 

Management of Grazing Distribution:

An Update of the Latest Research

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**Objective**

The objective of this Fact Sheet is to provide a brief review of established approaches to manipulate grazing distribution and summarize recent research that will be discussed during the 2013 NM SRM Summer Meeting Field Days and the SWCRS Distribution Workshop on June 25, 2013. References provide in-depth information on grazing distribution practices. Many of the references are available at:

<http://aces.nmsu.edu/academics/anrs/targeting-cattle-grazing.html>

**Introduction**

The 4 principles of grazing management are stocking rate, timing of grazing, kind and class of animals and distribution ([Vallentine 2001](#_ENREF_16)). Management of livestock distribution has large potential returns in the western US because often about 1/3 of extensive and/or rugged rangelands of the western US do not get grazed. If managers can successfully manipulate grazing, stocking rates can potentially be increased on a sustainable basis. Also, many environmental concerns associated with livestock grazing, such as degradation of fishery and wildlife habitat, water quality and rangeland health, are a result of poor distribution ([Bailey 2005](#_ENREF_2)). Management of distribution can be used to resolve many issues associated with livestock grazing.

Most of the tools available to ranchers to manipulate grazing distribution have been known for years ([Williams 1954](#_ENREF_19)). [George et al. (2007](#_ENREF_11)) and [Bailey (2004](#_ENREF_1)) recently reviewed grazing distribution management practices. Water developments are a powerful tool to improve distribution, especially if there are portions of gentle or rolling pastures that are greater than 2 miles from water ([Holechek 1988](#_ENREF_13)). In rugged or mountainous pastures, water developments may be a great method to improve distribution if areas are further than 1 mile from water. Although water development is a powerful tool to improve distribution, it can be expensive to construct and requires maintenance.

Fencing is often used to improve distribution, but fencing and pasture rotation does not necessarily result in improved distribution ([Bailey and Brown 2011](#_ENREF_3)). Reducing pasture size often does not change the underlying factors that are limiting distribution such as slope, elevation, distance to water and plant community preferences. Fencing can also be expensive to construct and maintain. See [Bailey and Brown (2011](#_ENREF_3)) and [Bailey (2005](#_ENREF_2)) for a complete discussion.

Strategic supplement placement can be a powerful tool to change cattle distribution during periods when forage is dormant. Mature forage is usually deficient in protein and other nutrients and supplements are attractive to livestock. Low-moisture block protein (LMB) supplements have been used successfully to attract cattle to graze steep slopes and areas far from water ([Bailey et al. 2001b](#_ENREF_10); [Bailey et al. 2008a](#_ENREF_8)).

Low-stress herding can be a useful technique to reduce livestock use near riparian areas. [Bailey et al. (2008b](#_ENREF_9)) found that herding cattle from riparian areas to uplands at mid-day reduced cattle use near streams and increased the amount of residual herbaceous vegetation along stream banks.

**Recent Research**

**Targeted Cattle Grazing**

The combination of low-stress herding and strategic supplement placement can be a powerful tool to focus cattle grazing during dormant forage conditions ([Bailey et al. 2013](#_ENREF_6)). After cattle become accustomed to LMB supplements, cattle can be herded to target areas where salt and LMB are placed. Research at 4 study sites show that cattle will often stay near target areas for about 8 hours / day (33% of their time). Herbaceous standing crop within the study areas can be reduced by 30% to 50% without the use of fencing. Our research shows that cattle grazing can be focused with these techniques in rugged terrain and at distances from 1 to 2 miles from water. [Bailey and Stephenson (2013](#_ENREF_5)) describe the techniques needed to successfully implement targeted cattle grazing. Targeted cattle grazing can be used to attract big game into specifc areas by reducing levels of dormant and rank vegetation that big game typically avoid ([Pollak 2007](#_ENREF_15)). Targeted cattle grazing can also be used to manage fine fuels to help in wildfire control ([Varelas 2012](#_ENREF_18)). In areas where wildfires have burned rangeland in mosaic patterns, targeted cattle grazing could potentially be used to focus cattle in unburned areas, while burned areas recover. Typically, pastures that have burned are rested for 2 years after the fire. In areas with intermittent wildfires, targeted cattle grazing could be used to allow some use of the pasture without adversely impacting areas that were burned.**Genetic Selection for Grazing Distribution**

Genetic selection is a powerful tool to improve productivity of livestock. Grazing distribution like other traits is affected by both nature and nurture. [Howery et al. (1998](#_ENREF_14)) found that mothers had a strong effect on their daughters’ spatial distribution preferences. The effects of the mother were attributed to early learning because they also occurred for both biological and foster mothers in this cross-fostering study. [Bailey et al. (2010](#_ENREF_7)) found that previous experience affected distribution patterns of cattle in extensive pastures in the Chihuahuan Desert. Cattle with recent experience in the desert grazed farther from water than naïve cows and cows that had not been in the desert for 3 years. The genetic effect of grazing distribution has not been studied extensively. Cattle breeds that were developed in mountainous terrain, such as Tarentaise, use steeper and higher terrain than cattle developed in gentler terrain such as Herefords ([Bailey et al. 2001a](#_ENREF_4); [VanWagoner et al. 2006](#_ENREF_17)). Similarly, cattle breeds that are adapted to hot temperatures can travel further during the summer than cattle adapted to temperate conditions ([Herbel and Nelson 1966](#_ENREF_12)).

We tracked 160 cows at 7 ranches located in New Mexico, Arizona and Montana. We found that genetic markers on chromosomes 4, 8, 12, 17 and 29 individually accounted for 10 to 25% of the variation in use of steep slopes, high elevations and areas far from water. The association between indices of terrain use and multiple genetic markers near candidate genes clearly shows that cattle grazing distribution is a heritable trait. These types of traits are typically described by a statistical procedure from large populations known as heritability estimate (i.e., proportion of phenotypic variation explained by genetics). Our initial results suggest that the heritability of grazing distribution may be similar to that of weaning weight, which has been the most economically relevant trait in selection decisions of cow/calf operations for almost a century.

We also have developed a prototype DNA test to identify cows and bulls that have superior genotypes for grazing distribution. This prototype will likely cost less than $30 per cow. Potentially, these tests can be used to identify bulls that will likely sire daughters that use more rugged topography and travel farther from water. These DNA-based results could also be used to select (cull) cows with superior (inferior) genotypes. Such selections could be made without the need for expensive GPS tracking. Only a blood sample and DNA test would be needed. Data from the DNA tests are complex so we will develop molecular breeding values for producers to use in the cattle breeding selection programs. The molecular breeding values will be similar to Expected Progeny Differences (EPD’s) that ranchers regularly use to select bulls and replacement heifers.

If subsequent research supports our initial study, new markets may become available to cattle seedstock producers in the Western US. Cattle breeders could select and sell bulls and replacement females that are uniquely adapted for rugged and extensive pastures that are common on arid and semiarid rangelands. [Bailey et al. (2001a](#_ENREF_4)) and [VanWagoner et al. (2006](#_ENREF_17)) found that performance of cattle that use steep, rugged terrain that is far from water have similar performance as cattle that use gentle terrain near water. Correspondingly, selection for grazing distribution is not expected to have any negative effect on reproduction or calf weaning weights. Cattle adapted to rough topography and large acreages should have similar temperaments to cattle that have not been selected for distribution. Previous research by the investigators has shown that terrain use was similar among cows with docile, moderate and aggressive temperaments at calving.

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