Comparing Goat Production Economics on Different Production Systems in the Southeastern U. S.

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The sharp increase in the Hispanic and Muslim populations in the United States has resulted in a substantial increase in the demand for goat meat (Figure 1). Hispanic population will be more than 25% by year 2050. This shift in population results in changes in agricultural products that meet the demand for new products like goat meat.

Goat meat production in the U.S. is unable to meet current demand. Consequently, more than 11,000 metric tons or 24,354 million lbs. of goat meat, equivalent to about 700,000 goat carcasses were imported in 2006 from Australia and
New Zealand to meet the demand (Figure 2). This is an increase of more than 40% in goat meat import.

![Figure 2. U.S. Goat meat imports.](image)

Source: USDA-NASS

This creates profitable opportunities for limited resource farmers in the Southeast to maximize economic return from small farms and to maximize return per acre. On the other hand, despite poor soils, the southern U.S. is well suited for forage production. In Alabama about 4.5 million acres of pastures are used to support a little less than one million brood cows. However, due to their size and relative inefficiency, cattle are not well suited to small farm operations, and will not match small ruminants in their ability to provide a high economic return per acre. Goats are even more efficient from a reproductive perspective, because of their high proportion of multiple births (twins and triplets). However, according to veterinarians, the humid environment of the eastern United States results in gastro-intestinal parasites posing a major challenge for goat producers: these parasites can result in lower weight gain, but can also lead to high mortality rates. Compared to perennial pastures, annual pastures planted on a prepared seedbed are expected to reduce the need for deworming because parasite larvae are destroyed and diluted during tillage operations. Consequently, forages such as annual ryegrass would appear to have promise for goat production. Considerable information is available for cattle production from annual ryegrass, but there are no
data available for goats. Of particular importance is identification of an optimal range of stocking rates for goats.

Goats are typically browsing animals: if allowed free access to grazing and browse they generally obtain 60 to 80% of their diet from browse plants. They are also very sensitive to gastro-intestinal parasites which are abundant in the humid climate of the Southeast, and which are likely to pose more of a problem when animals are grazing (because larvae are typically located in the grass layer, close to the ground) than when they are browsing. Typically, woody forage plants need to be rotationally stocked in order to ensure long term survival. A frequency of defoliation interval of 6 to 8 weeks would probably be optimal (Bransby, 1993), and removal of about 70% of foliage would result in greater forage yields than total defoliation.

The general goal of the following project was to develop and demonstrate a profitable and sustainable year-round forage system (mimosa, grass pasture or feedlot system in the summer-fall, and annual ryegrass pasture in the winter) for goat production, especially suited to limited resource producers, and with special focus on high quality forage and reduction of GI parasites. Most common production practices of grazing goats on warm season grasses, such as bahaiagrass, and feedlot system, with zero grazing, are also included in these comparisons. It must be noted that warm season summer pasture, browse system as well as feedlot system were directly compared during the same period with 16 wether kids data for each system; however, winter pasture system used buck kids and was conducted at a different time period inherited by the nature of the system. For fair comparison of systems, higher growth rate of bucks vs. wether must be considered. Therefore, direct comparison could not be made.

Experimental Procedures

In first experiment twenty four high percentage (HP; 87.5%), and twenty one low percentage (LP; 50.0%), Boer cross wether goat kids were raised under different production systems and used to evaluate potential purity of breed differences and production system input that represent the meat goat industry in the Southeastern United States (Solaiman, 2006). Animals were weighed for two consecutive days, stratified by body weight (BW) and randomly assigned within purity of breed to one of three production
systems: 1) feedlot (CONC) containing 40% protein pellets, 40% soybean hulls, and 20% bermudagrass hay; 2) warm season bahiagrass pasture (BG) supplemented with 150 g (0.33 lbs./head/day protein pellets; 3) mimosa browse (MB) supplemented with 100 g (0.22 lbs./head/day of cracked corn. The CONC animals were housed individually in pens with raised mesh floors. Fresh water and feed were supplied daily. The BG animals were grazed on 2 acres pasture containing bahiagrass and fed protein pellet once daily. The MB animals were rotated every two weeks between four mimosa plots (1 acre) with trees trimmed to a height of 3-4 ft. initially and fed cracked corn once daily. Body weights were recorded after a four hour withdrawal from feed and water, for two consecutive days every two weeks. The growth period consisted of 14 wk.

For second experiment Marshall ryegrass was planted on a prepared seedbed in September, at a seeding rate of 30 lbs./ac. Nitrogen fertilizer was applied at 100 lbs. N/acre at planting, and 60 lbs. N/acre again in February. Phosphorus and potassium were applied according to soil test. Buck kids were placed on one 1-acre ryegrass pastures and continuously grazed at 11 goats per acre for 105 days. Data for two years of the grazing study is used for this comparison. No supplemental feed was used for this system.

Results

To optimize for protein and energy, animals on pasture were supplemented with 150 grams (0.33 lbs.) of protein pellets per animal per day and animals on mimosa were supplemented with 100 grams (0.22 lbs.) of corn per animal per day, respectively.

Performance

Animal performance on different production systems is presented in Figure 3. Initial body weight of goat kids was similar among production systems. Goats receiving the BG treatment had the lowest ADG, 47.5 g (0.1 lb.) over 134 days followed by goats receiving the MB treatment 82.4g (0.18 lbs.) and required more days on feed to reach harvest end points. Goats on feedlot style treatment exhibited the highest ADG of 125 g (0.27 lbs.) over the 98 days of growth period and reached harvest end point two to five weeks earlier than BG or MB treatments. Average over two years of performance on ryegrass pastures resulted in 138 g (0.3 lbs.) ADG for 105 days. There was no different in
performance between Boer crosses or claimed 75% purebreds. Unless is supported by a documented pedigree, claimed percentages do not warrant higher prices.

![Bar chart](image)

**Production Systems**

**Figure 3.** Goats performance on different production systems.

**Assumptions**

Production systems utilizing feedlot style was compared to those mainly based on summer pasture (common bahiagrass pasture), winter pasture (Marshall ryegrass) or browse (mimosa). Animals on feedlot style or Marshall ryegrass grew faster (about 120-140 g ADG) and reached expected slaughter date in less time when compared to other systems (about 80 g and 46 g ADG for mimosa and bahiagrass, respectively). For feedlot system, mimosa browse system and bahiagrass pasture system 16 animal data were used, 8 Boer crosses and 8 more than 75% Boer kids. More than 75% Boer kids were about $10 more in value when purchased. Prices of goats were actual prices paid. Few assumptions were made to compare these systems economically. Price of live goat sale is set at either at $1.00 per lb. regardless of weight or with variable pricing, depending on goat live weight for comparison (Table 5). Heavier animals are usually sold for less $/lb. For comparison purposes we assumed $1.25/lb. for 65 lbs. goat, $1.15/ lb for 70 lbs. goat, $1.10/lb. for 80 lbs. goat and $1.0/lb. for more than 85 lbs. goat. Higher prices will bring more profit. Dressing percentages is set at 50% and price for processing and packaging the meat is set as high as $1.0 per lb of meat. Lower processing costs will increase the profit.
Prices of fertilization, medication and feed were based on actual prices paid. Price of goat meat cuts is set at $3.00, $3.5 and $4.0 per lb. for comparison. Costs associated with establishing mimosa browse or pasture is not included.

ECONOMICS AND PROFITABILITY OF THE SYSTEMS

Profit and losses of feedlot system, summer pasture system, mimosa browse and winter pasture are presented in Tables 1, 2, 3 and 4 with the summary presented in Table 5 and figure 4. Preliminary results on input-output for mimosa browse are very promising when compared to reported results for similar size goats kept indoors and consuming more than 40% grain in their diet. However, economically (when input-output to the system was calculated), Marshall ryegrass was superior fallowed by mimosa browse when compared to other two systems. Results of these experiments indicated that commonly used bahiagrass pasture even with supplementation cannot support economically viable production system.

Table 1. Economic Analysis of Feedlot System

<table>
<thead>
<tr>
<th>Animals</th>
<th>16 Castrated Goats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial BW</td>
<td>50 lbs.</td>
</tr>
<tr>
<td>Final BW</td>
<td>77 lbs.</td>
</tr>
<tr>
<td>Age</td>
<td>4-5 months</td>
</tr>
<tr>
<td>Breed</td>
<td>Boer/Spanish</td>
</tr>
<tr>
<td>Feed</td>
<td>40% Dairy pellets, 40% Soybean Hulls, 20% BG Hay</td>
</tr>
<tr>
<td>Period</td>
<td>98 days</td>
</tr>
</tbody>
</table>

PURCHASES

<table>
<thead>
<tr>
<th>Goats, Boer crosses</th>
<th>16</th>
<th>$45/head</th>
<th>$720.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain Mix</td>
<td>$186.3</td>
<td>1380 lbs. @ $270/ton</td>
<td></td>
</tr>
<tr>
<td>Soy hulls</td>
<td>$96.6</td>
<td>1380 lbs. @ $140/ton</td>
<td></td>
</tr>
<tr>
<td>Bermudagrass Hay</td>
<td>$ 48.3</td>
<td>690 lbs. @ $ 3.50/bale</td>
<td></td>
</tr>
<tr>
<td>Medicated feed</td>
<td>$ 21.6</td>
<td>120 lbs. @ $ 9.0/50 lbs. bag</td>
<td></td>
</tr>
<tr>
<td>Cydectin</td>
<td>$ 4.2</td>
<td>$ 0.26/ goat</td>
<td></td>
</tr>
<tr>
<td>Co-Ral Dust</td>
<td>$ 9.9</td>
<td>$.62/ goat</td>
<td></td>
</tr>
<tr>
<td>Clostridium C &amp;D with Tetanus$</td>
<td>3.2</td>
<td>$0.20/goat</td>
<td></td>
</tr>
<tr>
<td>TOTAL Expenses</td>
<td></td>
<td>$1090</td>
<td></td>
</tr>
</tbody>
</table>

INCOME If sold live 80 lbs. @ $1.10/lb. $1408
Profit/goat $20
INCOME If sold live 80 lbs. @ $1.00/lb. $1280
Profit/goat $12

INCOME if slaughtered @ 50% dressing
Total meat & bone 640 lbs.
Costs of processing @ $1/lb. $640
If sold @ $3.00/lb. $1,920
Profit-loss/goat $12
If sold @ $3.50/lb. $2,240
Profit/goat $32
If sold @ $4.00/lb. $2,560
Profit/goat $52

Feed Costs $353
Feed Cost/goat $22
Medication Costs $17
Medication Cost/goat $1.1

As indicated above, raised goats on a feedlot style system if sold for at least $1.1/lb. for an 80-lbs. carcass, will not produce extra revenue if retail cuts are sold less than 3.5/lbs.

Table 2. Economic Analysis of Grazing System (Summer)

<table>
<thead>
<tr>
<th>Animals</th>
<th>16 Castrated Goats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial BW</td>
<td>46 lbs.</td>
</tr>
<tr>
<td>Final BW</td>
<td>60 lbs.</td>
</tr>
<tr>
<td>Age</td>
<td>4-5 months</td>
</tr>
<tr>
<td>Breed</td>
<td>Boer/Spanish</td>
</tr>
<tr>
<td>Feed</td>
<td>2 acres Bahaiagrass Pasture, Dairy pellets, 100-200 g/head/ day</td>
</tr>
<tr>
<td>Period</td>
<td>134 days</td>
</tr>
</tbody>
</table>

PURCHASES
Goats  Boer crosses 16 $45/head $720
Lime $30/ton $60 @ rate of one ton/acre
Fertilizer 16-16-16 $350/ton $140 @ rate of 400 lbs./acre
Medicated feed $21.6 2.4 50 lbs. bags @ $9.0/bag
Cydectin (twice) $8.3 @ $0.26/goat $65.95/500 cc
Permeceprin $6.25 @ $0.40/goat $16.85/12.5 lbs.
Clostridium C &D with Tetanus $3.2 @ $0.2/goat
Ivermeectin $8.8 @ $0.55/goat
Valbazin $3.0 @ $0.19/goat
Panacur $6.7 @ $0.42/goat
Grain mix @ 3.5 lbs./d for 54 d $25.5 189 lbs. @ $270/ton
Grain mix @ 7.0 lbs/d for 52 d $49.1 364 lbs. @ $270/ton
Grain mix @ 10.6 lbs/d for 28 d $40.1 297 lbs. @ $270/ton
Bermuda grass Hay $10.5 3 bales @ $3.5/bale

TOTAL expenses $1095

INCOME If sold live 60 lbs. @ $1.25/lb. $1200
Profit/goat $7.0
INCOME If sold live 60 lbs. @ $1.00/lb. $960
Profit-loss /goat $-8.5

INCOME if slaughtered @ 50% dressing
Total meat and bone 480 lbs.
Costs of processing @ $1/lb. $480
If sold @ $3.00/lb. $1,440
Profit-loss/goat $-8.5
If sold @$3.50/lb. $1,680
Profit/goat $7.0
If sold @ $4.00/lb. $1,920
Profit/goat $22.0

Feed Cost $339
Feed Cost/goat $21
Medication Cost $36
Medication Cost/goat $2.25

Goats raised on bahiagrass pasture required more grain and anthelmintic treatments and took longer to reach saleable weight. If goats are sold at a flat price of $1.00/lb., producers lose money. This is the most probable scenario taking place at local markets in Alabama and elsewhere. For profitable operation with this system, goats must be sold at higher prices and if slaughtered, price/lb. of retail goat meat sold must be more than $3.5/lb. for minimal profit. It is notable that this system takes 134 days to produce market goats.

Table 3. Economic Analysis of Browse System

Animals 16 Castrated Goats
Initial BW 46 lbs.
Final BW 70 lbs.
Age 4-5 months
Breed Boer/Spanish
Feed Mimosa, Corn 100 g/h/d
Period 134 days

PURCHASES
Goats Boer crosses 16 $45/head $720.0
Corn 100g/hd/d $ 37.1 @ $4.4/bushel
Medicated feed $ 21.6 0.5 lb/hd/d for 15 days
Cydectin $ 4.2 @ 0.26/goat
Co-Ral Dust $ 9.9 @ 0.61/goat
Clostridium C &D with Tetanus $ 3.2 @ 0.20/goat
Valbazin $ 3.0 @ 0.19/goat

TOTAL Expenses $799.0

INCOME If sold live 70lbs. @ $1.00/lb. $1120
Profit/goat $ 20
INCOME If sold live 70lbs. @ $1.15/lb. $1288
Profit/goat $ 30.5

INCOME if slaughtered @ 50% dressing
Total meat 560 lbs.
Processing cost @ $1.00/lb. $ 560
If sold @ $3.0/lb. $1,680
Profit/goat $ 20
If sold @ $3.50/lb. $1,960
Profit/goat $ 37.5
If sold @ $4.0/lb. $2,240
Profit/goat $ 55

Feed Cost $ 58.7
Feed Cost/goat $ 3.7
Medication Cost $ 20.3
Medication Cost/goat $ 1.3

This system was most profitable system considering the lowest manual and financial input to the system. The most significant part of the system is its low feed cost. This has been the reason behind the success of Australian meat export to U.S. Most of the meat is produced by feral goats feeding on browse. This system may not produce the heaviest
carcasses; however, lighter carcasses are more expensive than heavier carcasses. However, it is notable that this system takes 134 days to produce market goats.

Table 4. Economic Analysis of Grazing System (winter)

<table>
<thead>
<tr>
<th>Animals</th>
<th>22 bucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial BW</td>
<td>53 lbs.</td>
</tr>
<tr>
<td>Final BW</td>
<td>85 lbs.</td>
</tr>
<tr>
<td>Age</td>
<td>4-5 Months</td>
</tr>
<tr>
<td>Breed</td>
<td>Boer/Spanish</td>
</tr>
<tr>
<td>Feed</td>
<td>Marshall Ryegrass 2 acres</td>
</tr>
<tr>
<td>Period</td>
<td>105 days</td>
</tr>
</tbody>
</table>

**PURCHASES**
- Goats Boer cross 22 @ $45/hd $990.0
- Medicated feed $30.0 @ 0.5/goat for 15 days
- Cydectin $5.8 @ $0.26/goat
- Co-Ral Dust $13.4 @ $0.61/goat
- Clostridium C &D with Tetanus $4.4 @ $0.20/goat
- Marshall Ryegrass $28.8, 30 lbs/acre @ $24.0/50 lbs.
- NPK 16-16-16, 2% S $140, 400 lbs./acre @ $350/ton
- Ammonium Nitrate $70, 200 lbs./acre @ $350/ton applied

**TOTAL Expenses** $1282.4

**INCOME if sold live 85 lbs. @ $1/lb** $1870
**Profit/goat** $26.7

**INCOME if slaughtered @ 50% dressing**
- Total meat 935 lbs.
- Processing cost @ $1.00/lb. $935
- If sold @ $3.0/lb. $2,805
- Profit/goat $26.7
- If sold @ $3.50/lb. $3,272.5
- Profit/goat $48
- If sold @ $4.0/lb. $3,740
- Profit/goat $69

**Feed Cost** $269
**Feed Cost/goat** $12.2
**Medication Cost** $23.6
**Medication Cost/goat** $1.1
This system produces heavier carcasses that are sold with lower price per lb. However, this system is one of the most profitable production systems. It is possible to graze two sets of goats on the same pasture during the entire period of winter grazing from December-February and March-May. However, higher manual and financial input may be necessary for extra revenue. This system produces goats for market in 105 days comparable to feedlot system. It is notable that in this system we used bucks that tend to grow faster than wethers used in feedlot system. Therefore adjustments should be made for true comparisons. This is only an illustration of different production systems as we utilized them.

Table 5 represent a summary of input, output and profit per goat for different production systems. Feedlot system with its highest input may be more profitable when compared with summer pasture grazing system that is mostly practiced in Southeastern U.S. However, combination of browse and pasture grazing, when possible, may offset high prices paid for anthelmintics and extra feeding necessary with summer grazing. High input systems such as improved winter pastures are very economical and can reduce use of anthelmintics for goat production mainly because of land preparation for this system.

Table 5. Summary of system comparisons ($/goat)

<table>
<thead>
<tr>
<th></th>
<th>Feedlot</th>
<th>Bahiagrass</th>
<th>Browse</th>
<th>Ryegrass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Final wt.</td>
<td>80</td>
<td>60</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>Days</td>
<td>98</td>
<td>134</td>
<td>134</td>
<td>105</td>
</tr>
<tr>
<td>Area</td>
<td>16 pens</td>
<td>2 acres</td>
<td>4 acres</td>
<td>2 acres</td>
</tr>
<tr>
<td>Feed cost /goat, $</td>
<td>22</td>
<td>21</td>
<td>3.7</td>
<td>12.2</td>
</tr>
<tr>
<td>Medication cost/ goat, $</td>
<td>1.1</td>
<td>2.5</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Total cost</td>
<td>68</td>
<td>68.7</td>
<td>50</td>
<td>58.3</td>
</tr>
<tr>
<td>Profit per goat if sold live</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable price*</td>
<td>20</td>
<td>7.0</td>
<td>30.5</td>
<td>26.7</td>
</tr>
<tr>
<td>Flat price $1/lb.</td>
<td>12</td>
<td>-8.5</td>
<td>20.0</td>
<td>26.7</td>
</tr>
<tr>
<td>Profit per goat if sold retail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$4.0/lb.</td>
<td>52</td>
<td>22</td>
<td>55</td>
<td>69</td>
</tr>
<tr>
<td>$3.5/lb.</td>
<td>32</td>
<td>7.0</td>
<td>37.5</td>
<td>50</td>
</tr>
<tr>
<td>$3.0/lb.</td>
<td>12</td>
<td>-8.5</td>
<td>20</td>
<td>26.7</td>
</tr>
</tbody>
</table>
*$1.25/lb. for less than 65 lbs goat, $1.15/ lb for 70 lbs. goat and $1.10/lb. for 80 lbs. goat and $1.0/lb. for 85 lbs. goat.

Figure 4. Profit or loss for sale categories

I. SUMMARY

A comparison of production systems indicated that animals on feedlot or Marshall ryegrass grew faster and reached expected slaughter weight in less time when compared to bahaigrass pasture and mimosa browse. Marshall ryegrass system was most economical production system in our study. Although intact male goats were used for winter grass system, thus, produced heavier carcasses, wether goats with less gain capacity could have reached market weight in the same timing. Raising wethers on mimosa browse was associated with lowest input to the system and seems profitable; however, it took 4 or 5 more weeks for these goats to reach market weight than those on feedlot system or improved winter pasture, respectively. Stocking rates of mimosa fields, rotationally browsed, and Marshall ryegrass continuously grazed were 4-5 and 8-11 goats/acre, respectively; therefore, considering allocated area for goat production, more goats can reach market weight using improved winter pasture that can add to this system’s profitability. Warm season grass pastures such as bahaigrass pastures used in our study
could not sustain a profitable meat goat production because of high system input in terms of supplemental feeds and antihelmintics used in this system. Also our study indicated that paying more for a undocumented goat claimed to be of a superior breed is unwarranted. There was no difference in the performance of those goats that we paid $10 per head more and believed to be of a superior crossings.

LITERATURE CITED


USDA-NASS. National Agriculture Statistic Service. (http://usda.mannlib.cornell.edu/reports/nass/livestock/pls-bban/lsan0305.pdf)

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