

## **Biological Weed and Brush Control with Sheep and Goats**

### **Introduction**

Grazing animals, especially sheep and goats, can be used to either promote or reduce weed and brush abundance. By itself, grazing may not give complete eradication of a particular species but can reduce it to a manageable or economic level. However, when a biological control such as grazing is combined with other control methods such as herbicides, mowing or burning, elimination may be possible and less expensive than by one of these methods alone. Use of grazing animals, particularly sheep and goats, may be increasingly important in areas where herbicides can not be used, where other means of control are too expensive or where landowners desire biological control methods.

When grazing management is not provided, these grazing animals can cause significant damage to the environment. Overgrazing can reduce desirable plant cover, disturb soils, increase runoff and erosion potential, weaken native plant communities and allow exotic weeds to invade. There is also the possibility of spreading weed seed from one site to another.

In general the specific weed or brush species of concern and the desirable plant community will determine the number and species of grazing animals as well as the duration and frequency of grazing. A site specific grazing plan should be developed that lists target species for control, owners objectives, number and type of grazing animal to be used and frequency and duration of grazing.

### **Grazing Habits/Preferences**

Cattle are bulk grazers and can utilize high fiber diets. Cattle tend to be somewhat non-selective and graze for quantity rather than quality. Cattle prefer grass to other types of plants. Cattle will eat taller, more mature grass plants than either sheep or goats. Sheep and goats on the other hand are more likely to eat broad-leaved plants. Goats, due to their smaller rumen capacity, are more selective for quality and eat the nutrient dense portions of plants. Sheep are somewhat intermediate to these extremes but strongly prefer short, tender forbs and short, young grass regrowth over mature grass and generally, grass over browse. Sheep vary according to their breed in use and preference of browse material. Hair sheep breeds tend to be heavier browsers than wool breeds. Shropshires, a wool breed, have been used to control herbaceous weeds in woody plantings. Goats prefer browse then grass then forbs. Goats clear brush more effectively and rapidly than sheep. Goats tend to eat a greater variety of plants than sheep. Grazing all three species together in a diverse pasture would result in more uniform grazing of all plants present. This would help control weeds and brush while yielding more pound of gain per acre compared to single livestock species grazing.

Sheep are opportunistic and selective foragers and tend to graze closer to the ground than goats. Goats graze from the top down and tend to graze the top of a pasture canopy fairly uniformly when grazing in a pasture situation. Goats tend to leave a 4 to 5-inch residual height in a grazing situation if given the opportunity. Goats refuse to graze forage that has been trampled and/or soiled. The diet selection of goats appears to be to select

grasses when the protein content and digestibility are high but to switch to browse when the overall nutrient content of the browse becomes higher. The addition of sheep and/or goats to cattle pastures has been shown to benefit the cattle by reducing browse plants, broad-leaved weeds and in some cases plants that are toxic to cattle. By reducing the canopy of undesirable vegetation desirable plants produce more growth. Cattle will graze near sheep and goat manure deposits while sheep and goats will eat around cattle manure deposits. This also results in more uniform utilization of the pasture and may help break parasite cycles. Cattle do not share parasites with sheep or goats. Sheep and goats however, do share the same parasites.

Plant species availability, plant diversity, animal hunger and previous diet experience can determine a grazing animal's selection of particular food plants. Differences in vegetation quality or diversity may cause an animal to eat a particular species in one situation and to ignore or only lightly use in another. A period of adjustment may be needed to get grazing animals to eat a new type of plant that is unfamiliar to them. It may be advantageous to find animals that have previous grazing experience with the target plant species.

### **Woodland Grazing/Understory Management**

Goats show great potential as biological agents to control understory vegetation in mixed hardwood forests. Studies have shown that 65% of the diets of goats during July and August were made of vining species e.g. honeysuckle, greenbriar, rattan, Virginia creeper poison ivy and wild grape. Excessive damage to desirable tree species did not occur until other forage was consumed and during the winter when other forage availability became scarce. Understory vegetation can be preserved or destroyed depending on stock density, duration and frequency of grazing. In one study, 400 goat grazing days per acre were obtained from a woodlot without damaging the existing desirable vegetation.

Sheep and goats are increasingly being used to manage understory in woodlands to reduce fuel loads and the potential for wildfires. In several of the western states the U. S. Forest Service has employed the use of sheep or goats as a low-tech, low-cost approach to undergrowth control on national forests. This approach benefits the environment by eliminating the need for herbicides and reducing wildfire risks.

### **Brush Control**

Goats are the species of choice for controlling brush in pastures, abandoned farmland and rangeland. Managed defoliation of brush by goats has resulted in substantial increases in vegetative cover of desirable grasses and legumes while reducing or eliminating undesirable shrub species. In one grazing study in West Virginia, goats reduced brush cover from 45% to 15% in one year while sheep took three years to achieve the same results. After 5 years of grazing goats had reduced brush cover to 2%. Grazing management for this type of control involved brush defoliation early in the spring and repeated defoliation during the growing season. Complete defoliation starting in late summer/early fall had no impact on the woody vegetation and regrowth was 100% the following spring.

In a study in North Carolina, multiflora rose bushes were practically eliminated after four grazing seasons (97 – 98% dead canes). Defoliating multiflora rose bushes at 4 to eight week intervals starting in May resulted in a 21% plant death by the beginning of the second year, 78% by the beginning of the third year and 94% by the beginning of the fourth year. Spring and summer proved to be the critical grazing times. Grazing of multiflora rose after the first of August for the first time had negligible effects. Local experience in Missouri has shown similar results with blackberry and dewberry brambles.

### **Timing and Duration of Grazing**

Animals should be brought in to an infested area when they will be most likely to damage the target species without significantly impacting the desirable vegetation. Grazing during seed or flower production can be very useful on some plants, however some species are only palatable during the early growing season. Goats will tend to eat forbs at a later stage of maturity than cattle or sheep. Goats consume chicory, ironweed, ox eye daisy, curly dock, pigweed, Queen Anne's lace, yarrow, thistle and burdock at flowering whereas sheep and cattle may eat some of these species during the vegetative growth stage. Goats prefer a lot of the weedy grasses (cheat, foxtail, purpletop, and barnyard grass) in the vegetative pre-heading stage. Goats prefer young tender growth and leaves on most browse species (buckbrush, multiflora rose, blackberry, honeysuckle, sumac, cedar, oak and hickory). Sometimes a mowing to allow new growth and keep growth young may be beneficial in controlling these species. Grazing of certain species may initially result in an increase in stem density and root buds, but repeated grazing should lead to reduced stem density in the long term.

Grazing should be closely monitored and the animals promptly removed when defoliation of the target species has been achieved and/or before desirable species are impacted. Monitor target plant species and when they have leafed back out return the grazing animals for another defoliation. Generally, when the objective is to reduce or eliminate a target species then timing and duration of grazing is opposite of what we do when managing desirable species, i.e. longer grazing periods followed by shorter rest periods. Repeated defoliation is the key. In this case we are trying to stress target plants. Grazing managers must be flexible and have control over herd movements. Lack of control can result in overgrazing of desirable species and/or reduced animal performance due to lowered intake.

In most cases at least two years of intensive grazing (controlled overgrazing of target species) followed by annual brief grazing by the same species is required to gain and maintain control of an infestation. Control gained by grazing sheep or goats may not be maintained by cattle grazing alone in subsequent years due to cattle avoiding target species.

Seeds of certain weed species can pass through the digestive tract and remain viable. Animals that have been grazing on these types of plants should not be put in weed free areas until all seeds have passed through their digestive tract. This is usually 3 to 9 days. The higher the quality of the overall diet the faster the passage through the digestive tract. Weed seeds can also be transported to new areas in animal hair coats. Care and

precaution should be taken when moving animals from an infested area to a non-infested area.

### Stocking Rates

The following table should be used as a guide for stocking rates when using sheep or goats for weed and brush control.

Pasture Type	% Brush Canopy	Cows	Sheep	Goats	Cows + Goats
Excellent Pasture	<10%	1	5 to 6	6 to 8	1 +(1 to 2)
Brushy Pasture	10 – 40%	1	6 to 7	9 to 11	1 +(2 to 4)
Brush Eradication	>40%			8 to 12	.5 +(6 to 8/ac)
Sustainable Browse Management	Maintaining 10 –< 40 % brush canopy		1 to 3/ac	1 to 3/ac	.25 + (1 to 2)/acre

The stocking rates given for excellent pasture and brushy pasture are not on a per acre basis but a comparison to cattle. With excellent pasture you could stock 6 – 8 goats on the same amount of land it takes to run 1 cow. On brushy pasture you could run 9 – 11 goats on the same amount of land required to run 1 cow. The column with Cows + Goats is a combined stocking rate of cows and goats. It is generally thought that on good to excellent pasture you can add 1 to 2 goats per cow without changing the cattle stocking rate due to differences in diet preferences and grazing habits. With brushy pasture the number of goats added to an existing cattle socking rate would be 2 to 4 per existing cow.

The stocking rates given for brush eradication are the numbers needed on a per acre basis to eradicate brush and convert to pasture in a short (2 – 3 year) timeframe. When using goats alone the stocking rate would be 8 – 12 goats per acre depending on brush density and how quick the producer wanted to eliminate the brush. The stocking rate for goats could be reduced to 6 to 8 goats per acre and add 0.5 cow units per acre to achieve the same results and diversify income sources, assuming there is still a grass component available under the brush canopy.

The stocking rate given for sustainable browse management is on a per acre basis and is the number that could be stocked to utilize and manage woody species without completely eliminating it or degrading desirable species.

### Management Considerations

For biological weed and brush control with sheep and goats to be economically viable and sustainable producers need to consider four important factors. These four obstacles are the primary factors limiting the use of sheep and goats today.

1. **Adequate fencing** – In order for the use of sheep and goats to be effective in controlling vegetation the producer must be in control of where the animals are at all times. This entails proper fencing. What is effective for cattle will probably not be effective for sheep or goats. Generally, the perimeter fence should be either 5 to 8 energized high tensile wires or woven wire with 1 to 2 strands of barbed wire or high tensile energized wire above it. With horned goats the 12 x 6 netting is preferred to prevent goats from getting their heads caught in the fence. In some cases, 2 offset high tensile energized wires have been used in conjunction with an existing 5 strand barbed wire fence successfully. For cross fencing or paddock fencing, 2 to 4 strands of high tensile energized wire, polywire or polytape have been used successfully. An electric netting is also available for temporary or movable fencing that is very effective also. Electric fencing is often the most effective, least expensive option that allows for added flexibility.
2. **Effective Predator Control** – Losses due to predators (coyotes, wild dogs or the neighbor's dog) is probably the primary reason more producers don't utilize sheep and goats in their operation today. In Missouri, predators are a likely problem and should be planned for. Generally, the best predator control consists of a combination of effective predator fencing and a guard animal. Effective predator fencing consists of 6 – 8 high tensile energized wires (alternating hot and ground) with the bottom wire 6 – 8 inches from the ground and the top wire 52 – 60 inches from the ground. Sometimes a barbed wire laid on the ground surface gives added protection and prevents digging under. On existing barbed wire fences, dropping the bottom wire to the ground surface and adding some offset high tensile energized wires on the outside of the fence have been successful. Offset wires should also be used in combination with woven wire fences to prevent predators from climbing in. Electric fencing helps discourage predators, but it will probably also be necessary to employ a guardian animal. Livestock guard dogs, such as the Great Pyrenees or the Anatolian Shepherd, llamas and donkeys have all been used successfully and have their proponents. Each has its advantages and disadvantages. Generally, the livestock guard dog is probably the most effective, but requires special facilities for feeding and the extra cost of feeding. Llamas and donkeys can eat whatever is available in the pasture and don't cost as much to maintain but may not be as effective, especially in larger, brushier pastures. In small operation, with smaller pasture size and higher visibility llamas and donkeys can be quite effective. The main thing to keep in mind is, as the herd or flock grows and divides into multiple groups, it will probably take 1 guard animal per group regardless of the type of guardian animal used.
3. **Parasite control/prevention** – Parasites are a major problem with sheep and goats under any system. Worm eggs are deposited on the pasture in the manure; the eggs hatch and the larvae start to travel up plant stems and leaves. Higher concentrations of animals on a given area may magnify the infestation. If animals are returned to a pasture too soon or are allowed to graze too close to the ground, they will pick up additional larvae through grazing and parasite levels in the animal will build up to a detrimental level. Some grazing management techniques such as not allowing the animals to overgraze or graze too close to the ground and allowing longer (at least 30 days) rest periods which allows for some of the larvae to die off will help control parasite levels. Also, parasites are species specific. Cattle parasites affect cattle only,

not sheep or goats. Sheep and goats do share parasites with each other but not with cattle. Grazing cattle in combination with sheep and/or goats in a rotation will help break the life cycle of the parasite. The non-host species act as vacuum cleaners, ingesting the worm larvae and preventing them from affecting the host species. Even with good grazing management, some form of parasite control will probably be necessary. Several dewormers have been used effectively on sheep and goats. There are more labeled for sheep than goats available on the market today. Rotating dewormers or switching types from time to time may be necessary to prevent parasites from building up a resistance to a particular type of dewormer. A local veterinarian experienced in sheep and goat health should be consulted to develop an effective parasite control plan.

4. **Marketing** – For sheep and goat production to be economically viable, producers must know what their marketing options are, what the market wants and where the markets are. In some areas and with some producers direct marketing of animals to the consumer may be a good option. This usually has more potential closer to larger cities or population areas, especially areas with high ethnic populations. This form of marketing requires more time and skill on the producer's part but potentially has the greatest potential return. Some local auction barns have regular sheep and goat sales. Some of these attract large volume buyers and may be a good option. There are probably more sheep sales through local auction barns in Missouri than goats at this time, however there are more and more viable goat auctions appearing as the demand for slaughter goats increases and more producers add goats to their operation. Most of these markets can be tracked on the internet and compared to the major national or regional markets. A third option that exists in Missouri is pooled sales. The Missouri Meat Goat Producers Association has set up a pooled internet sale for meat goats. Several small producers can collectively pool their animals and attract more buyers via the internet. Other breed and producer organizations may have similar programs.

### Summary

Sheep and goats can be used as an ecologically sound and economically viable alternative for biological weed and brush control. Site specific grazing plans will need to be developed that lists target species to control, owner's objectives, number and type of grazing animal to be used as well as timing, duration and frequency of each grazing event. The brush and/or weed control plan should also state the degree of grazing or browsing use for effective control of the target species as well as the maximum allowable use of desirable non-target species. When grazing management is not controlled, the grazing animal can cause significant damage to the environment through overgrazing. Grazing should be closely monitored and animals promptly removed or stocking rates adjusted when defoliation of the target species has been achieved and before desirable species have been negatively impacted. Once target species have leafed back out grazing animals should be returned for another defoliation. Repeated defoliation (controlled overgrazing) of the target species during the growing period is the key to successful biological weed and brush control with sheep and goats.

**Literature cited:**

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Forage Needs and Grazing Management for Meat Goats in the Humid Southeast, Luginbuhl, J.M., Poore, M.H., Mueller, J.P. Green, J.T., NCSU Animal Science Facts, Publication Number ANS 00-604MG

**Other resources/references:**

American Sheep Industry Association - <http://www.sheepusa.org>

Appropriate Technology Transfer for Rural Areas (ATTRA) – <http://www.attra.org>

Missouri Alternatives Center – [www.agebb.missouri.edu/mac](http://www.agebb.missouri.edu/mac)

Boer and Meat Goat Information Center – [www.boergoats.com](http://www.boergoats.com)

Langston University Goat Research and Extension – [www2.luresext.edu/goats/index.htm](http://www2.luresext.edu/goats/index.htm)

Maryland Small Ruminant Page – [www.sheepandgoat.com](http://www.sheepandgoat.com)

Missouri Meat Goat Producers Association – [www.meatgoatproducers.com](http://www.meatgoatproducers.com)

North Carolina State University Meat Goat Research and Extension – [www.cals.ncsu.edu/an\\_sci/extension/animal/meatgoat/](http://www.cals.ncsu.edu/an_sci/extension/animal/meatgoat/)

Fort Valley State University Goat Center Publications – [www.ag.fvsu.edu/html/publications/GoatCenter/Publications.htm](http://www.ag.fvsu.edu/html/publications/GoatCenter/Publications.htm)

Breeds of Livestock – OSU – [www.ansi.okstate.edu/breeds/](http://www.ansi.okstate.edu/breeds/)

Premier 1 Supplies: sheep and goat supplies, electric fencing – [www.premier1supplies.com/](http://www.premier1supplies.com/)

Gallagher Power Fencing – [www.gallagherusa.com](http://www.gallagherusa.com)

Kencove Fencing Supplies – [www.kencove.com/](http://www.kencove.com/)

Tru Test – Speedrite/PEL Power Fencing, livestock scales, supplies – [www.tru-test.com/](http://www.tru-test.com/)