Beef Logic

by Bob Long

High Altitude Can be Problem for Cattle

Cattle breeders with ranches in the Rocky Mountain states are well acquainted with high mountain disease, also known as brisket disease. This malady rarely occurs below 5,000 feet of elevation, but at this altitude and higher it can be a serious problem. Herds of native cattle on high altitude ranches can experience death losses of 5 percent in some seasons. Cattle reared in lowland areas and moved to mountain ranches have suffered losses of 30 to 40 percent.

High mountain disease is a noninfectious disorder resulting from an atmospheric oxygen shortage at high elevations. Available oxygen is 17 percent less at 5,000 feet than at sea level and decreases to 31 percent less than sea level at 10,000 feet. Cattle at these high altitudes encounter this oxygen deficiency which causes pulmonary artery constriction resulting in an increase in pulmonary blood pressure (pulmonary hypertension). The right side of the heart must work harder to compensate for the increased pressure. This leads to heart enlargement and other circulatory problems resulting in edema (fluid collection) in the throat, brisket and along the underline — hence the name brisket disease. The overworked, enlarged heart weakens and death results from congestive right heart failure.

Any stress on cattle such as extremes in weather, rough handling, weaning or vaccinations, can increase the incidence of brisket disease. Even a high energy concentrate diet can precipitate the problem and feedyards located at high altitudes have experienced losses.

High mountain disease is observed in all breeds. However, there is wide variation in the ability of cattle to tolerate high altitude and its oxygen deficiency. Fortunately, the ability to thrive at extreme elevations is highly heritable and so selection of breeding stock for this trait can solve the problem.

Jim Brinks and other researchers in the animal sciences department at Colorado State University established in the late1970s that cattle with the ability to tolerate high elevations carry a much lower Pulmonary Arterial Pressure (PAP) than those susceptible to brisket disease. Healthy, normal cattle can range in PAP from 30 to 45 millimeters of Mercury (mmHg) and any animal over 50 mmhg is considered a poor risk for either seedstock or commercial production at high elevations.

PAP has been found to be highly heritable (.75) and low PAP identifies those cattle that can tolerate high altitude. Therefore, purebred breeders who wish to sell seedstock to ranchers in the Rocky Mountain states should make PAP a routine performance measure on every animal. Fortunately, as PAP goes down other measures of performance tend to improve — a desirable negative correlation.

A measure of PAP requires that a plastic cardiac catheter six feet in length and connected to a physiological pressure transducer be passed down the jugular vein through the heart to the pulmonary artery and the pressure recorded. This is an expensive and time consuming procedure requiring the following:

1. A trained and experienced technician with proper equipment.
2. Cattle from 10 to 14 months of age that have been treated alike.
3. Cattle located at 6,000 to 7,000 feet above sea level and having been there at least 90 days.
4. Animals at least 2 weeks post weaning.
5. No vaccinations within 2 weeks prior to testing.
6. Ambient temperature above 32 degrees.
7. A squeeze chute and head gate.
6. Electricity and clean water available.
9. Two cowboys to assist in handling the cattle.

The requirement of conditioning the cattle at high elevations for 90 days before testing would appear to eliminate the use of PAP scores in lowland herds. However, breeders or AI studs wishing to establish PAP values for top bulls can do so by arranging for progeny tests in herds with a PAP data bank Such herds are few. Colorado State University has this information on large numbers in their experimental herds.

A leader would be Tybar Angus, a progressively managed seedstock herd at Carbondale, Colo. Tybar has PAP data on several generations that has been used by Colorado State personnel to compute expected progeny differences(EPDs) for PAP on the entire Tybar herd. An untested bull could be progeny tested in such a herd and assigned an EPD for PAP on the basis of his progeny's scores compared with herdmates.

The industry will hear more about PAP scores and PAP EPDs in the future as commercial breeders in the Rocky Mountain states demand this information when buying bulls. AJ

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Send or fax your comments to:
Editor, Angus Journal
320 1 Frederick Blvd.
St. Joseph, MO 64506
Fax(816)233-6575