Low-stress Herding Improves Herd Instinct, Facilitates Strategic Grazing Management

Matt Barnes
Field Director,
Keystone Conservation

Introduction

Range riders can improve grazing management for rangeland health, livestock production, and coexistence with wildlife, potentially including large carnivores, by applying "strategic grazing management." In this project, practical conservationists partnered with progressive ranchers in western Montana to develop herding methods for strategic grazing management. We compared and combined two approaches to herding cattle at relatively high stock density within a rangeland pasture in a larger grazing rotation.

Strategic Grazing Management

Grazing under extensive conditions is uneven in both space and time, leading to distribution issues (Coughenour 1991; Bailey et al. 1996). At larger scales, incorporating complexity and adaptive management, the well-planned movement of a herd through multiple pastures (rotational grazing) can be used to improve rangeland health and grazing capacity (Norton 1998, 2003; Teague et al. 2013). This is in apparent contrast to classical grazing studies, which were generally done at small scales and with rigidly applied grazing schedules, that found little or no advantage to grazing "systems" (Briske et al. 2008, 2011). The range profession is now moving the discussion beyond the old debate, to the strategic management of grazing across space and time, in the context of complexity and creativity (Barnes and Hild 2013).

Grazing "systems" (e.g., rotational deferment and rest) were originally developed based on the needs of rangeland plants, with less focus on livestock needs. Rotational grazing, depending on the particulars of grazing frequency, intensity, and selectivity, is more suited than other systems to livestock nutritional needs (Kothmann 1980, 1984; Malecheck 1984). Stocking rate is generally more important than grazing system for livestock production because overstocking reduces animal performance (Hart et al. 1988, 1993; Bryant et al. 1989; Heitschmidt et al. 1990). However, rotational grazing can be used to manage the stocking rate at a finer scale, effectively increasing forage availability (Norton 1998, 2003; Steffens et al. 2009; Barnes et al. 2011; Norton et al. 2013).

Ideally, livestock grazing is managed such that animals use the entire ranch or allotment over the course of a grazing cycle, without repeatedly grazing the more desirable plants in preferred areas. A well-planned rotation can even out grazing across landscapes and shift selection to a wider variety of plants (Norton 1998, 2003; Barnes et al. 2008; Teague et al. 2013). The main guidelines are (a) to incorporate diversity in pasture layouts, (b) leave sufficient residual standing cover at the end of each grazing period, (c) allow sufficient time between grazing periods that the preferred plants are re-grown before they are re-grazed, and (d) vary the time of year that a pasture is grazed. In practice, this generally means relatively short grazing periods, with non-grazing periods long enough for plant recovery. On arid and semiarid rangelands, the ideal recovery period may be somewhat longer than a year. To accomplish all of this generally requires concentrating herds at relatively high stocking density (Steffens et al. 2009, 2013; Teague et al. 2013). Increasing stock density also promotes grazing animals' natural anti-predator behavior, and thus may facilitate livestock-carnivore coexistence (Barnes 2014).

To accomplish strategic grazing management, the facilitating practices that are potentially the most effective are (a) rotational grazing, provided that there are enough pastures and they are small enough, and (b) herding, if done in a way that achieves the same benefits as rotational grazing.

Herding

Herding (the tending of livestock by herders on the range) generally implies controlling livestock movement without fences, or on a finer scale within a larger pasture. Open herding within an otherwise extensively managed unit—such as from preferred (e.g., riparian) or sensitive areas to areas where more utilization is desired—can be effective range management (Butler 2000; Bailey et al. 2008), but usually does not dramatically increase stock density. Close herding (at high stocking density) through the management unit over the course of a season, if preventing repeat grazing of preferred plants, can be considered functionally equivalent to rotational grazing without physically bounded pastures (e.g., Bradford and Allen 1999). Using the principles and techniques of low-stress livestock handling (LSLH) (Hibbard 2012), herding (i.e., low-stress herding) is much more effective than with conventional handling (Cote 2004, 2013; Bailey and Stephenson 2013).

Pilot Project

In a previous project, rancher Garl Germann developed and applied the "rodearing" method, with support from Keystone Conservation, as a way to improve grazing distribution and prevent losses to poisonous plants and predators, by herding cattle at high stock density on otherwise extensively managed rangeland. The term "rodear" is from the Spanish *rodear*, meaning to encircle; in cowboy jargon, it usually is applied to husbandry events such as roundups where animals are gathered and held in place on the range with little or no fencing. In this case the rodear is a form of close herding, where riders encircle and slowly move the herd at high stock density. It is neither a strictly conventional nor a LSLH method. In LSLH, it is not recommended to encircle livestock or to enforce an uncomfortably high stock density (Cote 2004; Hibbard 2012).

On the Germann Ranch's North Meadow Creek allotment in the Tobacco Root Mountains in the Beaverhead National Forest in Madison County, Montana, during 2012 and 2013, from June to August the riders were a daily presence with the herd. The riders mostly kept the herd together in a single group, putting them in small temporary paddocks of electric fence within the pasture ("sub-paddocks") at night and sometimes in the afternoons. Sub-paddocks were generally 1-3 acres surrounded by a single strand of polywire, or electrified fladry (a single strand of polywire with closely-spaced streamers, or "fladry," that hang down to almost ground level, through which wolves are afraid to pass). Most days, from early morning until mid-afternoon, the riders "rodeared" the cattle to water and back (the sub-paddocks were not located at water sources). This consisted of containing the cattle in a tight bunch and herding them slowly enough that they could graze most or all of the time.

In the Tobacco Root Mountains, including the Meadow Creek area, a wolf pack was present, black bears and mountain lions are common, and there have been reports of grizzly bears. The area also has significant poisonous plants (e.g., larkspur; *Delphinium* spp.), which had been a source of mortality in previous summers. Riders prevented all livestock losses during both summers of the project.

Objectives

The primary objectives of this project were to refine the methodology and demonstrate proof-of-concept of the rodearing method, and either improve the rodearing method with LSLH, or find the best combination of rodearing and herding with LSLH methods, in terms of effectiveness and labor input.

Herding Methods

Project Area

Dog Creek is a geographically distinct management unit of Sieben Live Stock Co., located north of Highway 12 between Helena and Missoula, near Blossburg in Powell County, Montana; just west of Priest Pass on the Continental Divide. The land is a mosaic of grassland with conifer and aspen (*Populus tremuloides*) forests. It is highly productive rangeland and in good rangeland health. The ranch supports wildlife, including deer and elk, resident coyotes and black bears, and is within the geographic range of the gray wolf and at the southern end of the expanding grizzly bear population from the Northern Continental Divide.

This is already a well-managed ranch, with relatively intensive grazing management. Sieben Live Stock Co. uses Holistic planned grazing, an aspect of the Holistic Management decision-making framework. This means that grazing management is planned based on all important considerations, including but not limited to rangeland health, livestock production (overall and individual animal performance), water availability, presence of wildlife, and social factors. The Dog Creek operation uses rotational grazing (a single herd contained on a portion of the landscape at any time, and moved around the landscape in a sequence of pastures), combined with rotational rest (some pastures are rested each year). The Dog Creek unit is several thousand acres, fenced into seven permanent pastures, which the owners usually subdivide with temporary electric fence for a total of 14 to 21 pastures. In most years it is stocked with 500 to 600 custom-grazed yearlings. In 2013 it was stocked with 386 co-mingled (i.e., not originally from the same herd) spayed heifers (a reduction in response to two years of drought).

Our project built upon this foundation of existing pastures to further intensify management. We set up a project in the last pasture in the rotation, the Olson Meadows, during 2013, September 3-16. This is highly productive pasture of loamy soils, primarily in the silty and wet meadow (20-inch precipitation zone) ecological sites. Dominant grasses include rough fescue (*Festuca scabrella*), Idaho fescue (*F. idahoensis*), bluebunch wheatgrass (*Pseudoregnaria spicata*), pinegrass (*Calamagrostis rubescens*), needlegrasses (*Achnatherum* spp.), and the introduced timothy (*Phleum pretense*) and redtop (*Agrostis gigantea*). Water is available at three metal tanks; there are no live streams.

Two-Phase Approach

Prior to the project, the heifers would form small- to moderate-sized groups and spread out across much of the available pasture, but would not use it evenly (see Figure 1).

Figure 1. Prior to herding, the co-mingled spayed heifers scattered themselves in small bunches.

Phase 1. For the first half of the project (Sep. 3-8), Germann and rider Eric Sauerhagen demonstrated the rodearing method (see Figure 2 and videos below), which involved keeping the cattle in a small temporary sub-paddock at night and rodearing them to forage and water during the day (see *Pilot Project* above).

Figure 2. Rodearing, a form of close herding.

The following videos demonstrate (a) a moving rodear with one rider applying pressure in the rear of the herd and the other holding the front, and (b) a rider containing cattle in a moving rodear. (Videos by Garl Germann)

Link to "Rodearing 101" video
Link to "Rodear Dynamics" video

Phase 2. For the second half of the project (Sep. 9-16), Barnes and Sauerhagen worked with Whit Hibbard (one of the ranch owners and the resident manager) to use LSLH to train the co-mingled heifers to function socially as a single herd (see Figure 3). They gathered the cattle at mid-day, herded them between water tanks using LSLH, and attempted to place them in a target area in late afternoon to evening. In this phase, once the heifers started to show increased herd instinct, we counted the number of groups each morning. We needed to use all three water tanks and the area between them every day, so we could not effectively divide the pasture in half for treatment purposes.

Figure 3. Range riders using low-stress herding to re-kindle the herd instinct, increase stock density, and manage grazing distribution.

RESULTS

Phase 1: Night-penning and Rodearing

In Phase 1, Germann and Sauerhagen demonstrated proof-of-concept for the rodear method. The temporary sub-paddock was established on several acres in the north corner of the pasture, based on an ocular estimate of forage for two to three nights. Over the week the polywire was moved out from the corner to incorporate more forage as needed. Because the pasture was productive and relatively easy to cross-fence, the cattle were not only night-penned, but kept inside the paddock for much of their morning feeding bout. They were then rodeared outside of the paddock to new forage and water.

The rodearing method demonstrated excellent fine-scale control over the cattle (see Figure 4). However, the high stock density needed to be constantly enforced by either the two riders or polywire. Also, unless the temporary paddock contains a sufficient water source, the method requires daily use (i.e., to herd the cattle to water).

Figure 4. The rodear involves cattle encircled at high stock density. This mobile phone app shows 386 heifers on 1.15 acre, or a stock density of 252 animal units per acre. (Figure by Garl Germann)

Phase 2: Low-Stress Herding

In Phase 2, Barnes and Sauerhagen, and on some days Whit Hibbard, kept the cattle outside of the temporary sub-paddock. They gathered the cattle at mid-day when the bulk of the cattle began going to water. The cattle would cluster around one tank even after it was empty, so we herded the cattle from that tank to the others using LSLH. LSLH is based on the principle of using pressure and release to inspire the cattle to do what the herder wants them to do, letting them think that it is their idea. Based on this principle, we took the herd on a drive, in a way intended to be rewarding to the cattle. We started the cattle in an intended direction toward an attractant (usually a water tank), and then let them line themselves out as they would without human pressure, and let the stragglers catch up to the leaders at their own pace. After watering, we then attempted to place the cattle in a target area using LSLH techniques. For the first few days we had little success, except that the cattle seemed to be getting calmer. Initially they actually spread out away from the placement area as soon as we left, indicating that they were not yet as comfortable with that stocking density as they appeared to be. On the fifth morning (day 6), 95% of them were together in a single herd, about 0.5 mile from the target area where we had attempted to place them. We directed the remaining heifers towards the main herd, and the entire herd then moved together around the pasture all day without rider pressure. That evening (day 6) we attempted another placement, and the next morning (day 7), the herd was not all together, but for the first time a significant proportion remained in the target area (see Figure 5).

Figure 5. The herd instinct rekindled after low-stress herding. This photo of cattle voluntarily remaining at high stock density was taken 24 hours after the riders stopped herding.

Figure 6. After the riders had successfully rekindled the herd instinct using low-stress herding, they attempted to place the cattle from a rodear (enforced high stock density). The cattle appeared to be placed and did not appear to be stressed, but they did not remain as a herd, nor remain placed.

That afternoon (day 7) was our final opportunity to try placing the cattle. We attempted to combine the two main methods by rodearing the cattle (i.e., keeping them tightly encircled rather than letting them line out), and then attempting to place the cattle simply by slowing the rodear to a stop (see Figure 6). This did not work, as on the final morning (day 8) the cattle were spread out all over the pasture again—a result that is counterintuitive but consistent with LSLH theory (see Discussion below).

Lessons Learned

Overall Successes

We met our original purpose in that we applied and measured holistic and conservation-based livestock management and grazing practices for range health, wildlife, and habitat. We now have proof-of-concept of those practices, although there remains room for refining and recombining them. We used leading-edge methods to intensify grazing management within an existing rotation, increasing stocking density with herding. This has benefits for rangeland health, and by extension both livestock production and wildlife habitat. It all works by breaking undesirable patterns of over- and under-use, and managing grazing in a way more like what these plant communities evolved with, based on the patterns of wild grazing herds in the presence of their predators. The rodearing method, in particular, demonstrated exceptional control of cattle grazing. No wildlife conflicts occurred during the project (although we cannot conclude that this was a direct result of our practices because we cannot measure events that did not happen). These practices have potential for broader application, and we plan to build upon this initial success in future years.

Grazing Distribution

We could not conclusively assess our effect on grazing distribution. Because of its management, the ranch already has shorter grazing periods, higher stocking density, and more even distribution of grazing across the landscape than it would likely have under season-long grazing. Because we only had one pasture to work in, with herd size as well as beginning and ending (shipping) dates fixed, we had no way to demonstrate an increase in grazing capacity (the sustainable stocking rate for a given level of animal performance). Cattle selected native bunch grasses and avoided timothy and redtop regardless of method. However, every acre was grazed, and most of the pasture was grazed lightly. The northern two-thirds was grazed more moderately simply because cattle used it (not including the sub-paddock) throughout the grazing period, while they only had access to the south third of the pasture during the second week. We estimated that there was enough forage left to sustain the herd for at least another week, and possibly two. This suggests that we may indeed have improved distribution (see Figure 7).

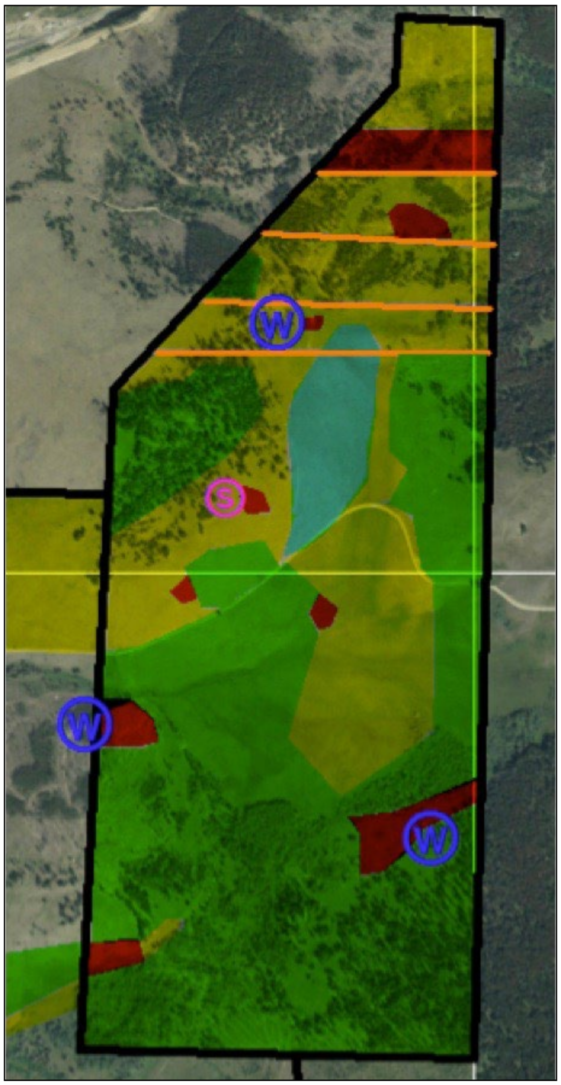

Figure 7. Utilization map of the Olson Meadows, September 2013. Blue = slight (0-10%), green = light (11-30%), yellow = moderate (31-50%), and red = heavy (>51%) utilization. W = water tank; S = salt/mineral feeder. The orange lines represent the locations of the temporary electric fence (beginning in the north corner and moving southward). In previous years without herding, utilization at the north end was slight. (Map by Todd Graham)

The temporary fenceline was advanced every day or two in strip-grazing fashion. In other words, had we continued this pattern across the entire pasture, we would have strip-grazed it, but we also used rodearing (or herding) to take the cattle to water and back. This approach could be used to maximize use of unpalatable plants (e.g., timothy and redtop, which only had significant use in the more heavily grazed patches inside the sub-paddock). However, forced use of low-quality forage would likely reduce animal performance. If the pasture can be simply subdivided with temporary electric fence such that all subdivisions contain sufficient water, rodearing would not be necessary and the total labor requirement would be much less, but many small paddocks would be required to achieve even utilization.

Herd Instinct

The amount of stress experienced by cattle due to handling is very difficult, if not impossible, to assess. In the first couple of days the cattle were not accustomed to the rodear formation (i.e., tightly encircled) and were difficult to keep together, but after a few days it became much easier. The cattle did not appear to be stressed. However, for the first few days that we attempted to place the cattle in Phase 2, as soon as the riders left, the cattle spread out in a ring-like fashion, leaving the target area empty of cattle. This likely reflects both that the riders were still learning the subtleties of LSLH, and that the cattle were not yet comfortable with this density. On the last afternoon, we re-incorporated the rodear formation into our herding, rather than allowing the cattle to choose their own density. Although it appeared to be working well at the time, the next morning the cattle were spread out all over the pasture again. We lost all of our progress of the previous several days. This was counterintuitive, as the cattle did not appear stressed in the rodear, but is consistent with LSLH theory. That is, this anecdote suggests that the cattle were uncomfortable with the enforced density of the rodear formation and it had not been made their idea. This prevented success at keeping the herd together once the density was no longer enforced, thus preventing successful placement. This does not necessarily mean that the rodear is too high-density. It suggests, rather, that if the goal is for the cattle to learn to voluntarily stay at high density, riders need to let the cattle form a herd structure they are comfortable with, and gradually increase the density in a way that makes it their idea (i.e., by applying pressure and release). Riders should apply pressure to get a desired response (e.g., move towards the herd), then release pressure when the animal(s) do the right thing. If the desired density is constantly enforced by rider pressure with no release, staying in a tight herd won't be the animals' idea, they will likely feel uncomfortable, and they will tend to push back by spreading out.

Skill Level and Labor Requirements

Our experience reinforced what we already knew: LSLH is superior to conventional handling, but counterintuitive (as well as somewhat counter to much of cowboy culture). An individual must be dedicated to learning these principles and techniques, or else they will either abandon them outright or conclude that they already know how to do it when they really don't. This is a significant barrier to adoption of LSLH in general.

The labor requirements for any kind of daily herding are substantial. Herding, to work well, needs trained riders—preferably trained in LSLH. Most cowboys are not trained in LSLH (many claim to use it but clearly do not know what it means). Rodearing required less skill level but more rider-hours. In this project we used two riders most of the time, although a single skilled rider probably could mostly accomplish the low-stress herding once the herd is trained to stay together. A single rider would probably not be able to maintain the stocking density that we applied in the rodear, however.

We also learned that riders who were students of LSLH but not experts could not simply show up and instantly train the herd to stay together and immediately be successful at placing the herd. After five days we were successful at the former, but after a week we were unsuccessful at the latter. The cattle must willingly stay together as a single herd before riders can successfully place them. Placing livestock is also the aspect of LSLH that requires the most skill. (Bud Williams, the developer of low-stress livestock handling, noted that placing cattle takes a very high skill level.) A week was not long enough for the riders to successfully place this herd, or to achieve the level of control over the cattle that could be achieved in a few days with the combination of rodearing and night-penning. The short-term project suggested, however, that the level of control over grazing distribution would increase over time, and it seems likely that with skilled riders and sufficient time, the method of low-stress herding and no sub-paddocks would approach the effectiveness of sub-paddocks and rodearing. Herding would most likely be successful if significant time is invested at the beginning of the season to train the cattle to stay together as a herd (including night-penning in small paddocks), and then continuing with LSLH whenever animals are handled throughout the season, and supplementing existing fencing with low-stress herding as needed.

Significantly, the night-penning and rodearing method requires daily application (unless the sub-paddock contains sufficient water, which it usually does not because the intent is to promote grazing far from water). If the riders must miss a day, the cattle must be turned out, and then gathered again before the method can be re-started. Without sub-paddocks the cattle have free access to water, so it is not necessary that herding be done every day, and the time of day is not as critical. The method does work best after the cattle have gone to water about midday (Bailey and Stephenson 2013).

We were able to reduce the daily labor of temporary fencing and rodearing by changing the schedule from beginning in early morning and lasting much of the day to beginning in late morning and lasting several hours. This only worked because the bulk of the cattle's daily foraging requirement could be met inside the temporary paddock. On less productive rangelands, either the temporary sub-paddock would have to be much larger, or it would have to be used only for night-penning. Herding without night-penning required fewer hours per day, largely because the riders simply waited until the cattle mostly gathered themselves around water at midday.

Conclusion

These herding methods work, but for them to be truly transferable, the benefits need to outweigh the costs. With two riders working every day, the labor cost of season-long daily herding probably would exceed the benefit in most situations. However, in many situations, especially after the herd instinct is (re)kindled, a single rider can apply low-stress herding. In this case, it is impossible to assess the labor costs relative to benefits because we did not have a control treatment of large-scale season-long grazing (which would maximize distribution problems). The ranch was already practicing rotational grazing with 7 to 21 pastures, and already has more even distribution than it would have without rotational grazing. Further improvement in distribution can be obtained simply by temporarily splitting a pasture with electric fence. This generally requires much less labor. In some cases, the maximum benefit relative to labor input may be with daily low-stress herding (and possibly night-penning) at the beginning of the grazing season, until the herd instinct is (re)kindled, followed by herding as needed.

LSLH methods are superior to conventional livestock handling in general whether moving livestock between pastures or herding them within a pasture. The difference between handling methods becomes both more important and more apparent the more often animals are handled, especially in the context of herding. The relative benefits of cross-fencing, herding, and rodearing will depend on the unique context of each individual ranch. All of these methods bunch cattle together and then move the herd around the landscape, rather than spreading the herd across the landscape. As such, they have on the most general level similar benefits, including preventing grazing distribution problems, increasing land health and capacity, improving wildlife habitat and potentially preventing livestock-wildlife conflicts.

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Matt Barnes *is Field Director for Rangeland Stewardship at Keystone Conservation. A former ranch manager and rangeland management specialist, he is a Certified Professional in Rangeland Management and holds an MS in Range Science. He is editor and coauthor of the sponsored issue of the* Rangelands *journal on Strategic Grazing Management for Complex Creative Systems.*

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