Pulmonary Arterial Pressure (PAP) Estimates and Relationship with Birth Weight, Gestation Length, Growth Traits, and Sire Lines

Kaylen Stearns, MS Student, Montana State University

Pulmonary arterial pressure (PAP) determines an animal's susceptibility to High Altitude Disease (HAD), also known as Brisket Disease, High Mountain Disease (HMD), and right-sided heart failure (RHF). Clinical signs of HAD include brisket edema, lethargy, jugular vein distention, diarrhea, poor appetite, and death. There is currently no treatment or cure for HAD and the only recommendation is to move affected animals to lower elevation. In 2012, it was estimated that 1.5 million head of cattle resided in high elevation production systems. High Altitude Disease accounts for 3-5% of calf death loss, yearly and results in an economic loss of approximately $60 million, annually.

To help mitigate the risk of an animal developing HAD, beef cattle producers can use PAP scores to determine an animal's susceptibility to HAD. Through a right-heart catheterization procedure, a PAP test measures the resistance of blood flow through the lungs. Similar to human blood pressure, PAP scores are measured in millimeters of mercury (mmHg). Scores will range from 30 mmHg to greater than 50 mmHg, with lower scores being more desirable (30-40 mmHg). Pulmonary arterial pressure scores are influenced by several factors, including age, sex, genetics, and environmental conditions.

There is very little research conducted relating PAP measurements to cattle performance and previous research that has been performed has yielded conflicting results. Researchers at Montana State University modeled the relationship of PAP with gestation length, birth weight, and growth traits of developing Angus bulls. In addition, this study compares mean PAP scores of the most common sire and grandsire lines from progeny within the data set. Increased knowledge of PAP scores and the relationship between performance traits and PAP estimates can allow for a better understanding of selection goals in beef cattle.

We collaborated with a Montana based Angus producer to investigate the relationship of Angus yearling bull pulmonary arterial pressure (PAP) estimates with birth weight, gestation length, and growth traits. The real-world application provided by using performance driven Angus seedstock cattle provides a unique component to our project. Our research showed there was a relationship between PAP and gestation length, birth weight, yearling weight, and weaning to yearling gain. The association between gestation length and PAP scores showed that as gestation lengths increased, PAP scores did as well. The relationship between birth weight and PAP also showed that as birth weight increased so did PAP scores. However, the relationship between PAP scores, yearling weight, and weaning to yearling gains suggested that as performance and gains increased, PAP scores decreased. From this result, we concluded that bulls with improved heart-lung function will experience increased gains and extra performance compared to those with decreased heart-lung function. Although we did find significant relationships with PAP and the above traits, these relationships still explain very little of the variation in PAP scores.

The findings from this study could help enhance beef cattle production in high elevation systems. By better understanding how PAP scores are related to performance, beef cattle producers can make conscious breeding decisions to achieve production goals based on their operation. Sire progeny showed consistency and little variability of PAP scores. This illustrates that sire selection for PAP does make a difference and has an impact within an operation.

For more information, please contact Kaylen Stearns (kaylenstearns@montana.edu) or Dr. Tim DelCurto (timothy.delcurto@montana.edu).