Available online at www.sciencedirect.com
ScienceDirect
Small Ruminant Research 71 (2007) 234–242
Small Ruminant Research
www.elsevier.com/locate/smallrumres

Effects of stocking rate and creep grazing on performance by Spanish and Boer × Spanish does with crossbred Boer kids

M.D. Yiakoulaki [a,b], A.L. Goetsch [a,*], G. Detweiler [a], T. Sahlu [a]

[a] *E (Kika) de la Garza American Institute for Goat Research, Langston University, P.O. Box 730, Langston, OK 73050, USA*
[b] *Laboratory of Range Management (236), School of Forestry and Natural Environment, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece*

Received 25 January 2006; received in revised form 19 June 2006; accepted 6 July 2006
Available online 15 August 2006

Abstract

Twenty-six Spanish does with twin Boer × Spanish kids and 26 Boer × Spanish does with twin 3/4 Boer–1/4 Spanish kids were used in a 76-day experiment to determine effects of stocking rate (SR) and creep grazing on pre-weaning performance. The study commenced approximately 2 months after kidding. There were four treatments, three involving SR and one creep grazing, with two animal groups or replicates for each treatment (consisting of both genotype sets) per treatment. Groups had 4 does with 8 kids for the low SR (L), 6 does with 12 kids for a moderate SR (M), and 8 does with 16 kids for both the high SR (H) and creep grazing treatment (C). Groups grazed 0.4-ha pastures of various grasses and forbs, with the most prevalent forb being ragweed (*Ambrosia artemisifolia* L.). Kids of C groups also had access to similar 0.4-ha pastures that contained the tree legume mimosa (*Albizia julibrissin* Durazz). All pastures consisted of four equal size paddocks that were sequentially grazed twice by the same animal groups (i.e., phases 1 and 2 were 48 and 28 days in length, respectively). Post-grazing forage mass decreased linearly with increasing SR ($P < 0.01$) (1902, 1454, 928, and 1150 kg/ha; S.E. = 51.2), and change in forage mass during the phases linearly increased ($P < 0.05$) (1078, 1247, 1746, and 1493 kg/ha for L, M, H, and C, respectively; S.E. = 120.6). Change (pre-grazing–post-grazing %) during the experiment in the contribution of ragweed to the sward increased linearly with increasing SR ($P < 0.05$) (−6, 12, 33, and 9% for L, M, H, and C, respectively; S.E. = 4.5). ADG by does (47, −16, −54, and −2 g/day; S.E. = 21.8) and kids (76, 61, 37, and 81 g/day; S.E. = 6.7) linearly decreased with increasing SR ($P < 0.03$); however, kid BW gain per unit land area was similar among treatments (115, 138, 113, and 124 kg/ha for L, M, H, and C, respectively; S.E. = 21.7). Kid ADG was similar between genotypes but doe ADG differed ($P < 0.05$) (−47 and 34 g/day for Spanish and Boer × Spanish, respectively; S.E. = 11.5). In conclusion, creep grazing with high SR for does can increase ADG of does and kids but not relative to lower SR for both does and kids. Spanish does with Boer × Spanish kids may be less able to maintain or increase BW while supporting kid growth compared with Boer × Spanish does.

Keywords: Goats; Stocking rate; Creep grazing

1. Introduction

One of the most important management decisions for grazing animals impacting current and future productivity and profit is stocking rate (Hart, 1978). Individual animal performance generally decreases with increasing stocking rate though production per unit of

* Corresponding author. Tel.: +1 405 466 6164; fax: +1 405 466 6180.
E-mail address: goetsch@luresext.edu (A.L. Goetsch).

0921-4488/$ – see front matter © 2006 Published by Elsevier B.V.
doi:10.1016/j.smallrumres.2006.07.003

land area rises to a plateau then declines. However, it is not as well understood how performance of lactating females and their offspring is impacted by stocking rate. For example, within certain limits lactating females can compensate for low nutrient intake with high stocking rate through tissue mobilization. But, depending on the severity of body weight loss this could have detrimental effects on later performance without a sufficient period of realimentation.

Creep feeding entails supplementation of nursing young typically with concentrate, which has been fairly extensively studied with cattle (Ritchie, 1987; Prichard et al., 1989). One important objective of creep feeding is to increase growth rate and body weight for increased economic returns at the time of marketing. However, another type of creep feeding, often termed creep grazing, is to allow young nursing animals access to an additional pasture area with moderate or high quality forage (Blaser et al., 1986). The young animals through special gates are able to use the creep pasture and to return for suckling, thus possibly reducing stress associated with weaning. Another possible benefit of creep grazing, in addition to elevated weight gain and weaning weight without concentrate supplementation and its associated labor requirement and cost, is an increased stocking rate on land grazed by lactating animals.

Foliage of multipurpose trees can be important supplementary sources of nutrients for ruminants (Topps, 1992; Melaku et al., 2004; Pamo et al., 2006) for bridging seasonal deficits in feed quantity and nutritive value. As browse plant species are highly preferred by goats (Papanastasis et al., in press), they could contribute to creep grazing systems by supplying required nutrients, particularly when the availability or nutritive value of grasses and forbs is low. Recently, mimosa has been evaluated as a potential tree legume that can be incorporated into production systems to provide high quality forage for small ruminants (Addlestone et al., 1999; Luginbhul and Mueller, 2000; Bing and Corley, 2004). Creep grazing by goats or of browse plant species does not appear to have been studied extensively. A creep grazing system might be of particular interest with high stocking rates to compensate for potentially limited milk production by females, which could also lessen tissue mobilization to support milk synthesis. Although, it is unclear if creep grazing in such a scenario would be advantageous compared with also allowing the mother to utilize a larger area.

Growth and size benefits from use of Boer goats compared with local genotypes such as the Spanish of the US are well known, and performance improvements from crossbreeding have been shown as well. But, potential effects of different levels of Boer breeding or blood have not been extensively investigated. In this regard, the recent study of Gipson et al. (2006) investigated differences in postweaning performance of growing wethers with 50 or 75% Boer blood. A similar consideration is for preweaning performance during which time milk production by the dam in relation to nutrient demand or potential for use by the offspring could be important. Therefore, objectives of this experiment were to determine effects of different stocking rates with mixed grass/forb pastures and creep grazing on performance by Spanish does with Boer × Spanish kids and Boer × Spanish does with 3/4 Boer–1/4 Spanish kids.

2. Materials and methods

2.1. Pastures

The experiment was conducted during the summer of 2004 with ten 0.4-ha pastures of the American Institute for Goat Research of Langston University, Langston, Oklahoma (latitude 35°56′35″N; longitude 97°16′52″W; elevation 261 m). Average mean, maximum, and minimum temperatures during the experiment were 24.5, 29.7, and 19.9 °C, and total rainfall in this region of Oklahoma was 23 and 35 cm in the spring and summer of 2004, respectively. Vegetation of the pastures was dominated by grasses such as bermudagrass (*Cynodon dactylon* L.) and johnsongrass (*Sorgum halepense* (L.) Pers.) and forbs such as ragweed (*Ambrosia artemisifolia* L.), silverleaf nightshade (*Solanum elaeagnifolium* Cav.), and Carolina horsenettle (*Solanum carolinense* L). Secondary grasses included *Bromus tectorum* L., *Dichanthelium oligisanthes* (J.A. Schultes) Gould, *Eragrostis* spp., *Cyperus echinatus* (L.) Wood, and *Setaria glauca* (L.) Beauv., while other forbs present were *Trifolium campestre* Schreb., *Medicago sativa* L., *Rumex crispus* L., *Lactuca canadensis* L., *Schrankia uncinata* Willd., and *Conyza canadensis* (L.) Cronq.

In addition to various grasses and forbs present in other pastures, two pastures included mimosa trees (*Albizia julibrissin* Durazz) planted as seedlings in the early summer of 2001. Each pasture had 10 rows of mimosa trees separated by 3.1 m and with a 0.46-m interval within rows. Trees were pruned to a height of 0.6 m before grazing in 2003 and 2004 to promote branching and ensure animal access to leaves. All 10 pastures were split into four paddocks. Animals sequentially grazed the paddocks in two cycles or phases; thus, each paddock was grazed twice by the same group of animals. The length of time in paddocks was 14, 14, 10, and 10