

# BY THE NUMBERS

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## Selecting Cattle for High Elevations

*High altitude disease (HAD) causes concern for Angus breeders running cattle at greater elevations.*

HAD, commonly called “brisket disease,” generally affects cattle running at or above an elevation of 5,000 feet (ft.). 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 in time.

### Fighting the disease

For years, researchers and veterinarians at Colorado State University (CSU) have been studying the disease and its onset to develop a testing method to find animals more suitable for these living conditions. The test aims to collect pressure measurements within the 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 30-180 mmHg, with lower scores being more favorable.

The PAP procedure has been

helping operations avoid the unfavorable onset of HAD by finding high-risk individuals earlier in life. Identifying these animals early allows producers to avoid sending these types of animals to high altitudes and removes them as selection candidates to breed for the next generation.

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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 4-6-week period before scores are collected. This warm-up period allows cattle to adjust to the environmental settings for accurate assessments to take place.

### Genetic evaluation research

Since the introduction of the technique, a significant amount of data has been collected. Using this data, research into tools to aid in the genetic selection of cattle with lower PAP scores has taken place. Some of the first American Angus Association

research on PAP began in 2013, but at that time not enough data was present to release a research expected progeny difference (EPD). Therefore, the American Angus Association, Angus Genetics Inc. and CSU began to pool data resources to lay the fundamental groundwork for a PAP genetic evaluation.

A recent study, looking at the three combined Angus datasets, investigated the relationships of scores taken at different elevations. The study by Pauling et al. (2018), found a high positive correlation ( $r=0.83$ ) between PAP measurements taken at high (5,250 ft. or greater) and moderate (4,000-5,250 ft.) elevations, which supports that PAP scores taken at moderate elevations can be an informative indicator of measurements taken at higher elevations. In fact, the correlation between the two elevations is actually higher than witnessed between carcass records and ultrasound scan measurements used to inform carcass EPDs.

For the Association’s PAP genetic evaluation, measurements taken at 5,500 ft. or greater are considered high-elevation measurements; whereas those taken from 4,000 to 5,500 ft. are considered moderate

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elevation. Heritability estimates, as depicted in Table 1, were similar to those reported in previous research with high-elevation measurements reporting a higher heritability estimate compared to moderate-elevation PAP scores. In addition, the correlation estimate between the two elevation groups remained relatively unchanged from previous reports.

In total, 4,700 high-elevation and 1,500 moderate-elevation PAP scores were used in this initial research run. Through collaborations with high-altitude breeders and CSU, more data will be added to this database in the coming months.

**Table 1: Heritability (on diagonal) and correlation (off diagonal) estimates for high and moderate elevations.**

	HIGH	MODERATE
HIGH	0.32	0.80
MODERATE	—	0.16

## Research EPD released

The research PAP EPD, which was released Feb. 1, 2019, predicts the genetic differences in PAP score with lower PAP EPDs being more desirable. A lower score indicates a sire should produce progeny with lower pressures, thus decreasing risk of HAD.

It is also important to remember a PAP EPD is not a replacement for taking scores on cattle living at high elevations. An animal may have good genetics to pass on to the next generation, but due to a life event, BRD for instance, their respiratory system may be damaged, causing them to lack the fitness to survive at high altitudes. Think of PAP in terms of scrotal size. Animals may have the genetic potential to pass along larger



scrotal size genetics, but scrotal circumference (SC) EPDs are not a replacement for breeding soundness exams (sometimes referred to as a BSE). Producers will not send a bull out without conducting a BSE no matter how good his SC EPD is. The PAP EPD can be valuable to select parents for the next generation with less risk. However, if a sire is to be taken to higher elevations to live, he should be tested.

With this initial release, only artificial insemination (AI) sires with accuracy values of greater than 0.40 are published with the breed average of the PAP EPD being -0.3. Members who have sent in data to the Association are commended for their efforts and as a result have received research PAP EPDs on individual animals in their herds with PAP scores submitted. If members have PAP data they would like to send into the Association, they are asked to

log into their AAA Login account to submit these scores. The collection of more PAP data will allow for more research on the topic and, ultimately, more definitive answers about HAD susceptibility.

For additional questions on PAP or the PAP EPD, please contact the performance programs department. [A](#)

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*Editor's note: The Association has worked to make participation in whole-herd reporting as simple as possible. If you have questions, contact the office at 816-383-5100.*