0.00

5,500 ft. Heritability estimates, available online at <https://bit.ly/2Ilj23d>, were similar to those reported in previous research, with high-elevation measurements reporting a higher heritability estimate compared to moderate-elevation PAP scores. Because high-elevation PAP is more heritable, each PAP score taken at higher elevation actually influences the PAP EPD to a greater extent. In addition, moderate-elevation scores only act as an indicator trait for high-elevation PAP, much like ultrasound scan data is an indicator of carcass merit.

The research PAP EPD, like any EPD, predicts the genetic differences in PAP score, with a lower-PAP EPD being more desirable as it indicates a sire should produce progeny with lower PAP scores, decreasing risk of contracting HAD. It can be used as a tool to select parents for the next generation, but it does not replace testing bulls or females living in these high-altitude environments.

Because it is a research EPD, cattlemen will not see the EPD on animal pedigrees when searching on www.angus.org. Instead, a research report is published on www.angus.org for AI sires who have a 40% accuracy or above for the trait.

Conclusion

While this trait is not a concern for many across the United States, it is critically important to some. Development of the PAP EPD is one example of the innovation taking place within Angus. Looking at specific environments and developing tools, like EPDs and indexes, to aid operations in selecting cattle that will thrive under different environments or production systems remains a high priority for AGI. Traits like altitude tolerance and hair shedding are a new era of novel-trait selection tools to identify cattle that are suitable for different areas of the country. Next-generation tools add even more value to our Angus genetics. |

Editor's note: "Sorting Gate" is a regular *Angus Beef Bulletin* column featuring herd improvement topics for commercial producers using Angus genetics. Kelli Retallick is AGI's director of genetic service. For additional information on performance programs available through the American Angus Association and AGI, visit www.angus.org and select topics under the "Management" tab.