MEAT GOAT PERFORMANCE AND CARCASS PARAMETERS
WHEN FINISHED ON ORCHARDGRASS, RED CLOVER, OR ALFALFA
PASTURES

K.E. Turner, K.A. Cassida, and J.Y. Pritchard

Abstract

The meat goat industry is growing rapidly in the U.S., particularly on small farms. There are a diversity of forage types and qualities used in meat goat production systems. Seventy-two Boer goats were used to evaluate weight gain and carcass parameters when growing goats were finished on alfalfa (Medicago sativa L.; ALF), red clover (Trifolium pratense L.; RCL), or orchardgrass (Dactylis glomerata L.; OGR) pastures without energy supplementation. Forage mass showed an interaction (P < 0.001) between treatment and time over the grazing season. Goat kids grazing RCL and ALF had higher BW than those grazing OGR throughout the grazing season. Average daily gain (ADG) was similar for ALF and RCL kids (mean 0.18 lb/d) and both were greater (P < 0.001) than OGR (0.11 lb/d). Carcass wt were similar for kids finished on RCL and ALF (mean 33.8 lb), but both were greater (P < 0.0001) than kids grazing OGR (29.8 lb). Dressing percentage of RCL and OGR was similar (mean 51.7 %), but both were greater (P < 0.05) than ALF (49.8 %). Ribeye area was higher (P < 0.01) for kids finished on RC compared to ALF and OGR. Backfat measurements were not different (mean 0.05 in). Goats finished on ALF, RCL, and OGR produced desirable finished BW and carcasses for the Muslim Halal ethnic market.

Introduction: The meat goat industry is growing rapidly in the U.S., particularly on small farms. Meat goat production in the U.S. almost extensively uses the Boer breed to take advantage of the meat-type conformation and heterosis derived from crossbreeding. Weight gains of over 200 g/d for Boer and Boer crossbreeds have been reported (McGregor, 1985). However, using simulation modeling, Blackburn (1995) reported that as the forage base (quality and quantity) changed from high forage to low forage, Boer goat performance ranked below the Spanish goat, suggesting that nutrient intake from low- to medium-quality grasses is insufficient to maximize growth potential for Boer and Boer-cross goats.

Alfalfa (Medicago sativa L.; ALF) is an important legume forage for many classes of livestock (Van Keuren and Matches, 1988) and ALF hay is often used to supply crude protein in finishing diets for small ruminants. Alfalfa is a tall growing, winter hardy plant that produces high yields and quality forage (Hoveland, 1992) and supports superior weight gains (Gelaye et al., 1990) in goat systems. Red clover (Trifolium pratense L.; RCL) grows...
well on fertile and moderately acidic soils and does well under rotational grazing (Taylor and Smith, 1995), and has higher rumen escape protein levels compared to alfalfa (Jones et al., 1995). Orchardgrass (Dactylis glomerata L.; OGR) is a major pasture grass in the northeastern United States (Hoveland, 1992).

There is little information available on performance and carcass merit of meat goats in management intensive grazing systems. This experiment was conducted to evaluate meat goat weight gain and carcass characteristics when goat kids were finished on different pasture forages without energy supplementation.

**Materials and Methods:** Seventy-two growing goat wethers (avg wt 43.6 lb) were randomly assigned to three pasture treatments (OGR, RCL, or ALF) that were each replicated three times, resulting in a stocking density of 16 kids/ac (8 kids/pasture). Each pasture contained 0.5 ac subdivided into ten 0.05-acre paddocks for rotational stocking management based on a target 4-d occupation period. Forage mass was determined each week by clipping a 10-ft² quadrat to a 1-in stubble height before grazing. Because goats grazed unevenly, paddocks were mowed to a 3-in stubble height immediately after each occupation.

Grazing was initiated on 6 June and continued until 5 Oct. 2005. Animals had access to water and mineral supplement at all times and were dewormed every 30 d with a combination of orally administered anthelmintics prescribed by a collaborating veterinarian. Interim full BW were recorded every three wk. Goats grazing ALF and RCL were moved to prairiegrass (Bromus catharticus Bahl.) pastures for 9 d in July following carbaryl application to legumes for control of leafhoopers. Goats grazing RCL also grazed prairiegrass for 18 d beginning 19 Aug. and for 6 d beginning 29 Sept. because of limited regrowth of RCL. Final full weight was recorded on 5 Oct.

Ribeye area (REA) and backfat (BF) measurements were obtained by ultrasound prior to animals being transported to Eighty Four Packing Co., Eighty Four, PA and slaughtered by the Muslim Halal way. Carcasses were held overnight in a walk-in cooler maintained at 34°F. Chilled carcass weights were recorded and percentage internal fat (KHP) estimated and recorded. Dressing percentage was calculated using the chilled carcass weight divided by final BW.

Body weights, overall gain, and carcass data were analyzed as a CRD using ANOVA procedures of SAS (1990). The model for BW included effects of date and treatment. Means were separated when a significant F-value (P < 0.05) was indicated.

**Results and Discussion:** Forage resource influenced meat goat liveweight change over the grazing season (Figure 1). Goat kids grazing RCL and ALF had higher BW than those grazing OGR on d 199, 220, 241, 262, and 278. Overall ADG was similar for ALF and RCL kids (mean 0.18 lb/d) and both were greater than OGR (0.11 lb/d). Forage mass displayed a complex interaction between treatment and time (P < 0.001) across the grazing season, but tended to be numerically higher for RCL than for ALF or OGR in the last half of the season (Figure 2).
Final BW were similar for kids finished on RCL and ALF, but both were greater than kids grazing OGR (Table 1). Chilled carcass wt followed a similar trend. Dressing percentage of RCL and OGR was similar (mean 51.7 %), and both were greater than ALF (49.8 %). Ribeye area was higher for kids finished on RC compared to ALF and OGR. Backfat measurements were not different (mean 0.05 in).

Results were similar to greater liveweight gains reported for lambs grazing forage legumes rather than grasses (Karnezos et al., 1994). Luginbuhl et al. (2000) reported an ADG of 0.22 lb/d when male weanling Boer and Boer crossbred goats were offered orchardgrass hay plus corn-soybean meal supplement versus an ADG of 0.37 lb/d on alfalfa. Fraser et al. (2004) reported lambs grazing red clover had higher weight gain than those grazing alfalfa or perennial ryegrass; alfalfa lambs gains were also greater than perennial ryegrass. Oman et al. (1999) reported similar REA and BF measurements for range-reared Boer x Spanish intact male goats.

There are many factors that affect ruminant performance when grazing pasture. Forage mass influences intake and ultimately performance. Lambs had greater intake of alfalfa or red clover in comparison to perennial ryegrass (Fraser et al., 2004). Alfalfa contains secondary plant compounds that are modified by rumen bacteria into estrogegenic compounds such as isoflavone (phytoestrogen; Saloniemi et al., 1995) and may increase weight gain in grazing animals. Red clover also contains phytoestrogens (i.e. equol) that are reported to increase weight gain (Moorby et al., 2004). In addition, red clover may improve weight gains via a polyphenol oxidase-mediated increase in rumen escape protein (Jones et al., 1995).

This was the first year of a 3-yr study to evaluate weight gain and carcass parameters when finishing meat goats on pasture. Goats finished on ALF, RCL, and OGR produced desirable BW and carcasses for the Muslim Halal ethnic market.

Literature Cited:


Table 1. Final body weight (BW) and carcass parameters when meat goats were finished on alfalfa (ALF), red clover (RCL), or orchardgrass (OGR) pastures in 2005.

<table>
<thead>
<tr>
<th>Item</th>
<th>ALF</th>
<th>RCL</th>
<th>OGR</th>
<th>P level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final BW, lb</td>
<td>65.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>67.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>57.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Chilled carcass wt, lb</td>
<td>32.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>34.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dressing percentage, %</td>
<td>49.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>51.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>52.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>REA, sq in</td>
<td>1.19&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.11&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>BF, in</td>
<td>0.047</td>
<td>0.051</td>
<td>0.048</td>
<td>NS</td>
</tr>
<tr>
<td>KHP fat, %</td>
<td>0.33&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>0.39&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.28&lt;sup&gt;b&lt;/sup&gt;</td>
<td>= 0.05</td>
</tr>
</tbody>
</table>

<sup>a,b</sup>Means within a row without a common letter differ at the listed probability (P) level. Abbreviations: BW, body weight; REA, ribeye area; BF, backfat; KHP, kidney, heart, and pelvic. Chilled carcass weight included the weight of the head, heart, kidney, liver, and spleen.
Fig. 1. Change in body weight over the 2005 grazing season when meat goat wethers were finished on alfalfa (ALF), red clover (RCL), or orchardgrass (OGR) pastures.

Fig. 2. Forage mass of alfalfa (ALF), red clover (RCL), and orchardgrass (OGR) pastures over the 2005 grazing season.