Estimating Overnight Weight Loss of Corralled Yearling Steers in Semiarid Rangeland

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On the Ground

• A common practice for assessing livestock weight gains from grazing animals on rangelands is to confine animals overnight without feed or water to reduce variation in weight loss and percent shrink.
• Advances in remote sensing of vegetation, such as the Normalized Difference Vegetation Index (NDVI) provide opportunities to estimate greenness (an indicator of both the quality and quantity of the plant community) that could be used with air temperature and relative humidity as predictors of percent shrink in grazing animals.
• We determined percent shrink losses from cross-bred yearling steers at each of four weigh dates for four consecutive years.
• Percent overnight shrink by yearling steers grazing semiarid rangeland was influenced positively by air temperature and NDVI values, but not relative humidity.
• The prediction equation we developed can provide temporal weight gain data within a grazing season without the logistical difficulties in gathering and holding animals, as well as eliminate associated animal stress from shrinking and regaining gut fill multiple times.

Keywords: air temperature, overnight shrink, relative humidity, remote sensing, shortgrass steppe.

A common practice for assessing livestock weight gains from grazing animals on rangelands is to confine animals overnight without feed or water to reduce variation in gastro-intestinal (gut) fill, which can represent 10–22% of pre-shrunk body weight. Other common weighing protocols include only withholding feed, weighing animals on multiple, consecutive days, and weighing animals at the same time each day. There is a need for a standard procedure that is less labor intensive and more animal friendly. Percent animal weight lost during this overnight period ranges from 2.3–5.9% of total body mass over 12 hours for steers on rangeland. Environmental influences associated with weather conditions, such as humidity and temperature, can affect shrink for cattle grazing on rangeland.

Advances in remote sensing of vegetation provide opportunities to estimate greenness that could be used as another predictor of percent shrink in grazing animals. The Normalized Difference Vegetation Index (NDVI) is a broadly applied remotely-sensed spectral index that integrates two key spectral features of vegetation: 1) low reflectance in the red wavelengths, and 2) high reflectance in the infrared portions of the electromagnetic spectrum. It is calculated as: NDVI = (IR-R)/(IR+R), where R is the reflectance in the red portion of the electromagnetic spectrum and IR is the reflectance in the infrared portion. Values range from 0 to 1, with low values (e.g., 0.1) representing bare ground and higher values (e.g., 0.8) representing active growing vegetation. NDVI has been directly related to aboveground forage production and forage quality in the North American Great Plains.

Understanding the influence of NDVI, in addition to environmental factors, on percent shrink for grazing animals could provide an acceptable alternative to traditional production practices by offering a practical and reliable method for estimating weight losses from overnight shrink on cattle grazing rangelands across the grazing season. This would allow for quantitative temporal gain measurements without the associated stress of the shrink and regaining gut fill for grazing animals following each weigh date. Cattle would only need to be gathered and weighed immediately (i.e., unshrunk weights), and then placed back on pasture. Alternatively, non-shrunk cattle weights could even be obtained automatically from scales within pastures and weights adjusted using determined prediction equations derived from experimental studies.