CARIBBEAN FOOD CROPS SOCIETY 44

Forty Fourth
Annual Meeting 2008

Miami, Florida, USA

Vol. XLIV – Number 2 Continued
Poster Session Abstracts
With Some Posters Expanded as Full Papers

MEETING HOST:
UF UNIVERSITY of FLORIDA
IFAS

2008 Proceedings of the Caribbean Food Crops Society. 44(2):516-521. 2008

Poster #44

Stocking Rate Trial with Boer X Spanish Goats under Thinned Loblolly Pines

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ABSTRACT.
Goat meat is said to be one of the most highly consumed meat in the world. The perception of using goats for vegetation management other than as a grazing livestock remains very high. As the demand for goats increases due to healthy diet needs and ethnic population presence, the need to increase production using various grazing practices for small ruminants has begun to receive attention. The present study was conducted to determine stocking rates of Boer x Spanish goat crossbreeds in a silvopastoral system of loblolly pines and Tifton9 bahiagrass. The experimental area consisted of loblolly pine plantation that was planted in 1979 and thinned in November 2001 to 1.2- x 12-m spacing. Tifton-9 bahiagrass was planted between widely spaced loblolly pine trees. Treatments consisted of (1) shaded pastures and open pastures of Tifton-9 bahiagrass as the main plots, and (2) two stocking rates (10 and 17 goats per ha) crossbred goats as the subplots using a split-plot arrangement. Goats grazed paddocks using a rotational stocking method. Live weight data was used to calculate the average daily gain (ADG) and weight gain or loss of animals over the grazing period to determine recommended stocking. For Year 1, there was no significant difference in ADG of the animals for the shade treatment ($P = 0.124$) or stocking rate treatment ($P = 0.673$). For Year 2, the results showed a significant effect of stocking rate ($P = 0.003$) on ADG. The result from this study indicated that the low stocking rate was best for the goats evaluated. High stocking rates for both years caused weight loss thus indicating that a low stocking rate will be best for the paddock sizes used for the study. A silvopastoral system with goats at a stocking rate of 10 goats ha^{-1} averaging 34 -45 kg body weight on bahiagrass grown under trees can provide adequate forage.

KEYWORDS: silvopastoral system, Tifton-9 bahiagrass, stocking rate.

INTRODUCTION.

Meat goat production is increasing in the United States due to goats' economic value as efficient converters of low quality forages into quality meat, milk, and hides products for specialty markets (Engle et al., 2000). According to the National Agricultural Statistics Service, there are approximately 60,000 head of meat goats found in the state of Florida for 2007. The main reason for meat goat increase in the United States is the wide variety of ethnic groups that have settled in the United States who have a desire for goat meat, milk and other goat products (Engle et al., 2000). Another reason

is that with limited resources a small herd of goats may be the only livestock that a small farmer can raise in self-sustainable enterprises (Engle et al., 2000).

Farmers can use goats as brush control since goats tend to browse shrubs and trees more readily than grass (Mislevy et al., 2000). However, goats will graze well on improved grass pastures (Mislevy et al., 2000). Mature goats have a daily dry matter (DM) intake ranging from 30 to 50 g kg-1 of their body weight (Pinkerton et al., 1991). The quantity of the forage eaten by the animals per day is influenced by availability, DM concentration, digestibility, and rate of passage (Pinkerton et al., 1991).

Research data on stocking rate of small ruminant for silvopastoral systems is not readily available. With the increased influx of goat farmers in Florida and other southern states, coupled with the need for tree maintenance for environmental benefits, this type of information is needed for the farmers to decide upon an actual stocking rate using goats as the livestock component. The objective of this study was to provide information for an optimal stocking rate for Boer x Spanish crossbred goats for a silvopastoral system with loblolly pine trees.

MATERIALS AND METHODS.

Study Site

The site for this study is located at Florida A&M University Research and Extension Center Farm, Quincy, Florida. The farm is located in the lower southeastern region of the United States Geological Survey (USGS), 7.5-minute Dog-town quadrangle topography map. The property lies west of state road 267 and south of state road 272 at 30^{o} 36″ N latitude and 84^{o} 33″ W longitude (Clarke, 1999). The major land cover includes pine, mixed hardwood/pines forests, agriculture and non-vegetative urban infrastructure (Darbyshire, 1993).

The area used for this research consisted of loblolly pine that was planted in 1979. This area was thinned in November 2001 from the original spacing of 1.2 x 2.4 m to a 1.2 x 12-m spacing (Whilby, 2004).

Experimental Design

A split plot experimental design was used for these studies. Treatments consisted of 1) shaded pastures (existing under the established loblolly pines) and open pastures of Tifton 9 bahiagrass as main plots, and 2) two stocking rates (10 & 17 goats per hectare) of Boer x Spanish crossbred goats as subplots.

The total acreage used for this research was 1.62 hectares of land; 0.8 hectare shaded and 0.8 hectare unshaded. Both the shaded and unshaded areas were divided into four 0.2-ha experimental units. Each experimental unit was then further subdivided into two 0.1-ha paddocks. Each experimental unit consisted of two stocking rates of Boer x Spanish crossbreed of goats and there were two replications of each treatment. Goats grazed paddocks using a rotational stocking method. Goats were placed in each 0.1 ha paddock for 14 d then rotated to the second 0.1-ha paddock within that experimental unit for the next 14 d, that is, a 14-d grazing period followed by a 14-d rest period in each 0.1-ha paddock. Thus, there was a 28-d grazing cycle in all the experimental units.

Animal Management

For Year 1, thirty-two 18-month old animals were dewormed with cydectin at a rate of 1 cc per 9 kg animal weight. Iron (Ferrodex 5 ml / 23 kg) was given to each animal one week before assignment to pastures. For Year 2 the same deworming program was used, however, these animals were 36 months old. The animals were bred at Florida A&M University Research and Extension Station in Quincy, Florida. Animals were assigned randomly to treatments but balanced for average weight of animals. For Year 1, the average initial weight of the animals was 23 kg (0.08 AU). Animals were assigned to pastures on September 27, 2005. For Year 2, 32 adult animals were selected averaging 45 kg initial body weight (0.17 AU) and assigned to pastures on August 22, 2006. Each paddock within each experimental unit was grazed by the assigned stocking rates for the Boer x Spanish goats.

Data Collection for the Goat Weights

Live weight data was collected for goats during a two-year study. For Year 1, initial weights of animals were collected before they entered into the grazing trial and another weight was taken 6 wk later at the end of the grazing trial. For Year 2, goats were weighed at the beginning and every 28 d after being introduced into the paddocks.

Weight Analysis for Goats

Live weight data was used to calculate the average daily gain (ADG) and weight gain or loss of animals over the grazing period. Average daily gain was calculated using the following formula:

$$\frac{FW - IW}{\text{\# of grazing days}}$$

FW = final weight, IW = initial weight

Statistical Analysis

Animal performance responses were analyzed using the Proc Mixed of SAS at the 0.05 probability level. The treatments were shade (shaded versus unshaded) and stocking rate (high (17 animals ha^{-1}) and low (10 animals ha^{-1}) animals) with two replications. Average weight for the animals over the entire grazing period was also analyzed using analysis of variance. Treatments were stocking rate, shade and dates.

RESULTS/DISCUSSION.

For Year 1, there was no significant difference in average daily gain (ADG) of the animals for the shade treatment (P = 0.124) or stocking rate treatment (P = 0.673). Animals in the shaded area lost an average of 0.017 kg d-1 while the goats in the unshaded area gained an average of 0.016 kg d^{-1}. Goats in the low stocking rate gained an average of 0.004 kg d^{-1} while the goats in the high stocking rate loss 0.005 kg d^{-1}. Kallenbach et al., (2006) indicated that ADG of heifers was the same for animals in shaded and unshaded pastures. The average weight gain/loss for the animals during Year 1 showed that the animals maintained their body weight throughout the grazing period (Table 1). These results were expected since the grazing period was very short thus a significant weight gain would not be seen in the animals. Another reason for these results could be due to the age of the animals. These animals were older and so they are expected

to have a lower growth rate when compared to yearlings or six months old animals that are expected to have a faster growth rate.

For Year 2, the results showed a significant effect of stocking rate ($P = 0.003$) on ADG. The animals in the low stocking rate were gaining an average of 0.047 kg d^{-1} while the animals in the high stocking rate were losing an average of 0.011 kg d^{-1}. The average weight gain/loss analysis for Year 2 showed that the animals in the low stocking rate gained weight while the high stocking rate lost weight (Table 2).

Similar results have being obtained by Goodwin et al., 2004, who reported that goats reared in a grass only pasture had an average daily gain of 27 g d^{-1}.

The results obtained showed the lower stocking rate performed better than the high stocking rate. This result could be due to increased availability of forage for the animals, which could provide for the weight gains.

SUMMARY.

The results from this study indicated that the low stocking rate was best for the goats evaluated. High stocking rates for both years caused weight loss in the animals, thus indicating that the stocking was too high for the paddock sizes used. The shade did not significantly affect the stocking rate of the animals. The data obtained for Year 1 showed no significant differences among the treatments. It was expected that the animals in the low stocking rate in the shaded pastures would perform better due to the shade which would allow the animals to be grazing more frequently than the animals in full sunlight. These results however could have come from factors such as the management conditions of the animals before they were placed on pasture. The animals used were being supplemented and when they were used in the study, no supplementation was given to these animals. The removal of the supplementation could have resulted in loss of some vitamins or essential nutrients found in the supplementation feeds that were not available in adequate proportions in the grass.

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Table 1: Mean Weight gain/ loss (kg) of Boer x Spanish Crossbreed goats by shade and stocking rate during Year 1 of a Two year Silvopastoral study.
[a] Converted from 3 goats and 5 goats per 0.1 ha paddocks respectively.

Effect	Weights				
	Weight Dates	Initial weight (8-22-06)	9-19-06	10-17-06	Final weight (11-14-06)
Shade	Shaded	48	48	49	50
	Unshaded	47	48	46	46
Stocking Rate	Low (10 goats/ha)[a]	47	48	49	49
	High (17 goats/ha)[a]	47	48	48	47

Table 2: Mean Weight gain/ loss (kg) of Boer x Spanish Crossbreed goats by shade and stocking rate during Year 2 of a Two year Silvopastoral study.
[a] Converted from 3 goats and 5 goats per 0.1 ha paddocks respectively.

Effect	Stocking Rate	Initial weight (9/27/2005)	Final weight (11/8/2005)
Shaded	10 goats/ha[a]	30	30
	17 goats/ha	30	30
Unshaded	10 goats/ha	30	30
	17 goats/ha	30	30