Options for Fattening (Finishing) Meat Goats
S. Schoenian

Abstract: The meat goat industry is growing worldwide and there is an increasing demand for goat products. To meet the demand, producers must be able to profitably fatten (finish) goats. There are numerous ways to feed goats. Research has shown that concentrate feeding increases growth performance (ADG). In fact, according to NRC requirements, concentrate feeding is the only way to achieve higher rates-of-gain (> 100 g/d). The effects of concentrate feeding on carcass traits have been evaluated by many researchers. Concentrate feeding increases dressing percentage, carcass weight, and carcass fatness. It may also alter fatty acid composition and meat quality. The cost: benefit ratio is the most important aspect to consider when deciding upon the method of finishing goats. Market prices must exceed feed and other production costs. Thus, the economics of feedlot finishing or pen feeding will vary by geographic location, farm, feed costs, and other factors. For the past several years, the University of Maryland has been evaluating the health, performance, and carcass characteristics of pen vs. pasture-fed goats.

Key words: concentrate feeding, feedlot, grazing goats, profitability

Opções de Engorda para Caprinos de Corte (Acabamento)

Resumo: A indústria de carne caprina está crescendo em todo o mundo e há uma crescente demanda pelos produtos caprinos. Para atender à demanda, os produtores devem ser capazes de terminar os animais de forma rentável, havendo inúmeros modelos de manejo alimentar. A pesquisa mostrou que a alimentação concentrada aumenta o desempenho de crescimento. Na verdade, de acordo com os requisitos do NRC, alimentação concentrada é a única forma de alcançar maiores taxas de ganho (>100 g/d). Os efeitos do concentrado na alimentação sobre as características de carcaça foram avaliadas por muitos pesquisadores. Concentrado na alimentação aumenta o rendimento de carcaça, peso de carcaça e gordura da carcaça. Também pode alterar a composição de ácidos graxos e qualidade da carne. A relação custo: benefício é o aspecto mais importante a considerar quando se decidir sobre o método de acabamento de caprinos. Os preços de mercado devem ultrapassar o custo com alimentação e outros custos de produção. Assim, a economia da terminação em confinamento ou alimentação vai variar de acordo com a localização geográfica, fazenda, os custos de alimentação e outros fatores.

Palavras-chave: alimentação concentrado, confinamento, pastagem, rentabilidade

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Introduction

The meat goat industry is growing worldwide and there is an increasing demand for goat products. In the United States, growth has stagnated, but the industry has increased substantially in the past several decades. The changing demographics of the U.S. population is credited with the growing demand for goat meat products. Meat goats have also found popularity on the burgeoning number of small and hobby farms in the U.S. Further, it is believed that published goat statistics are low, as many goats do not pass through traditional slaughter channels.

In the United States, due to the ethnic diversity of the market place, there is a demand for meat goats of many different types and sizes. There is a market for virtually every goat, from a young, milk-fed kid having a carcass weight of less than 10 kg to a mature intact male goat with a live weight in excess of 70 kg. For many producers, the goal is to produce an 18 to 36 kg kid that will grade Selection 1 (preferably) or 2.

According to Figure 1, USDA grades can have a significant impact on the prices received for live goats (USDA, 2013). For producers who direct market goat meat, Selection 1 goats will produce a higher percentage of salable product (> 50 percent yield). USDA goat grades are based on muscling, with Selection 1 goats having superior muscling, Selection 2 goats having average muscling, and Selection 3 goats having inferior muscling (LSU, 2012).

Finishing Meat Goats

There are numerous ways to grow and fatten (finish) goats for market, as goats can be successfully fed a variety of feedstuffs and be marketed at various weights, ages, and body conditions. In fact, there is no optimal way to finish a goat for market. The choice of the finishing program will vary by farm and market. Profitability will be influenced by season, year, management, and genetics. Producers may also have personal preferences as to how they want to fatten their goats.

Table 1 shows the daily nutrient requirements for a 20 kg Boer buckling (NRC, 2007). For dairy-type bucks, the requirements would be mostly higher (NRC, 2007). For indigenous (local or native) goats, the requirements would be mostly lower and the gain potential would be less (NRC, 2007). Doelings and castrates would also have lower requirements and less potential for growth (NRC, 2007).

Table 2 shows the range in nutrient composition for various types of feedstuffs (NRC, 2007). The figures in the tables show that higher growth rates (> 100 g/d) are not possible without some concentrate feeding (NRC, 2007). According to this author, it is also difficult to produce a Selection 1 goat without some concentrate feeding (or at least high quality forage). Dry matter intake (DMI) is another limiting factor, as a kid often cannot consume enough wet forage (even high quality forage) to meet its nutritional requirements for growth, especially if high rates of gain are sought.

Concentrate Feeding

While fewer studies have been done with goats than other livestock, various studies have shown
that concentrate feeding will increase ADG, dressing percentages, carcass weights, and carcass fatness in goats (Safari, 2009; Mushi, 2009; Asizua, 2010; Liméa, 2010; Oman, 1999). Higher quality forage may also improve performance and carcass quality (Wildeus, 2007).

Depending upon the degree of finishing, concentrate feeding may lower percentages of trimmed cuts (Ryan, 2007). Concentrate feeding may also alter fatty acid composition (Ryan, 2007; Liméa, 2010) and have limited effects on meat quality (Safari, 2009; Ryan, 2007).

The most important aspect of concentrate feeding is cost: benefit ratio. Early feed trials in Texas with Boer and Tennessee Meat Goats showed that there is a narrow opportunity for profit when feedlotting goats (Pinkerton, 1997).

In evaluating different feedlot rations for meat goats, Machen et al. determined the most economical ration to be one consisting of whole shell corn (80%) and a premix pellet (20%). However, the ration had to be ground to prevent the goats from sorting the pellet.

Hutchins et al. (2006) were able to reduce feed costs by feeding by-product based rations (distiller’s grains and soybean hulls). Goats fed either a commercial diet or by-product ration had similar rates-of-gain during a 56-day trial; however, the cost of the by-product based rations was less than 50 percent of the cost of the commercial diet. In addition, the cost per gain for all rations was at a profitable level.

Similarly, Maryland researchers (Schoenian et al. 2002) were able to reduce feed costs by 50 percent by feeding a whole barley-based diet vs. a commercial diet to meat goat bucklings. The cost of gain for the barley-based diet was at a profitable level.

Researchers at Tennessee State University were able to increase live weight gains and returns above feed costs when they extended the feeding period from 45 to 135 days (same quantity of finisher fed); however, the researchers concluded that concentrate feeding was not economical if paid labor was required to feed the goats (Lema).

For feedlot finishing of goats to be profitable, market prices must exceed production costs. Cost of gain will be the primary consideration. Market prices will also have a large bearing on profitability.

**Pen vs. Pasture Studies in Maryland**

Pen vs. pasture studies were initiated at the University of Maryland’s Western Maryland Research & Education Center in 2011. The rationale for the studies is the fact that bucks finishing the Western Maryland Pasture-Based Meat Goat Performance Test are not market-ready, after almost 100 days of grazing. They grade mostly Selection 3 and receive low prices at the commercial markets. Their lack of market readiness has been confirmed by carcass evaluations in 2009 and 2010.

**Table 1** - Nutrient requirements for 20 kg Boer bucklings (NRC, 2007)

<table>
<thead>
<tr>
<th>ADG, g/d</th>
<th>DM, kg/d</th>
<th>DMI, %</th>
<th>TDN, kg/d</th>
<th>% TDN</th>
<th>CP, g/d</th>
<th>% CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.67</td>
<td>3.33</td>
<td>0.33</td>
<td>49.2</td>
<td>43</td>
<td>6.4</td>
</tr>
<tr>
<td>25</td>
<td>0.75</td>
<td>3.74</td>
<td>0.37</td>
<td>49.3</td>
<td>58</td>
<td>7.7</td>
</tr>
<tr>
<td>100</td>
<td>0.72</td>
<td>3.61</td>
<td>0.48</td>
<td>66.7</td>
<td>103</td>
<td>14.5</td>
</tr>
<tr>
<td>150</td>
<td>0.64</td>
<td>3.21</td>
<td>0.56</td>
<td>87.5</td>
<td>133</td>
<td>20.1</td>
</tr>
<tr>
<td>200</td>
<td>0.72</td>
<td>3.6</td>
<td>0.64</td>
<td>88.9</td>
<td>163</td>
<td>22.6</td>
</tr>
<tr>
<td>250</td>
<td>0.80</td>
<td>4.0</td>
<td>0.71</td>
<td>88.8</td>
<td>194</td>
<td>24.2</td>
</tr>
</tbody>
</table>

**Table 2** - Nutrient composition of different feedstuffs (NRC, 2007)

<table>
<thead>
<tr>
<th>Feedstuff</th>
<th>% DM</th>
<th>% CP</th>
<th>% TDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy concentrates</td>
<td>88-91</td>
<td>8-14</td>
<td>76-92</td>
</tr>
<tr>
<td>Protein concentrates</td>
<td>88-91</td>
<td>23-66</td>
<td>74-87</td>
</tr>
<tr>
<td>Grass hay</td>
<td>88-91</td>
<td>6-12</td>
<td>50-60</td>
</tr>
<tr>
<td>Legume hay</td>
<td>88-91</td>
<td>15-19</td>
<td>55-65</td>
</tr>
<tr>
<td>Fresh forage</td>
<td>24-29</td>
<td>14-18</td>
<td>61-67</td>
</tr>
</tbody>
</table>
**Year: 2011**

In 2011, a preliminary study was conducted. The purpose of the study was to compare the performance and carcass characteristics of pen vs. pasture-fed goats. Consigners to the Western Maryland Pasture-Based Meat Goat Performance Test provided pairs of genetically-similar (weaned) bucklings (mostly Kiko, avg. 20 kg) for comparison.

The PEN goats (n=9) were housed in a 4.9 m² pen, with a three-sided shelter. Grass hay was fed ad libitum in vertical hay racks. Grain was hand-fed once daily based on appetite. The grain was a commercial meat goat pellet (ADM Goat Power, 17% CP). Grain was gradually introduced to the goats and over the duration of the study, consumption averaged 0.45 kg per head per day. The PASTURE goats (n=9) grazed alongside the bucks (n=72) in the Western Maryland Pasture-Based Meat Goat Performance Test.

After consuming their respective diets for 112 days (including an adjustment period), the goats were harvested and their carcasses were deboned and separated into fat, lean, and bone. A sample of the longisimuss dorsi muscle was analyzed for fat, protein, and fatty acid composition.

The PEN goats had a higher rate-of-gain than the PASTURE goats (105 vs. 56 g/d). They had heavier carcass weights (12.3 vs. 9.4 kg) and higher dressing percentages (44.4 vs. 39.4%). While the carcasses from the PEN goats had more kidney and heart fat (2.6 vs. 1.4) and carcass fat (4.3 vs. 2.1), their boneless meat yields were 4.7 percent higher than the PASTURE goats (24.5 vs. 19.8).

**Year: 2012**

The pen vs. pasture study was repeated in 2012 with 30 bucklings, 15 per treatment (mostly Kiko, avg. 17 kg). In contrast with previous years, all of the study goats originated from the same farm (in Kansas); thus genetics and pre-weaning management were more similar. In addition, better quality hay (alfalfa-grass mix) was fed to the PEN goats. Hay was fed ad libitum at the beginning of the study and restricted in the later part of the study (after d-64).

Whole barley was hand-fed once daily based on appetite. The amount of grain was not increased after the goats reached a consumption of 0.6 kg per day (d-55). The PASTURE goats grazed alongside the bucks (n=81) in the Western Maryland Pasture-Based Meat Goat Performance Test.

**Year: 2013**

The study was repeated again in 2013 with another 30 bucklings, 15 per treatment (Kiko, avg. 22 kg). In contrast with previous years, all of the study goats originated from the same farm (in Kansas); thus genetics and pre-weaning management were more similar. In addition, better quality hay (alfalfa-grass mix) was fed to the PEN goats. Hay was fed ad libitum at the beginning of the study and restricted in the later part of the study (after d-64).

Whole barley was hand-fed once daily based on appetite. The amount of grain was not increased after the goats reached a consumption of 0.6 kg per day (d-55). The PASTURE goats grazed alongside the bucks (n=81) in the Western Maryland Pasture-Based Meat Goat Performance Test.
After a 13 day adjustment period and 84-day feeding period, all of the study goats were harvested and their carcasses were deboned and separated into fat, lean, and bone. A sample of the longissimus dorsi muscle is being analyzed for fat, protein, and fatty acid composition.

In 2013, the PEN goats showed superior growth, as shown in table 3 (141 vs. 21 g/d). Due to their heavier weights (almost 9 kg at the end of the study) and better live grades (1.2 vs. 2.5), the PEN goats were worth at least $40 per head more than the PASTURE goats (USDA, 2013).

As shown in the table below, the PEN goats had higher dressing percentages (DP), heavier hot (HCW) and cold carcass weights (CCW), larger rib eye areas (REA), and higher leg circumference. Though the PEN goats had more kidney and heart fat (KH) and carcass fat, they had a 5.1 percent higher boneless yield than the PASTURE goats.

In 2013, the bucks in the study (and in the buck test) faced a significant internal parasite challenge (more than 70% Haemonchus contortus). The PEN goats were virtually parasite-free during the study period, whereas the STUDY goats had higher average fecal egg counts (1288 vs. 78 epg) and FAMACHA© scores (2.5 vs. 1.1). The PEN goats did not require any anthelmintic treatments, whereas the PASTURE goats were dewormed an average of 1.9 times each.

### Discussion

The economics of different feeding programs will obviously vary. Feedlot finishing or pen feeding is more likely to be profitable when feedstuffs are economically priced and market prices are high. In the very least, the market needs to offer price differentials for goats of different qualities. On the other hand, increased weight gain and survival rates may more than compensate for higher feed costs. Goats with high growth potential (e.g. Boer) should be favored in feedlot finishing programs.

It is easy to calculate the cost of concentrates and other supplements fed to confined animals. The cost of pasture is harder to determine. While pasture is generally considered to be a more economical source of nutrients for ruminant livestock, this may not always be the case. There are costs associated with land ownership. In some places, the cost of pasture land is very expensive, as non-agricultural uses compete for land use.

Fencing costs can be substantial and should be counted against the goat grazing operation. In some situations, predation could limit the ability to successfully graze small ruminants. In the very least,
predator control can be an added cost to the grazing enterprise. Labor costs can be similar to confinement rearing, if management intensive grazing is practice and/or the goats must be frequently monitored for parasitism.

In humid climates, internal parasites can sometimes be an insurmountable barrier to profitable small ruminant grazing. In situations where parasites cannot be adequately or economically controlled, it may be advisable to raise young stock in confinement or dry lot and allow less-susceptible mature animals to graze pastures.

**Literature Cited**


