Utilization of Reclaimed Mine Pasture Species with Mixed Species Grazing

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Introduction

Post-mined land is often restored to support forage based enterprises. However, difficulty in controlling invasive species is one factor that causes such sites to be abandoned, as the unmanaged land slowly succumbs to brushy, woody vegetation with little or no commercial value. Thus, lands restored by mining operations constitute an unused resource with the potential to support economic activity. These lands may improve farm productivity if managed correctly. The demand for goat products in the US has increased in recent years (Glimp, 1995). Supply to meet these needs is limiting within the country. Imports principally from Australia and New Zealand are increasing each year (Glimp, 1995). Three ethic groups, Hispanic, Arabic (mainly Muslim), and Caribbean descent, are increasing and are responsible for this increase in goat consumption. These populations principally reside in the Atlantic and Southern regions of the country. Producers in the coal-mining region have a potential market opportunity that is created by newly establishing ethic groups with food preferences different from the native residence.

Goats eat the more nutritious and desirable parts of many different grasses, legumes, weeds, and browse plants (Ball et al., 2002). The browse plants goats consume include bramble, shrubs, trees, and vines (Luginbuhl et al., 1998a). Goats have small mouths and split upper lips, which allows them to eat small leaves, flowers, fruit, and other more nutritious parts of plants (Luginbuhl et al., 1998a). Their diet depends on the forage available and can vary greatly, but goats would prefer to eat 40 – 60% brush, 10 – 30% weeds and legumes, and 20 – 30% grass (Ball et al., 2002). Nutrient requirements of goats are greater that most domesticated ruminants, but these requirements are usually met due to their grazing behavior (Luginbuhl et al., 1998a).

Grazing goats on high-investment pasture is not economical; instead goats can be grazed with cattle to control unwanted brush and weeds (Ball et al., 2002). Goats will consume troublesome plants such as multiflora rose, thistles, blackberry, stinging nettle, and many more that cattle will not, while increasing the vegetative cover by favorable grasses and legumes (Ball et al., 2002; Luginbuhl et al., 1996). Using goats as biological control agents will decrease the need for costly mechanical cutting and herbicide application. When the purpose of goat grazing is to eliminate weeds and brush, goats can remain on these areas until all these species are destroyed. But if the brush and weeds are needed as long-term forage, the goats should be rotationally stocked to let these species recover (Ball et al., 2002).

The overall objectives of the research are to determine:

1) the effect of goat grazing in mix with cattle or alone on animal performance; and 2) differences between multi-species grazing and single species grazing of shrub-infested pastureland in regard to herbaceous species utilization patterns.

Research up to date

Fall, 2005

Three treatments, control, cattle grazing, and co-grazing (cattle + goats) were implemented. Two replacement heifers were assigned to each of the grazing treatments with the

addition of 10 goats to the mixed grazing treatment. Animals were weighed at the beginning and the end of the study. Ground cover was estimated at 85-90 percent in all treatments. The control treatment contained 5% grass, 15% legume, 70% weed, and 10% shrubbery, mainly autumn olive. The cattle only treatment contained 10% grass, 5% legume, 60% weed, and 25% shrubbery. The mixed grazing treatment contained 20% grass, 10% legume, 50% weed, and 20% shrubbery. In spring 2006, similar to fall 2005, three treatments were used (control, cattle grazing, and co-grazing (cattle + goats). In spring of 2006, however, 15 goats and 3 steers, and 3 steers/treatment replications were used for co-grazing and cattle alone grazing treatments, respectively. Each treatment utilized 4.5 acres.

In terms of animal performance, the goat herd as a whole gained weight during the study. However, as the goat herd was comprised of four does and six young wethers, the ending weights of the goats varied by age. This was probably due to the doe's ability to compete and achieve their diet in the face of limited available forage. For example, the does were able to browse at higher heights than the wethers. The does either gained weight or maintained weight. All four replacement heifers gained weight during the study.

The general appearance of the pastures after livestock removed was very apparent. In the co-grazed grazing treatment, vegetation as a whole appeared to be utilized more uniformly than in the cattle alone treatment. Goats browsed autumn olive shrubbery aggressively. Browse height was measured with a measuring stick and though a crude method, browse height was estimated at 56 to 72 inches (1.4 to 1.8 m). Goats were observed to stand on their hind legs to reach browse (Figure 1). They also would put their weight on branches and press them to the ground where the browse was more available. This observation is comparable to Australian research which found goats to browse up to 79 inches (2m) ((Harrington, 1978). It was also noted that as browse became limiting, bark stripping increased.

Figure 1. The effect of goat grazing on shrub control, Fall 2005 (PRP).

Spring/Summer 2006

Animal Performance

Goats grazing with cattle pastures infested with shrubs such as autumn olive, multiflora rose, and a weedy legume, sericea lespedeza, on the average, gained a total of 15.8 lb per goat at an average daily gain of 0.28 lb (Table 2). The gain is considered acceptable for animals mainly grazing "undesirable" plant species without supplemental feed. Cattle grazing with goats or alone gained 79 and 87 lb , respectively. The average daily gain of cattle co-grazing and grazing alone were 1.39 and 1.52 lb, respectively.

Table 1. Weight gain of goats and steers grazing shrub infested pastures. May-31-July28, 2006, Powell River Project site.

Animal Performance	**Cattle + Goats**		**Cattle**
	Cattle	Goats	Cattle
…….Weights in lb…….			
Weight Gain for the Period*	79	15.8	87
Average Daily Gain for the Period**	1.39	0.28	1.52

* Weight between May 31 and July the 28.
**Average daily gain for the period = total gain divided by number of days on pasture

Vegetation

Pastures grazed by the mixed animal species (goats + cattle) were uniformly grazed compared with pastures grazed by cattle alone (Figure 2). Co-grazed pastures had less invasive species including sericea lespedeza and other shrubs and thus had more desirable species such as birdsfoot trefoil, red and white clovers, tall fescue, orchardgrass, and other various commonly grown forages. Pastures where cattle+ goats grazed appeared to be more uniformly utilized (Figure 2) compared with pastures grazed by cattle alone. Goats browsed to the height of 6 ft or more, removed not only the leaves but also stripped the bark (Figure 3). In some cases the leaves on the debarked branches were yellowing (Figure 4) indicating eventual death of those debarked branches.

Summary

From previous research and the knowledge gained from the current study, goats grazed with beef cattle offers a unique advantage for producers in Appalachia to utilize vegetation that would otherwise have no other value. With the demand exceeding supply in the goat industry, economic opportunities should be excellent for producers to increase the products produced on the farm.

Figure 2. Pastures grazed by goat + cattle vs. cattle alone (PRP)

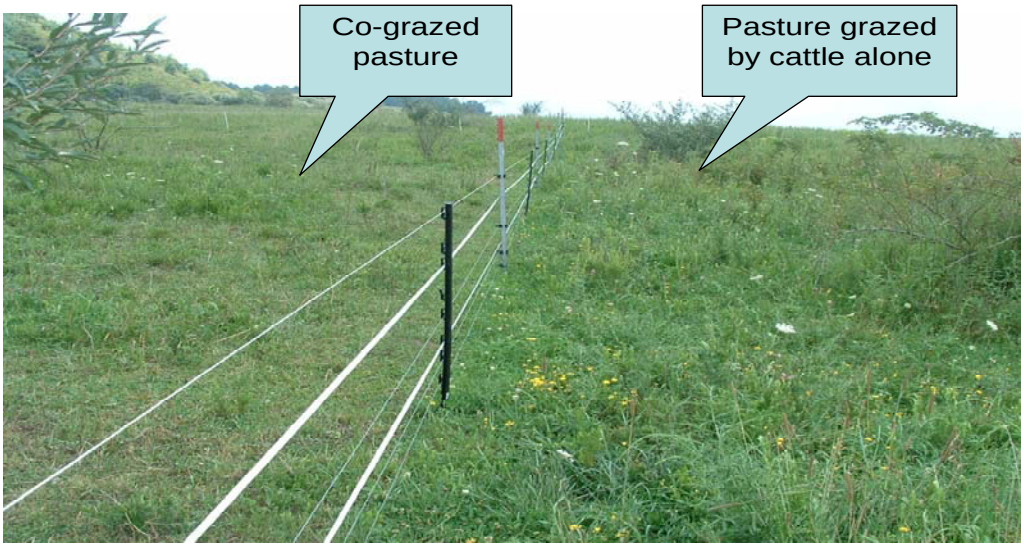


Figure 3. Autumn olive browse height (PRP)

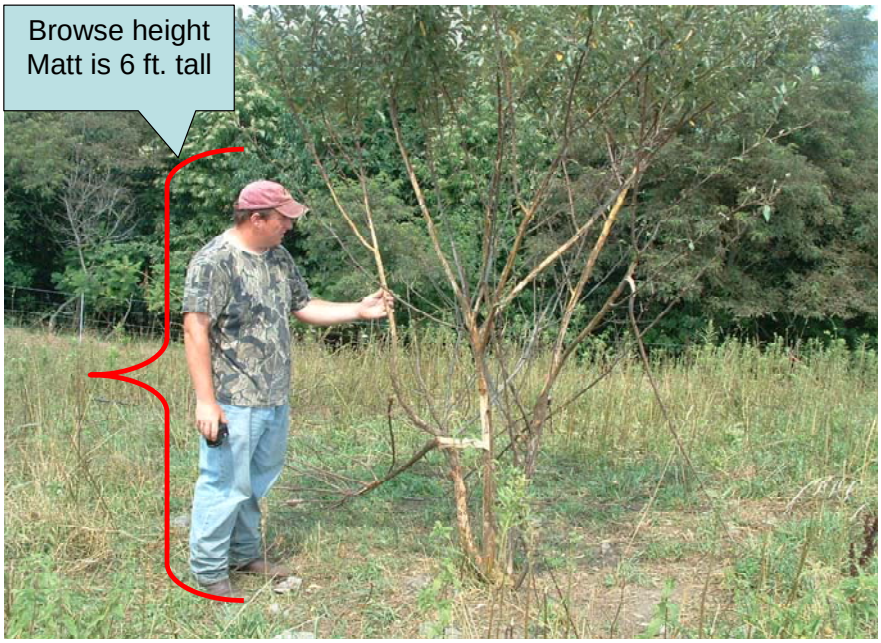
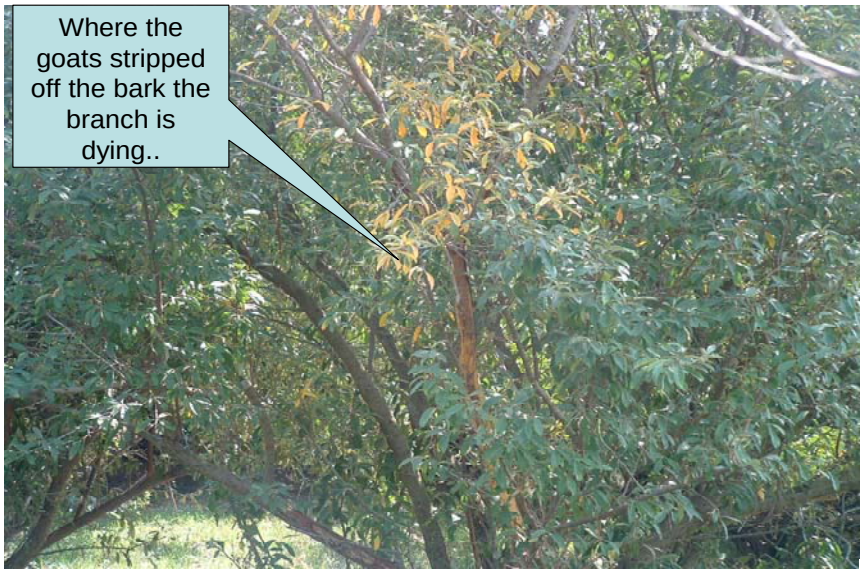


Figure 4. Effect of goat grazing on longevity of autumn olive (PRP)



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