

# Integrated Livestock Management

## High Mountain Disease

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High mountain disease (HMD) is also known as brisket disease, high altitude disease, dropsy or big brisket to the rancher and is a common condition in cattle raised on ranches at high altitudes (>5,000 ft.) in Colorado and its surrounding states. Although the proportion of oxygen in the air is the same at all altitudes, the atmospheric pressure is not. This means that as altitude increases the oxygen content in the air decreases. The reduced amount of oxygen present in the air at high altitude means less oxygen reaches the lungs and pulmonary artery. This causes the pulmonary artery to constrict, becoming narrower, making it harder for the heart to pump the same amount of blood through the lungs (similar to a partially blocked hose pipe). The constrictive response of the pulmonary blood vessels to low oxygen levels common to all mammals is a means of distributing blood away from poorly oxygenated areas within the lung to areas that are better oxygenated. However, there are three main reasons why cattle are particularly susceptible to low oxygen levels:

- The contractive shunting response in cattle is more exaggerated than other species.
- The design of the bovine lung does not allow free passage of air between neighboring regions.
- Cattle have small lung-size to body-weight ratios.

The result of pulmonary artery contraction and narrowing is increased blood pressure in this vessel (pulmonary arterial hypertension). If the animal stays at high altitude and the hypoxic stimulus remains then the muscle cells present in the wall of the pulmonary artery grow so that the wall thickens. Eventually, due to the sustained pulmonary arterial hypertension, right-sided congestive/dilatory heart failure develops. In order to pump the same amount of blood through the lungs the heart must work harder. Similar to muscle growth from resistance training or enlargement of the heart by endurance training in humans the heart of cattle with elevated PAP responds to the increased workload by enlarging. However, over time, the changes that occur within the heart reduce the effectiveness of the heart as a pump and the heart begins to fail. Heart failure produces the clinical signs characteristic of the disease, and ultimately leads to death of the animal.

## Signs of HMD

The cardinal sign of HMD is swelling of the brisket due to the buildup of fluid (edema). Other signs apparent of HMD in a live animal may include:

- Lethargy
- Weakness, unable to rise
- Decreased appetite
- Collapse
- Diarrhea
- Bulging eyes
- Distension and pulsation of the jugular vein
- Swelling due to edema of the limbs, under the jaw and/or belly
- Edema of the brisket region most apparent
- Death

The body temperature is usually normal but it may rise if there is an underlying illness or the animal is heat stressed.