

CHAPTER 1: Targeted Grazing – A New Paradigm for Livestock Management

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INTRODUCTION

Grazing by wild and domestic animals is a powerful natural force working in all ecosystems. The kind and abundance of plants that characterize any plant community are a result of the climate, soils, and herbivores including insects, wildlife, and livestock that inhabit that place. The regenerative or destructive power of herbivory to shape plant communities has been demonstrated time and time again as humans have managed the grazing of domestic livestock. For better or worse, livestock grazing has been applied for thousands of years in ways that change plant communities. Along with fire, grazing is the oldest vegetation management tool.

Today, livestock grazing is being rediscovered and honed as a viable and effective tool to address contemporary vegetation management challenges, like controlling invasive exotic weeds, reducing fire risk in the wildland-urban interface, and finding chemical-free ways to control weeds in organic agriculture. The challenge of converting livestock grazing from a ubiquitous land



use into a powerful vegetation shaping tool requires a paradigm shift for both land managers and livestock producers. Generations of herders and scientists have focused their efforts on improving the production efficiency of sheep, goats, and cattle for meat, milk, and fiber and for strength as draught animals. Recognizing that left unchecked, livestock grazing often resulted in the deterioration of pastures, early grazing management focused on mitigating these adverse effects so that forage could be grazed in a sustainable manner. Today's paradigm will harness the powerful ability of livestock grazing to change the botanical composition of grazing lands and use it to manage and control undesirable plants. The natural power of herbivory and the knowledge of how grazing influences vegetation communities can be skillfully combined to convert livestock grazing into a powerful tool for vegetation management.

This creation of a new livestock-based ecological service will require careful understanding of animal behavior and plant response. In the last few decades, a cadre of livestock producers has emerged who employ livestock with the primary purpose of controlling unwanted vegetation. In these new enterprises the traditional products of livestock production (meat, milk, and fiber) are a byproduct of vegetation management. This new paradigm emphasizes managing livestock as a service for vegetation control and creating desirable landscapes.

Targeted Grazing Defined

Targeted grazing is the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals. This concept has been around for decades and has taken many names, including prescribed grazing and managed herbivory. The major difference between good grazing management and targeted grazing is that targeted grazing refocuses outputs of grazing from livestock production to vegetation and landscape enhancement. The concept of a target requires that one has a clear image on which to focus and then aims something (i.e., an arrow) at the target to accomplish the desired outcome. In the case of targeted grazing, the land manager must have a clear vision of the desired plant community and landscape, and the livestock manager must have the skill to aim livestock at the target to accomplish land management goals. The key to success is having a clear understanding of both the Target (landscape condition) and the Arrow (livestock). Targeted grazing therefore requires knowledge of vegetation and landscape dynamics as well as livestock husbandry and animal behavior.

Value of Targeted Grazing

Scientific studies and practical experiences reveal the substantial value of grazing to meet ecological objectives. Sheep and goats are effective tools for reducing noxious weeds such as leafy spurge, spotted knapweed,

and kudzu. Managed grazing can also reduce the risk and extent of wildfire and improve wildlife habitat. Removing undesirable vegetation can be accomplished by controlled grazing along power line easements, irrigation canals, and roadsides and in forest plantations and orchards. Animal impact can also be harnessed to sow seeds for ecological restoration of degraded lands.

Targeted grazing should be considered as another tool in the kit for constructing desirable ecosystems. It can and should be used in combination with other technologies, such as burning, mechanical tree harvesting, hand-grubbing, chaining, applying herbicides, chiseling, and seeding. Most of these traditional management tools have significant economic, ecological, or social implications that limit their application. The vast roadless extent of many grazing lands makes it difficult to control noxious weeds with herbicides or to reestablish desirable forage plants after spraying. Weed and vegetation control is difficult on lands of low economic value, making chemical and mechanical treatments impractical. Insects and microbes for biocontrol can be quite effective for weed control but are difficult, expensive, and time consuming to develop. Prescribed burning is a useful tool, but its application is often hindered by concern over air pollution and the risk of unintended spread. Targeted livestock grazing is a readily available and under-exploited tool that is fast proving effective for vegetation management in many settings.

Research and on-the-ground experiences have clearly demonstrated that sheep and goats are a promising tool in the battle against weeds. Targeted sheep and goat grazing is an effective technique, rivaling traditional chemical and mechanical control methods for the management of deleterious invasive plants including leafy spurge, spotted knapweed, yellow starthistle, cheatgrass, saltcedar, and kudzu. Further, targeted grazing is viewed as an “environmentally friendly” alternative to traditional methods because it is often more effective and can be applied in vast roadless areas, leaves no chemical herbicide residue, can be removed whenever necessary, and often improves biodiversity. Plus, in the process of controlling undesirable plants, grazing animals convert them into saleable products – meat and fiber.

Livestock grazing, like any tool, can be misapplied and cause harm instead of repair. Overgrazing has often been implicated in encouraging the spread of noxious weeds. However, grazing can be honed into a highly effective weed management tool with precise application based on an understanding of plant-herbivore interactions. Converting grazing from a ubiquitous agricultural practice into a powerful tool for weed control and landscape enhancement will require information on the susceptibility and potential of the target plant or community for grazing the appropriate season and type of livestock necessary to achieve the desired objective.

Basic Principles of Targeted Grazing

The most important skill for all people applying targeted grazing for vegetation management is patience and commitment. The effects of correctly applied targeted grazing are generally slow and cumulative. A minimum of three years is usually required before noticeable differences in perennial herbaceous weeds are apparent. Browse may take much longer. Once management objectives are obtained, managers must be prepared to modify their grazing from the system in use when the problem occurred, or surely it will return.

Effective grazing programs for weed control require a clear statement of the kind of animal, timing, and rate of grazing necessary to suppress troublesome plants and maintain healthy landscapes. A successful grazing prescription should: 1) cause significant damage to the target plant; 2) limit damage to the surrounding vegetation; and 3) be integrated with other control methods as part of an overall landscape management strategy. Developing a successful grazing prescription requires a great deal of site-specific ecological information and animal management skill.

First, a targeted grazing prescription specifies the time grazing should be applied for maximum impact. This time is set when the target weeds are most susceptible to damage by grazing and when they are most palatable to livestock. How acceptable or palatable a plant is depends in part on the plant’s nutritive characteristics. The nutritive value or potential toxicity of plants varies throughout the growing season. Most plants are highly digestible and nutritious when they are young, and they become less nutritious as the season advances. It is also critical to apply grazing at a time of year when the target plant is susceptible to damage from defoliation. Plants are generally most susceptible to grazing when they have started flowering until they begin to form seeds. Enticing livestock to eat and cause damage to specific target plants requires careful selection of the time of year to apply grazing.

Second, the palatability of the target plant also depends on the animal’s inherited and developed plant preferences. Animals are born with a digestive architecture that makes some plants better forage than others. For example, cows have large, broad mouths and large rumens well suited for harvesting and digesting grass, but these same attributes make them less capable of eating shrubs. The narrow mouths of sheep and goats make them well suited for eating non-woody (herbaceous) broad-leaved weeds like leafy spurge, knapweeds, and kudzu. Goats are particularly well designed for eating shrubs with their dexterous tongues and lips and their relatively good capacity for detoxifying the tannins and terpenes often found in shrubs. Selecting the appropriate species for grazing forms the basis for an effective targeted grazing prescription. However, the life experiences and current nutritional state of an herbivore also influence the plants they will readily consume. A skilled livestock manager, or grazing service provider, knows how to prepare animals for specific vegetation management settings.

Finally, one must bear in mind that the plant targeted for control exists in a plant community of desirable plants. The basic goal of targeted grazing is to give the desired plants a competitive advantage over the target plant or plants. The challenge is to select the correct animal, grazing time, and grazing intensity to maximize damage to the target plant and minimize effects on the surrounding desirable vegetation. A clear understanding of the palatability and susceptibility of all plants in the community is needed to design a grazing strategy that will compromise the target plants and benefit the desirable plants.



Photo: Rob Rutherford, Cal Poly State University



Photo: Tim McCabe, USDA, NRCS

Role of Grazing to Reach Land Management Goals

Targeted grazing can play many land management roles depending on the current state and abundance of troublesome plants or weeds. Targeted grazing alone will not eradicate a weed. The prescriptive application of livestock grazing in vegetation management cannot be viewed as a one-time-then-walk-away approach. It must be viewed as a long-term landscape maintenance tool and as part of an integrated strategy. Targeted grazing can play an important role depending on the weed abundance:

- **Problem Prevention** – When weeds are at low levels on the landscape, carefully managed livestock grazing can keep weeds at bay and restore the balance to desirable plants in the community. It is likely that grazing programs could be useful in early stages of plant invasion to reduce colonization and slow the rate of invasion. Targeted grazing could prevent establishment of new plants or maintain low levels of weeds in the community.
- **Weed Control and Management** – At levels where weeds are having noticeable impacts, targeted grazing could be applied to control weedy plants and promote desirable vegetation. The careful application of the appropriate grazing animal at the

appropriate time and intensity can restore a balance in the ecosystem that allows the desirable plants to persist and thrive.

- **Converting Weeds to Feeds** – At high levels of weed dominance, livestock may be applied to harvest weeds as feed to gain a saleable product. Some weeds have significant nutritive value to grazing animals and can support livestock production. Many weed-dominated communities are stable and would be difficult to restore to a more desirable state. Viewing these communities for their potential forage value may be an important strategy with a focus on preventing the proliferation of other exotic plants that may be less palatable or more ecologically damaging. In some situations, such as crop aftermath or fallow, there is no concern for the so-called “desirable” plant community, and weeds can be viewed exclusively for their potential forage value.
- **Rehabilitation and Restoration** – When desirable plants have been pushed out of a plant community by the weedy species, opportunities to convert a landscape to a desirable state may require seeding and introducing new plants into the community. In these situations, livestock can be used to prepare a seedbed, trample seeds into the soil, and control weeds as new plants become established.



Balancing Vegetation Management Goals with Animal Production Goals

There is a continuum of management intensities that can be used for targeted grazing, and it is important to match the management intensity with the economic constraints of the land manager and the livestock production goals of the grazer. Examples of factors that will increase cost and reduce animal performance include: 1) high grazing pressure to induce livestock to consume a target plant, and 2) proximity to urban areas with inherent problems related to pets and the need to ensure that animals do not escape areas targeted for landscape enhancement. Vegetation management in situations like these can be very expensive and is often accomplished with dry females or castrated males that are not expected to produce a livestock product. At the other end of the continuum are producers from Texas to Montana where control of plants such as juniper and leafy spurge is a byproduct of their normal operation. These grazers may be willing to provide targeted grazing for the reimbursement of out-of-pocket expenses and free pasture.

There is also a continuum of the difficulty of controlling invasive plants, from easy to difficult to impossible. The difficulty of control will directly affect the intensity of management necessary to gain success in a targeted grazing project. On the “easy” end are plants such as Johnsongrass. Johnsongrass is considered a noxious weed and is a big problem in crops, but it is rarely found in pastures because it is very palatable and is quickly grazed out by any species of livestock at any

intensity of management. Leafy spurge might be considered a difficult plant to control because it is avoided by cattle. However, it is readily controlled with sheep or goat grazing, but that requires additional management intensity compared to cattle-only grazing. Examples of situations where targeted grazing is not appropriate include mature stands of juniper. While goat browsing is very effective for controlling small juniper, if the trees are allowed to get large, reclamation methods like mechanical control or warm season prescribed fire will be necessary before targeted grazing can be used.

Integrating Livestock Grazing into Weed Control Programs

Vegetation management and landscape enhancement strategies must be ecologically based with careful attention to positively directing community change, not just removing a weedy species. It is also important to develop integrated weed management systems using several techniques in well planned and coordinated strategies. Most landscape enhancement objectives are not easily accomplished with a single vegetation management tool. An approach that integrates several management techniques, including chemical, mechanical, and biological, is almost always the most effective and longest lasting strategy. For example, recent research indicates that grazing could increase the efficacy of herbicides. Livestock grazing may also be applied to reduce recruitment of weeds after herbicide or mechanical treatments. And, livestock grazing can be applied in concert with insect biocontrol agents to exact greater damage to a target plant population.

Incorporating grazing management into weed management plans has been recognized as one of the key components in successfully addressing weed problems. Using grazing animals to control noxious plants is a readily available approach because it is already the dominant use of Western rangelands and may be as simple as switching to the appropriate species of livestock for the current botanical composition of the land. However, making targeted grazing an active part of vegetation management programs will require greater dedication and commitment to grazing management techniques. Guidelines offered in this handbook are presented to promote targeted grazing as a technology to meet vegetation and landscape management goals. The intended uses of this handbook are to provide: 1) a reference for land managers to prepare targeted grazing management plans; and 2) a training and reference manual for people interested in initiating or expanding their livestock operation to include vegetation management.

Targeted Grazing Case Study – Leafy Spurge

The effectiveness of prescription grazing by sheep and goats has been clearly demonstrated for the management of leafy spurge, which aggressively competes with native plants on over 3 million acres of rangeland in the Northern Great Plains. According to the Government Accounting Office, these invasions are estimated to cause about \$100 million in damage each year (GAO 2001, Report to Congress, No. 01-724). Because cattle avoid grazing leafy spurge, the forage value of rangeland and pastureland can be decimated as leafy spurge invades and forms near monocultures. Fortunately, sheep and goats readily graze leafy spurge, finding it a nutritious and desirable forage and selecting it before resorting to eating grasses. Sheep and goats are highly effective tools for reducing the dominance of leafy spurge and are a readily applied technique in many areas of Montana and North Dakota. Using sheep to control leafy spurge can cost as little as 60 cents per acre, compared to a cost of \$35 per acre to spray herbicides from a helicopter. Currently, Montana weed trust fund dollars compensate sheep producers \$1 a head per month for grazing services to control leafy spurge on over 28,000 acres.



Targeted Grazing Case Study – Spotted Knapweed

Spotted knapweed is considered one of the most troublesome rangeland weeds in the northern United States and Canada. It is an aggressively spreading weed currently occupying more than 7.5 million acres of Western rangelands and costing the livestock industry more than \$42 million a year in lost forage and in additional weed control expenses. Herbicides, insects, pathogens, and fires have not effectively contained the spread of this noxious weed. Sheep readily graze spotted knapweed, consequently reducing its reproductive output and abundance.

Targeted Grazing Case Study – Kudzu

In the Southeastern United States, the aggressive climbing vine kudzu is rapidly spreading, overtaking everything in its path. Over 7 million acres are dominated by kudzu, and it is spreading at a rate of about 120,000 acres a year. This plant can easily creep up trees, fences, power poles, machinery, and buildings. Its aggressive growth costs the forest industry over \$20 million every year in Mississippi alone. Sheep and goats readily browse the leaves and young stems of this massive plant, providing an alternative to costly traditional control strategies based on herbicides and mechanical removal. After several years of grazing, kudzu can be radically reduced in stature and basically kept in check.



Targeted Grazing Case Study – Firebreaks

There is growing interest in livestock grazing to reduce fire fuel loads in response to continued urban development at wildland interfaces and to the extensive and destructive fires of 2000. Strategically applied sheep and goat grazing has reduced the risk and extent of wildfire in many settings. The most successful programs to reduce fuel loads are in California, where goats and sheep are commonly employed to graze the highly flammable shrubs of the chaparral region. Intensive grazing at the urban interface can create effective firebreaks as was accomplished near Carson City, Nevada, in a program named "Only Ewes Can Prevent Wildfire." A fenced corridor around the city was grazed by ewes resulting in removal of 71 to 83% of fine fuels. A survey of nearby homeowners revealed that over 90% supported the project and preferred the sheep to traditional chemical or mechanical methods of creating fuel



breaks. In the Great Basin, extensive wildfires often burn through areas dominated by cheatgrass. Intense sheep grazing of cheatgrass-dominated sites, for as little as two years, can effectively suppress or even eliminate cheatgrass stands (Mosley, J.C. 1996. *Sheep and Goat Research Journal*. 12:74-80). Though targeted grazing is used minimally for fuel management on federal forest rangeland, success has been demonstrated by several trial projects, and opportunities for targeted grazing are expected to expand. Federal funds for hazardous fuel reduction, exceeding \$350 million a year, could be used to secure the services of sheep and goat operators.

