

**EXTENSION**

Mixed-Species Grazing: A Potential Opportunity to Improve Rangeland Productivity and Increase Profits

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The purpose of this fact sheet is to introduce the concept of mixed-species grazing. Specifically, this fact sheet considers the combination of goats and cattle. There may be many benefits to the producer through diversifying their operation. One of those benefits when including goats is their ability to eat woody plants, therefore, improving the rangeland. Mixed-species grazing may not be financially viable for some operators, given the cost of secure fencing for goats and added labor. This fact sheet presents some preliminary analysis with given assumptions. Individual operators may decide to manage their goat herd differently, and those differences should be taken into consideration when evaluating the profitability of this system.

Controlling Woody Plants is Important

Eastern red cedar trees are taking over grazing land in the southern and central Great Plains. When rangeland has high level of woody plants, stocking rates must be decreased to meet the cattle's nutritional needs. Having less cattle on the same amount of land means the operation will become less profitable. Improved range management is even more important as the population grows because producers are challenged to increase livestock production on the same amount of land. Not only is rangeland management important because of a growing human population to feed, but less natural rangeland management is occurring.

Why is Controlling Woody Plants a Problem Now?

Historically, the Great Plains were populated with bison, elk, pronghorn and deer, which all grazed different vegetation, keeping woody plants from taking over¹. When only cattle are grazed on pastures, there is no longer the mix of grazing preferences. Not only are the animal species on rangeland different, but wildfires are typically extinguished. Lack of naturally occurring intense and frequent wildfires no longer control woody plants¹.

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Woody Plants may be Impacting Profitability

Eastern red cedar trees can cause significant amounts of loss to livestock production by limiting the amount of forage growth by shading grass. Water that would otherwise be used for the growth of forage for grazing is used by woody plants. Woody plants also reduce access to forage. In order to maintain profitability of cattle operations on rangeland, red cedar growth must be managed. Oklahoma State University is currently conducting a study on the use of patch burning and mixed-species grazing to improve rangeland productivity. The preliminary analysis in this fact sheet is derived from this ongoing study, more complete analysis will be available in coming years.

Red Cedar and Woody Plant Management

There are many ways red cedar encroachment is managed, including grazing management, herbicide use, prescribed fire, manual removal and mixed-species grazing. The most commonly used method differs between size of operation and location. Each of these management practices has varying levels of effectiveness and costs. An example of grazing management is the use of cross-fencing and rotational grazing to encourage the use of different parts of a pasture. We will now describe in greater detail the management practices compared in our research.

Herbicides are frequently used to manage rangeland, but this choice is expensive and often not effective. A commonly used herbicide for rangeland management is Grazon[®] P+D which costs about \$25 per acre and must be repeated frequently². The herbicide may be aerially sprayed or ground sprayed depending on the red cedar cover.

Prescribed fires are commonly used as a red cedar management control method. Well planned and managed prescribed burning is an economical and effective method of range management. However, the use of prescribed burning may be limited in some locations and are dependent on land ownership. Land owners may also face additional costs related to prescribed fires if their land is disjointed or far apart.

Mixed-species grazing is a less commonly used control method, but may be more economical than other methods. Mixed-species grazing may become more common as the goat and sheep market continues to expand and producers

look for other ways to improve their land. Mixed-species grazing offers an opportunity for reducing red cedar control costs while possibly increasing profitability of the grazing operation. Mixed-species grazing combined with prescribed burning may provide red cedar control and economic benefits that exceed either practice individually. Figure one shows that after 50 years of red cedar invasion rangeland will be in a cedar forest state and livestock productivity will be decreased to only 25% of maximum livestock production. With proper rangeland management, this encroachment can be slowed, halted or even reversed. The ideal state of rangeland at maximum production is a grassland state.

Using Goats for Mixed-species Grazing

Mixed-species grazing can include a variety of animal species combinations such as sheep, goats and even deer. Goats and cattle are the most often chosen combination because of the great spread of dietary differences. In short, goats and cattle eat different things, which allows for greater stocker rates and more woody plant control. The use of mixed-species grazing combined with patch burning may be even more effective than other control methods because browsers such as goats prefer to consume woody plants such as red cedar, whereas cattle prefer to consume grasses. Goats may increase profits because they can be sold for additional revenue and, depending on the level of woody species encroachment, will be able to improve rangeland productivity and potentially increase stocking rate of cattle. Because goats and cattle have different intake preferences, goats can usually be grazed alongside cattle without having to decrease cattle stocking rate. In general, goats consume more woody plants than cattle and can increase rangeland carrying capacity in woody areas by 70% due to the difference in forage preferences³. In general

two goats can be added per head of cattle without decreasing cattle stocking rate⁴. Therefore, in an operation with 20 cows, 40 goats can be added while maintaining the same number of cattle.

Assumptions Used for Analysis

Both breeding goats and stocker goats can be utilized in a mixed-species grazing operation. Both options are considered here. Please note that you may make different decisions regarding purchase time, weaning length, etc. that may impact the profitability of these two choices for your operation. Breeding goats are most often used for mixed-species grazing because kids can be sold each year for additional profit, without having to re-purchase all of the animals. Goats are considered seasonal breeders or short day breeders, so they breed best in the spring and fall – not the summer. Goats have a gestation period of 150 days; therefore if bred in October, they will kid in March and the kids can be sold in June. This assumes a weaning period of 60 days. Other operations may choose to wean at 90 days which could change the profitability of the breeding goats. Does generally have kid crops of 150% to 180%, meaning that, even when retaining does as replacements and accounting for death loss, kids sold should be greater than the number of does bred. The sale price of goats vary throughout the year, with a high price in February through April and low prices in August and September. While producers would like to capture the high market prices in late winter and early spring, goats are seasonal breeders and producing kids to sell at the seasonal peak price is often not realistic. For this analysis, it was assumed kids would be sold in June, at a price of about \$2 per pound based on historical prices. It is important to note that the sale price can differ from year to year.

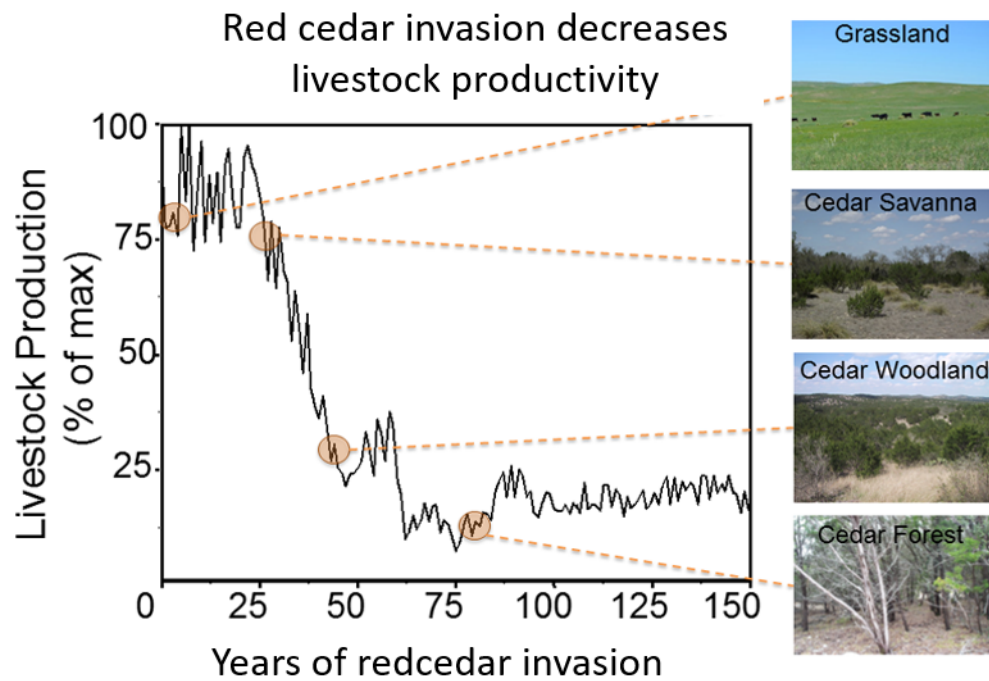


Figure 1. Red cedar Invasion decreases livestock productivity; Source: <http://neinvasives.com/species/plants/eastern-red cedar>.

Additional Costs of Mixed-Species

Grazing with Goats

There are additional costs related to the use of mixed-species grazing. Initially, a herd of goats will need to be purchased, including a sufficient number of does and one buck for every 25 to 35 does. In general, the rule of thumb is one buck for every 35 does. The original purchase of goats will be a significant up-front cost, but if doe kids are retained as replacements, this will be a one-time cost.

The mixed-species grazing operation will be most effective if patch burning is utilized as well. There will be additional costs related to the use of patch burning, but if a producer is already performing prescribed fires, this cost may not change. A large cost related to introducing a goat operation is the cost of building a new fence which can hold goats. The fence cost used in this study was about \$3 per foot for 4-by-4-foot woven wire fence. The total cost to fence the 180 acre pasture in this study was around \$33,000. A 4-by-4-foot woven wire fence is a very effective fence for containing goats, but other fences such as electric wire can be used and may also be effective. Fence cost on a per-acre basis decreases with increased pasture size. Depending on the current state of the cattle fence, fencing may only need to be improved, or a new fence may need to be built. The cost of fencing may vary greatly based on your current farm setup.

The goats will also require medical care, feed and labor, especially during kidding. Medical care needed can vary greatly between goat herds, but the cost for vaccinations will be around \$2 per head per year. It was assumed each breeding goat will require three hours of human labor each year at a cost of \$10 per hour⁶.

A livestock guardian dog should be purchased to mitigate the losses due to predation of both kids and adult goats. The livestock guardian dog will have some monthly maintenance costs such as dog food and medical care. The current cost to purchase a livestock guardian dog is \$1,000 and annual costs maintenance costs are about \$500. Budgets for meat goat and stocker goat production are available at [extension.okstate.edu/programs/farm-management-and-finance/budgets/index.html](https://okstate.edu/programs/farm-management-and-finance/budgets/index.html).

Additional Revenue of Mixed-Species

Grazing with Goats

Mixed-species grazing operations allow for increased profits, due to the additional revenue from the goat operation, as well as improved rangeland. When using a breeding goat operation, kids born each year can be sold to increase profits of the overall operation. Goats have a kidding rate ranging from 150% to 180%, therefore, a significant number of kids can be sold each year, and kids can be retained as replacements or to grow the goat herd. Goats not only provide additional revenue but can increase profit from the cattle herd by improving the condition and productivity of rangeland. As

the goats improve rangeland, the cattle stocking rate can be increased or producers may be able to decrease supplemental feed provided to cattle. If red cedar encroachment is not managed, encroachment will continue to the point where the land is no longer profitable.

Conclusion and Preliminary Results

Managing rangeland is important to maintain profitable livestock production and potentially increase profits. Preliminary analysis show mixed-species grazing can both increase profitability of the enterprise, as well as manage the state of rangeland more effectively than other control methods. Early research results show that the mean net present value of the breeding operation with prescribed fire is about \$16,000 greater than traditional management. Net present value is a way to compare the profitability of two operations while accounting for time.

Analysis of the stocker scenario was not promising. Due to the cost of buying goats every year, the stocker goat scenario was not profitable. However, this may not be the case for all operations or all years. In order to control red cedar, it was assumed the producer would be purchasing stocker goats in the spring/summer. Unfortunately, this also coincides with high goat prices. Two scenarios were considered: 1) selling the stocker goats in September or 2) selling the stocker goats in November, the time of year when goat prices are low. Operators may be able to purchase and sell stocker goats at more favorable times to increase profitability, but they may be giving up some woody plant control the goats provide given the assumptions.

It appears that mixed-species grazing can be a profitable and effective method for control of woody plant encroachment if breeding goats are used, given the assumptions of this analysis. As research on this topic continues, more definitive results will determine the efficacy of mixed-species grazing for woody plant control.

References

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