

CHAPTER 6:

Improving Grazing Lands with Multi-Species Grazing

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10 KEY POINTS

- Wildlife and livestock grazing preferences influence which plants dominate grazing lands.
- Single-species grazing can adversely affect botanical composition.
- Multi-species grazing is the norm for natural ecosystems.
- Tradition and easier management have made cattle the norm on grazing lands.
- The spread of invasive weeds on Western rangelands coincides with a reduction in sheep numbers.
- Multi-species grazing can increase grazing and carrying capacity.
- Two or more species grazed together can improve animal performance.
- Grazing cattle with sheep or goats can reduce sheep and goat parasites.
- Multi-species grazing can improve cash flow and reduce financial risk.
- Those committed to improving the land may find that multi-species grazing is the best way to fulfill that commitment.



Grazing lands are covered by a variety of plant species that affect the land's productivity and suitability for different species of herbivores. Although environmental factors like soils, climate, and fire are the primary forces that determine the kind of plants growing on a pasture, grazing preferences of livestock and wildlife also have a strong influence on which plants dominate grazing lands. Even the feeding habits of insects can change vegetation composition. For example, some forms of biological control are based on introducing an insect that feeds exclusively on a weedy plant species. Insect feeding on the target plant places it at a competitive disadvantage relative to other plants, which ultimately reduces the plant below a threshold level that is acceptable to the land manager. All herbivores, four-legged and six-legged, have a similar effect on the botanical composition of plant communities.

Multi-species grazing is when more than one kind of livestock (i.e. sheep, goats, cattle, or horses) graze a unit of land. The grazing can occur at the same time or at different times and still be considered multi-

“Stock eat the valuable forage plants and leave the poor ones, thus giving the latter undue advantages in the struggle for existence.”

Wooten 1908

species grazing. Multi-species grazing is the norm for naturally regulated ecosystems.¹ The grazers are a variety of wild animals like deer, elk, rabbits, rodents, and insects. On managed grazing lands, the norm is that grazing is dominated by a single species of livestock, usually cattle. The reasons for this include tradition, lower management requirements for beef cattle, and increased complexity of multi- vs. single-species management. However, few land managers appreciate the adverse impact that single-species grazing can have on the botanical composition of grazing lands. Simply including sheep and goats in an extensive management system could have highly beneficial results in terms of vegetation composition.

It can be argued that the current problem with invasive weeds in the Western United States has resulted from declining sheep numbers during the past 20 years (Figure 1). Many of the worst weeds we currently battle, like leafy spurge, yellow starthistle, and spotted knapweed, are forbs that sheep and goats find palatable and nutritious.

The major challenges to multi-species grazing for producers currently grazing only cattle are:

- Increased fencing requirements.
- Lack of knowledge of small ruminant husbandry.
- Increased complexity because of enterprise diversity.

Advantages of multi-species livestock grazing over single-species grazing include:

- Increased carrying capacity.
- Improved botanical composition of pastures and suppression of undesirable species.

- Increased individual animal performance of one or more species in the mix.
- Reduced predation of sheep or goats grazing among or bonded to cattle.
- Improved animal health because parasite problems are often reduced.

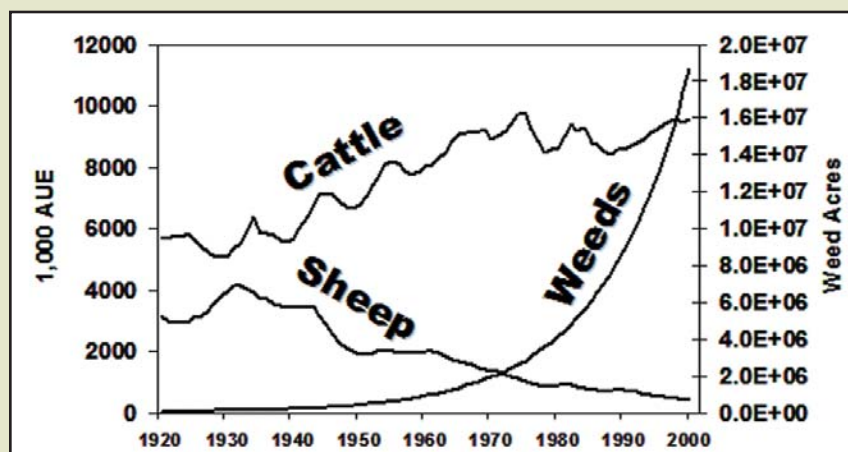


Figure 1. Trend in cattle, sheep, and weeds in the 11 Western states. The decline in sheep numbers accounts for almost 90% of the variation in weed acreage.

- Greater net return for the ranching enterprise.
- Improved cash flow from marketing different products at different times of the year.
- Reduced financial risk because of increased enterprise diversity.

These advantages result from different dietary and topographic preferences of different species of livestock (Figure 2). These differences include the plants the animals prefer to eat and where they graze. Cattle are primarily grazers, and their diets across a wide array of grazing land types are typically 70% grass. In contrast, goat diets average about 60% browse. Sheep diets are about 50% grass, 30% forbs, and the rest browse.⁴ In addition to botanical differences in diet preference, cattle, sheep, and goats differ in the parts of the landscape on which they prefer to graze. Cattle prefer lower flatter areas, which can lead to degradation of riparian areas. Sheep and goats will utilize steep slopes, prefer to bed on open upland areas, and have a strong tendency to graze into the wind. This can result in overuse around bed grounds or on the side of a pasture from which prevailing winds blow. These are broad generalizations that vary seasonally and among different plant communities with different botanical compositions.

Grazing lands that contain a variety of grass, forb, and browse species are difficult to graze with a single species of livestock in a way that will avoid shifting the botanical composition to a less desirable condition than the original pasture. A classic example is grazing a

mixed-composition range with only cattle. After several years of cattle-only grazing, preferred grass species decline while less preferred grass, forb, and browse plants increase (Figure 3, see next page). This change in composition, which rangeland ecologists call retrogression, resulted in the development of grazing systems to counteract the effect of selective grazing. Most grazing systems attempt to reduce selective grazing by increasing grazing pressure, then providing a period of deferment from grazing so grazed plants can recover. At proper stocking rates, such strategies can benefit the ecological condition of grazing lands, but they rarely benefit livestock production. In contrast, grazing with multiple species of livestock will spread grazing pressure across a wider variety of the plants in a pasture, which reduces the tendency of some lesser-grazed species to develop a competitive advantage over other species. Further, multi-species grazing increases total production as well as performance of at least one of the species.

This is not to infer that livestock grazing is the only cause of undesirable shifts in botanical composition of grazing lands. The introduction of exotic invasive plants, fire suppression, insect outbreaks, and other factors also contribute to vegetation changes, depending on the situation. Still, livestock grazing is the most ubiquitous factor that land managers can control that affects the composition and productivity of grazing lands. The ability to manage the number and kind of large domestic herbivores and the season they graze is a

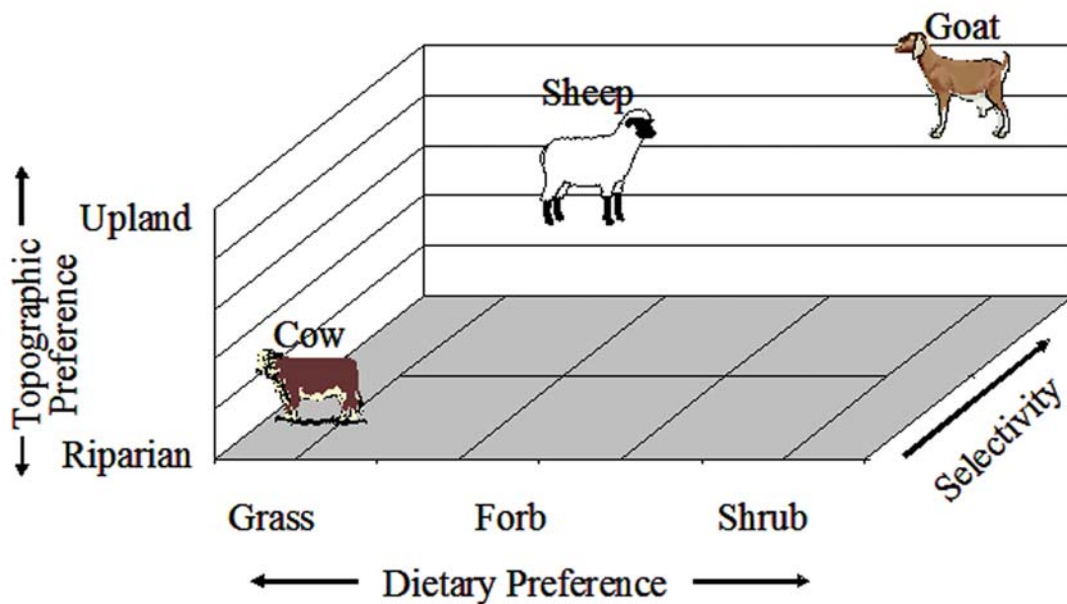


Figure 2. The X axis of this three-dimensional depiction of the relative dietary habits of cattle, sheep, and goats shows the relative preference for grass, forb, and shrub. The Y axis shows increasing ability to select higher quality components from diverse vegetation. The Z axis shows preference from low riparians to upland hilltops.

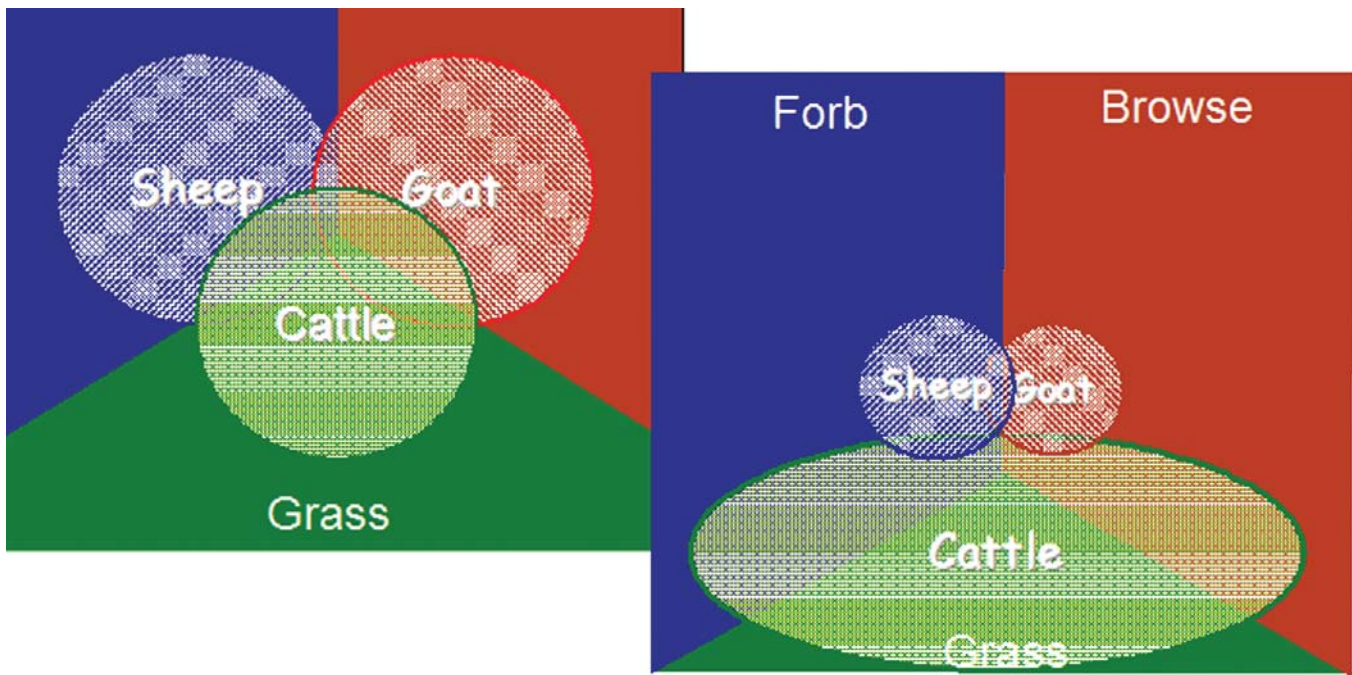


Figure 3. The diagram on the left shows how diet preferences should be balanced with available forage. The diagram on the right shows what is happening in many ecosystems where the major consumer is cattle and the grass component of the vegetation is declining while the forb and browse components are increasing.

critical consideration for using grazing animals to influence the succession of plant communities. For instance, in Texas goat browsing can slow the invasion of juniper even though white-tailed deer have a higher preference for juniper and are present in greater numbers.⁶ This is possible because the land manager can control the goats' grazing pressure and season of grazing.

Multi-species grazing can increase grazing land carrying capacity. Compared with grazing only cattle, grazing sheep and cattle increased production per unit area an average of 24% (range: 10 to 53%). In contrast, adding cattle to sheep-only grazing increased production an average of only 9%. In some instances, there was no benefit because ewes typically wean more pounds of offspring than cows, and lambs have a higher relative growth rate than calves.⁵ Competition for forage resources is always greater for two animals of the same species compared with two animals of different species. Because of this, grazing pressure is lower and individual animal performance higher at the same stocking rate under multi-species grazing compared to single-species grazing. Sheep grazed in combination with cattle gained an average of 30% more (range: 12 to 126%) than sheep grazed alone. The average gain was only 6% greater for cattle grazed with sheep than cattle alone. In some studies adding sheep to cattle-only grazing result-

ed in lower cattle gains. This indicates that when forage availability is low, sheep are more competitive for the limiting resource than cattle.

Benefits from multi-species grazing will be greatest when the different classes of livestock are balanced with the available forage resource and the total stocking rate does not exceed the carrying capacity of the land. A general rule of thumb is that on moderately stocked pastures one ewe can be added for each cow without affecting cattle performance or pasture condition. In areas with large amounts of undesirable brush that goats will consume (e.g., juniper or multiflora rose), the number of goats that can be added to a cattle- or sheep-grazed pasture can be much higher. However, not all brush is consumed by goats. For instance, mesquite, which infests millions of acres in the Southwest, receives only minor use by goats.

Replacement ratios of five sheep, six goats, or 1.2 horses per cow are commonly used and are based on relative differences in the amount of forage consumed per day. A more accurate approach for determining replacement ratios is to incorporate information about the dietary overlap of different species of livestock. Dietary overlap is the portion of diets from different species that is similar. So if dietary overlap with cattle is 25, 50, or 75%, the replacement ratio becomes 20, 10, or

seven ewes, respectively, that could replace each cow. However, animal unit equivalence is not symmetrical. Connolly and Nolan³ found that one steer could be replaced with four lambs without affecting the performance of other lambs, but 10 lambs could be added without affecting the performance of other steers. The bottom line is that replacement ratios are situation specific and will reflect the skill and knowledge of land managers.

A major impediment to adopting multi-species livestock management is a lack of livestock growers with the skills and knowledge to raise small ruminants. This challenge can be met by developing cooperative arrangements with owners of other livestock species. Another problem is a lack of net wire or other fencing in place that will contain small ruminants. Barbed wire fences can be modified by adding offset electric wire or extra strands of barbed wire to contain sheep and goats (*see fencing in Chapter 3*). In west Texas, where cattle, sheep, and goats are commonly run in the same pasture under extensive grazing conditions, interactions between different classes of livestock are seldom a problem. In intensive management systems and around water, interactions between cattle and small ruminants can present problems. These can be resolved by rotating one class in front of the other or installing fences or gates around portions of the water that allow sheep and goats to pass but prohibit cattle and horses (i.e., creep fencing).

Care must also be taken with trace minerals in multi-species grazing systems because sheep are more sensitive to copper than cattle. The levels of copper in supplements designed for cattle may exceed the safe level (25 ppm) for sheep but should not harm goats.

Multi-species grazing can also help manage internal parasites in sheep and goats.² Cattle do not have the same species of parasites as sheep and goats. Incorporating cattle into small-ruminant production systems can reduce parasite infection because the cattle reduce the density of small ruminants and consume parasite larvae, which move up the leaves and stems of herbaceous plants in part of their life cycle.

In many instances the most important decision in grazing management may be matching livestock dietary preferences to available forage, for example, using a class of livestock other than cattle to utilize the forage resource. This may also be the most difficult decision for land managers, especially livestock growers, because it can require a greater change in management, lifestyle, and self-image than any other decision relative to grazing management. However, for those committed to leaving the land in better condition than they received it, multi-species grazing may be the best way to fulfill that commitment.



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