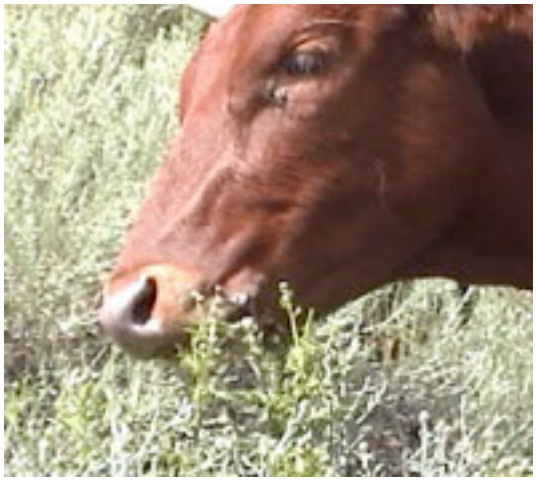

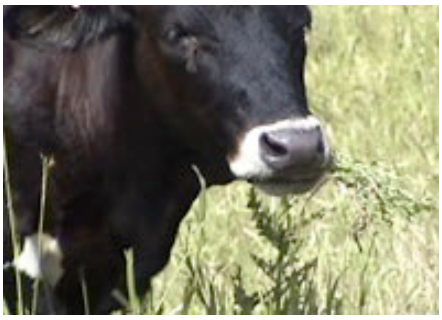

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Managing Livestock to Meet Weed Management Goals

Canada Thistle, Leafy Spurge and Spotted Knapweed

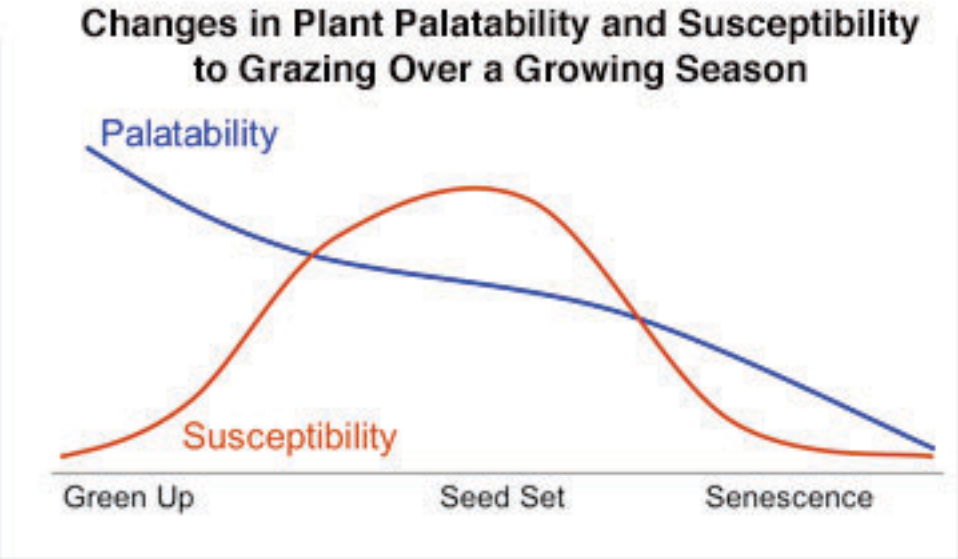
by Kathy Voth

Excerpted from 2009 Final Report for Grant-Kohrs Ranch National Historic Site
Cows Eating Weeds: Methodologies to Determine the Long-term Effectiveness of the 2004 Cattle Behavior Modification Project with Information on Managing Cattle for Weed Control

Managing Cattle to Meet Weed Management Goals

Once animals are grazing a target weed, our goals for that weed along with the time and money we have will determine how we manage our animals' grazing.

"Timing" and "Intensity" of grazing are our primary tools for managing vegetation. Timing of grazing means choosing the time of year when the target weed is most susceptible to damage from grazing and preferred species are least susceptible. As the picture below notes, a plant's palatability and susceptibility to grazing changes over the growing season with both palatability and susceptibility to control decreasing after seed set (Launchbaugh 2006). Since palatability is based on the nutritional value, it is obvious that we will have best luck with grazing when the plant's nutritional value is higher. Since seeds may also be spread in the manure of grazing animals, it also makes sense that we avoid grazing after seed set. Thus by paying attention to the growth stage of the target weed, we can pick a time before seed set to graze for maximum impact.



Intensity describes the frequency, or how often a weed is grazed, and the stocking density used when targeting a weed. We know that grazing a plant more than once during a grazing season can reduce its vigor and its population over time. Intensity of grazing is also increased when using a higher number of animals (a heavier stocking density), resulting in higher impact on the target weed. Some suggestions about timing and intensity are included by species below.

Even with proper timing and intensity, eradication of an invasive species is unlikely based on our past experience. In spite of concerted efforts over the last 50 years, weed populations continue to grow at about 14% per year. However, our historic experience with reductions in native grasses throughout the west, along with more recent targeted weed grazing research indicates that a plant can be severely reduced with grazing. How rapidly and to what degree we want to reduce a weed's population will determine how we manage our animals.

If speed and near eradication is the goal, we must spend a great deal of time and money managing our livestock. Since herbivores do not eat every part of every plant unless they are confined or forage is limited, and because rapidly reducing an invasive species population requires that every target plant be consumed, the closer we want to come to eradication, the more time and money we will need to spend on managing our grazing animals. Animals must be focused in smaller pastures,

we must move them to new pastures to prevent damage to preferred species, and then move them back again to hit regrowth of the target weed.

Under such a management intensive grazing system, the balance required between protecting preferred species and adequately injuring the target weed is difficult to achieve and requires daily and even hourly attention to changes in the pastures being grazed. Thus a prescription is not possible. Rather, the manager must be adaptable, and be prepared to practice both the art and science of grazing management.

Given those difficulties most targeted grazing managers prefer to take a slower approach towards reduction of weed populations, making a longer-term commitment to the process. One of the benefits of taking one's time is that material and labor costs are reduced. Another benefit is that potential damage to preferred species is easy to prevent and easier to recover from if a mistake is made.

Following are suggestions by species for developing a targeted grazing program to address the three weeds cattle were trained to eat based in part on a review of the literature presented by University of Idaho's Rangeland Ecology and Management Department (http://www.cnr.uidaho.edu/rx-grazing/Forbs). Because these species can all be found together in some Grant-Kohrs pastures, an overall suggestion for grazing management follows.

Leafy Spurge (Euphorbia esula)

Researchers recommend that 95% of top growth be removed. After the first treatment, regrowth should be regrazed. Grazing can occur in the growing and flowering stages. Work with sheep indicates that animals first learning to eat leafy spurge may prefer younger plants. As noted earlier, trained animals at Grant-Kohrs Ranch National Historic Site stripped leaves and flowers from plants in both June and August, so it is possible that grazing can be accomplished throughout the summer.

Potential Effectiveness

Grazing by sheep and goats has been very effective at reducing biomass on an annual basis when leafy spurge is grazed to a moderate to severe level of utilization. Thus, we should be able to expect similar results from cattle that have been trained or have learned from herd mates to eat the weed.

Researchers note that grazing effectiveness can appear to be low after the first year because plants might produce a flush of new growth the spring of the following year. The pictures on the next page from a grazing project in the Deer Lodge Valley in Montana, show that after four years of consecutive grazing, this high density infestation of leafy spurge was suppressed (Launchbaugh 2007).

In moist or riparian areas, leafy spurge appears to be more resilient, requiring more grazing frequency to suppress it. This is important to note since much of the leafy spurge on Grant-Kohrs Ranch National Historic Site occurs in riparian areas.

This is the infestation of leafy spurge in Deer Lodge Valley, Montana when herders first began using sheep to control it in 2001.

After the following year, spurge in the foreground has been replaced by grasses. Some spurge is still visible in at the base of the near hills and on the slope of the hill on the far left.

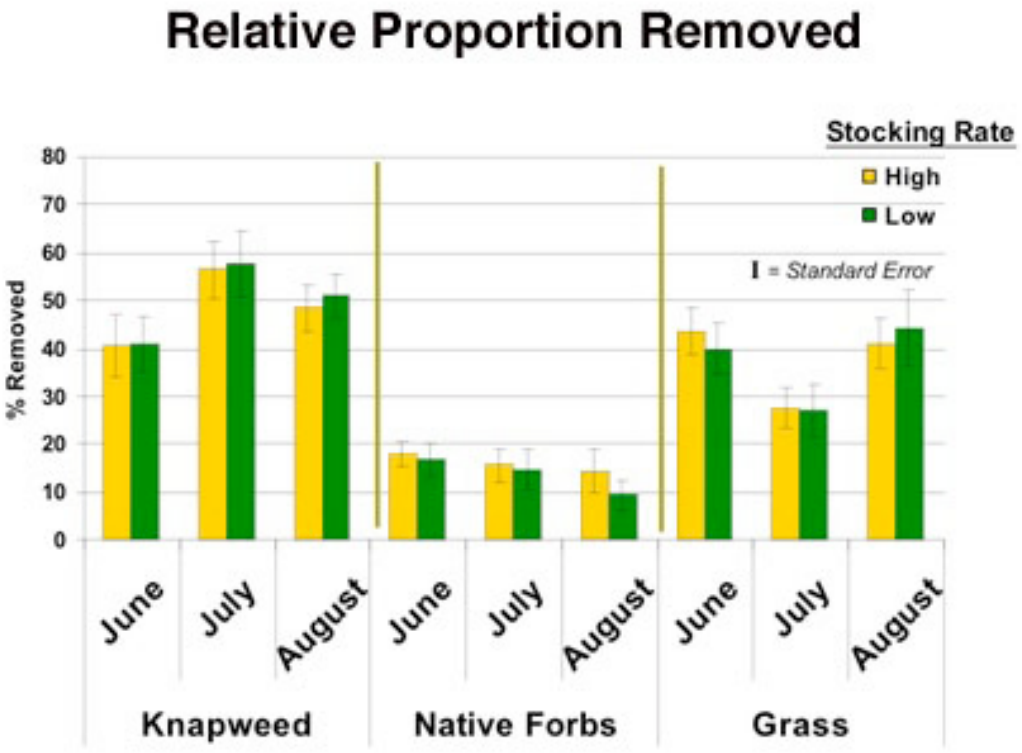
This is the pasture after four years of grazing by sheep. Leafy spurge is no longer visible.

Spotted Knapweed (Centaurea maculosa)

Since spotted knapweed is a biennial or short-lived perennial, the grazing objective for this plant is to prevent or reduce seed production. To choose the right time for grazing, I consider both potential impacts to the plant and the needs of the grazing animals.

A 2008 clipping study (Benzl) found that clipping during bolting stage reduced viable seeds by nearly 90% compared with no clipping, and that removing 100% of flowers at full bloom reduced seed viability by 100%. Unfortunately there is a great deal of difference between clipping and grazing. The clipper will always remove 100% of the flowers regardless of plant palatability. The cow, on the other hand, will never remove 100% of the flowers. She will also reduce the overall quantity she eats of the weed, and will eat more of the native grasses, because the nutritional value/palatability of the weed decreases when it is in flower.

The 2007 Launchbaugh study below indicates that target weed palatability is maximized, while impact on other species is minimized during July. Animals choose more of the target weed, and less of the grass during this month than the months of June and July. This coincides with what I observed in 2004 when the herd first grazed in trial pasture. Cattle in pasture grazed every knapweed plant to some degree, but all tops were bitten off. It is also what we would expect based on crude protein values of pre-flowering spotted knapweed (as much as 18%) and flowering knapweed (6.6 percent). Keep in mind that cattle require a minimum of 8% protein to function adequately.



Based on this information, I weigh the probability of reducing viable seeds by nearly 90% based on my animals' willingness to eat all bolting plants, versus the lesser likelihood of achieving 100% seed reduction when asking my animals to graze a plant that does not meet their nutritional needs. I keep in mind impacts on desirable species as indicated by additional research. This leads to my

preference for grazing in late June and July.

Management Cautions: That is not to say that grazing at this time doesn't have it's challenges. While our first year of grazing in trial pastures in 2004 indicated that grazing the grasses to 4 to 5 inches produced no negative effects, changes in precipitation can and will affect grass response. Thus, it is critical for range managers to take this into consideration when deciding timing and duration of grazing in any area.

Canada Thistle (Cirsium arvense)

Canada thistle is a perennial plant that has a vigorous and spreading root system making it more difficult to control whether with grazing or herbicide. Our objective in grazing this plant is to reduce its vigor by grazing it early and often.

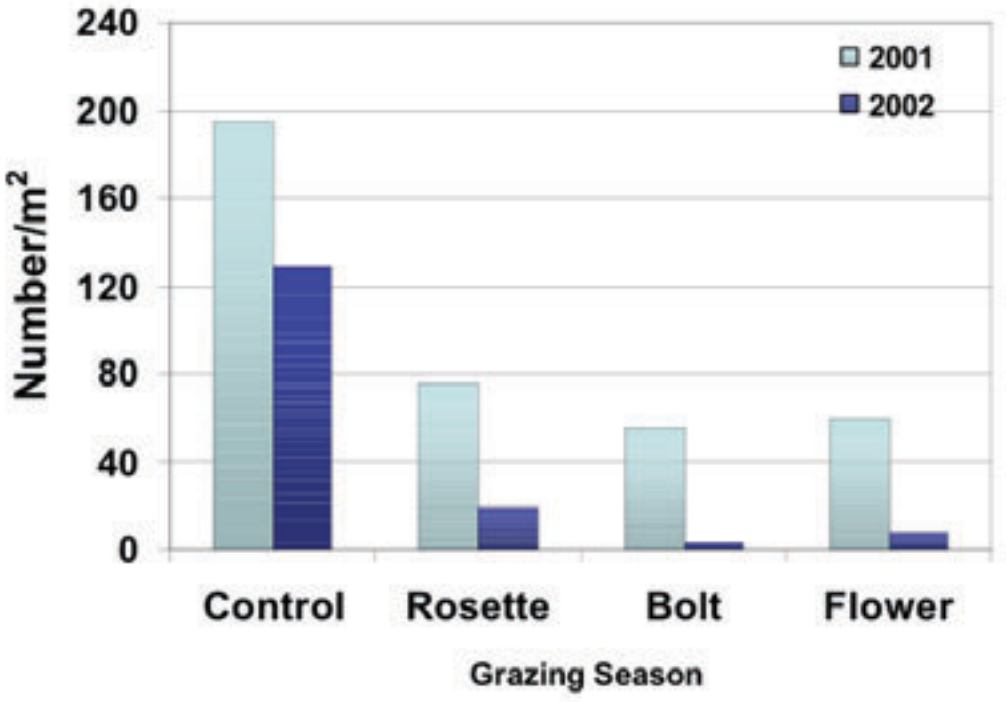
Researchers suggest beginning grazing when rosettes first appear, but since these are quite low to the ground, livestock may have difficulty removing rosettes. Our work at Grant-Kohrs Ranch and at 6 different ranches in the Ruby and Madison Valleys in 2008 demonstrated that trained cattle will graze this plant throughout the grazing season, that they will eat stemmier plants with equal gusto, and that they will graze it to the same height as the grass in the pasture. Ranchers in other areas have indicated that this kind of repeated grazing has eradicated Canada thistle from their pastures (Dennis Neal pers com).

Thus, animals should be moved from a pasture when necessary to protect preferred species, and returning to regraze new Canada thistle sprouts if grazing will not harm preferred species.

Suggestions for Cattle Management for Weed Management Goals.

Timing

Based on what we know about the three target weeds, focusing on grazing them in June and July when they are bolting and just before seed set will provide the most impact. This timing has been shown to reduce the number of flowers on spotted knapweed plants, as shown below (Launchbaugh 2007). It is also the time of year when the target weeds are at their most palatable.



Intensity

To really reduce weed populations using grazing, everything points to using high stocking densities and grazing plants more than once in a growing season. In Chapter 7 of "Targeted Grazing: A Natural approach to Vegetation Management and Landscape Enhancement, Bret Olson and Karen Launchbaugh provide the following suggestions for managing animals to achieve weed reduction goals:

> "The number of days to graze in a year depends on the characteristics of the target weed and the surrounding vegetation. The general goal is to graze at a frequency and intensity that will be most detrimental to the weed and most beneficial to the surrounding desirable vegetation. Exactly how this goal is accomplished will depend on the situation and the skill and knowledge of the person making grazing management decisions. The most common grazing strategies involve concentrating animals in relatively small areas for a few days and then moving them onto another area when defoliation objectives are met. In many cases, grazing prescriptions will involve returning to an area that was grazed earlier in the season to graze the regrowth of the target plant, preferably when desired species are dormant.

> "The number of years of grazing required for weed control varies, but will nearly always involve several consecutive years. The initial two to five years will focus on weed suppression based on the response of the target weed and surrounding plant community. After the target plant has been reduced to an acceptable level, grazing may be applied at a lower rate (fewer animals) and/or less frequent level for landscape maintenance. Targeted grazing is not a one-time and then walk-away tool – it is a long-term landscape enhancement commitment."

Given that the GRKO cattle herd will be reduced to less than 70 animals in the near future, treating areas with the target weeds at the intensity required will be difficult. Perhaps one of the most important contributions GRKO can make in advancing the use of cattle as weed managers would be as a demonstration ranch, using the small herd to target small pastures, and tracking animal performance and vegetation changes over time. Through on-going coordination with me as I gather new information, management of the herd could be adapted to improve impacts on weeds.

In this case, staff would pick a demonstration area and define goals for the vegetation in it. These goals could include reduction in target weed populations, increases in preferred vegetation, etc. The herd would then be used to meet those goals.

For example, if the goal was to reduce spotted knapweed populations the herd would be placed in the demonstration area in late June to early July when the knapweed is bolting, but not yet flowering. Animals would be moved when grasses were grazed to 4 to 5 inches in height to prevent long-term damage to them. Animals would return to regraze knapweed in late August or September when plants have had a chance to resprout or even bloom. Progress can be tracked over time using repeat photography and monitoring of plant densities in the demonstration area. Animals would be managed similarly for Canada thistle and leafy spurge reduction.

For more on the ins and outs of intensive grazing management, consult the book "Holistic Management Handbook: Healthy Land, Healthy Profits" by Jody Butterfiled, Sam Bingham and Allan Savory. Savory is known for his theories on intensive management, and though these theories have not yet been proven useful in arid areas, they seem to function well in areas, like the Deer Lodge Valley, that were traditionally grazed by large ungulates. (The book is available in paperback from Amazon.com for $24.75.)

Given that GRKO is considering leasing grazing on the ranch, another good demonstration opportunity would be using trained GRKO cattle to train lessee cattle before they begin grazing. Assuming that the leased areas would not be as intensively managed, comparisons in changes in weed populations could be made between intensively managed demonstration pastures and the leased pastures.

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Appendix D - Pasture and Grazed Weed Example Pictures

To help you select pastures with a good mix of forages, here are examples of pastures grazed at Grant-Kohrs Ranch National Historic Site in 2004 and 2005.

Target weeds are mixed in with all the forage you see here.

This is an example of a large spotted knapweed patch in this same pasture. Note that spotted knapweed tends to grow in drier areas and this is the drier end of the pasture.

Here is another pasture showing a mixture of grass and spotted knapweed.

Canada thistle was also mixed in with the grasses and spotted knapweed in this photo.

This is a long narrow pasture set up to test cattle on leafy spurge in August of 2005. Though the pasture was small it had a large patch of leafy spurge (foreground) as well as belly-high grass, Canada golden rod, and the other two target weeds as shown in the picture below.

Again, these pictures provide examples of where pastures and the mix of weeds with other forages. This picture shows grasses, canada thistle and spotted knapweed at the drier end of the pasture. The lower end of the pasture had little knapweed, but more grass as shown in the picture below.

Here are some examples of the varying degrees to which cattle graze spotted knapweed in pasture.

The ends were bitten off of this plant and leaves stripped from most stems.

Stems were grazed to about six inches from the ground on this plant.

This plant was grazed to about ten inches from the ground.

Here are examples of how cattle graze Canada thistle in pasture showing the progression from trimming tops to eating all but the stem of the plant.