A Survey of Prevalent Production and Marketing Practices in Meat Goats of Southern Origin

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INTRODUCTION

A. Preface


B. Justification

This study addressed an SRDC priority issue, economic development and a subissue, small scale/alternative agriculture. The major problem area addressed was the lack of farm-level information concerning meat goat marketing channels, constraints, pricing patterns, and opportunities for market expansion. This problem was and is pervasive, even in the leading goat producing states of Texas, Tennessee, Georgia and Alabama. For the newly emerging production areas, Arkansas, Oklahoma, Florida, North Carolina, Virginia and South Carolina, the problem is particularly acute. Inadequate goat industry marketing information is thought to be primarily due to lack of research-based Cooperative Extension Service efforts, to insufficient interest by many State Departments of Agriculture and, equally important, to the nature and structure of the industry itself.

In 1990 the production and marketing of goats and goat meat were widely perceived by Southern goat owners and Extension Service personnel to be largely unorganized, unobserved and unrecorded, and were accordingly thought to be erratic over time and place as to numbers, price, availability of retail product and consistency of quality. Equitable distribution of marketing margins across producers, intermediate exchange points, processors, wholesalers and retailers were also thought to be imprecise.

Producers and prospective goat producers, being virtually without relevant accurate marketing information, were and are seriously disadvantaged in basic decision-making concerning production opportunities and marketing options. Such disadvantage contributes to very cautious enterprise entry and/or expansion and also to delayed market response time by small-scale farmers, part-time agriculturalists and established ranchers alike. Fuller, more equitable participation in this fledgling industry could appreciably benefit Southern farmers with resources suitable for goat production.

C. Objectives

The major objective of this study was to identify and characterize production, marketing channels, and price margins for goats originating in the Southern U.S. by the following:
1) estimating goat production by state and by goat type.
2) describing goat marketing flows, and
3) obtaining typical live and carcass prices paid at private treaty, at auctions, by slaughter units and by wholesaler/retailers.

Corollary objectives include the following:
1) identify functional units (buying, selling, transporting, processing, facilitating) in the production and marketing chain,
2) describe institutional middlemen involved in goat marketing and
3) characterize behavioral patterns dictating internal and external changes affecting the industry.

The final objective was to prepare and publish this report which is a general overview of the Southern meat goat industry and subsequently publish target-specific fact sheets and bulletins and make verbal presentations of these findings to industry groups and educators.

D. Previous Work

An extensive study, "Strategies for Expanding Goat Meat Production, Processing, and Marketing in the Southeastern United States," was conducted by the Winrock International Institute for Agricultural Development, Morriston, AR (Winrock, 1986). It assessed the economic and technical feasibility of production of Southern meat goats, evaluated potential consumer demand for goat meat and its processed products and modelled processing plant flows. Additional information on production, marketing and consumption of goat meat has been reported in California (Gudahl, 1987), Louisiana (Gebremedhin and Gebrelul, undated), Florida (Degner, 1989) and North Carolina (McKinnie, 1989). Meat evaluation work has been reported from Texas A&M University (Shelton, et al., 1984; Snowder, et al., 1982), Langston University (Potchoiba et al., 1990); University of Florida (Johnson, 1989), European workers (Naude and Hofmeyer, 1981), the Mid-East Abas, et al, 1989), (Gaili and Ali, 1985), Mexico (Gonzalez, Owens and Arias-Cereceres, 1983) and India (Thulas and Ayyatuswami, 1983). Few specific extension bulletins are available concerning meat goat production, marketing and utilization (Pinkerton, Scarfe and Pinkerton, 1991; Pinkerton, 1991).

E. Procedure

Investigators initially contacted goat industry personnel already known to them and thereafter contacted persons and firms identified by the original informants as being market players of various magnitude. Investigators then made certain site visits to interview those who agreed to share information concerning industry production, processing and marketing practices.
Investigators also gathered assorted statistical data from state agencies, the U.S. Departments of Agriculture and Commerce, Canadian government entities and from selected public livestock auctions.

Frequently interviewees provided additional investigative leads while they were imparting historical and current general knowledge of the goat trade across time and place. As expected, interviewees varied widely in willingness to share operational aspects of their firms. Many held quite divergent attitudes toward their suppliers and customers. Moreover, some interviewees spoke only guardedly, while others spoke rather freely about their competitors. Considerable variation in assessments of future industry developments and prospects was also encountered. As always in such situations, investigators were obliged to make value judgements on the validity of the respondents’ replies and observations and subsequently to search for affirmations and contradictions among the aggregate findings.

Because preliminary findings among the Texas goat trade seemed to indicate that a majority of their animals were going to urban consumer markets in New York, New Jersey, Connecticut, Pennsylvania, Florida and, of course, Texas, investigators elected to concentrate their efforts in these states and also in states thought to be auxiliary suppliers to these urban areas. Limited grant resources precluded site visits to the historically strong California and Mexico markets; Eastern Canada markets were briefly examined because of their geographical proximity to northeastern U.S. markets and common sources of goats.
II. RESULTS AND DISCUSSION

A. Marketing Channels

1. Overview

Professional marketing activity normally concentrates on market development rather than market structure. Marketers may use advertising to create demand for a product or conduct research to identify and expand niche markets. The marketing of goat meat may require a novel approach in that an undersupplied ethnic market apparently awaits general recognition and further exploitation.

Principal flows of meat goats in the United States originate in the inland areas, mainly the southwest, and terminate in the major metropolitan areas, mostly the eastern seaports, but also in California. Evidence is mounting, however, that substantial portions of goats also come from the southeast and the midwest.

Major population centers along the eastern seaboard of the U.S. provide homes and livelihood for a disproportionately large segment of people generally regarded as "foreigners." Traditionally most of these immigrants have been naturalized U.S. citizens. But the 1990 Census showed more than half of all foreign-born persons living in the U.S. to be citizens of another country. Figure 1 shows the extent of increase of foreign nationals over the last three census periods. Many -- and probably most -- of these residents regard the consumption of goat meat as a natural and familiar practice.

The 1987 Agricultural Census, while regarded by many as providing spotty and understated goat data, does allow a valuable glimpse at the goat industry. As Figure 2 illustrates, more than 80% of the total goats in the nation are located in the South (11 states from Texas and Oklahoma to the Atlantic), including practically all the fiber goats. Although not reported directly, the number of meat goats can be calculated as a residual, subtracting dairy and fiber goats from the total. About 75% of the meat goats are found in the South; see Figure 2.

Most goat meat comes not from goats bred specifically to produce meat, but rather from excess dairy goats, spent fiber goats and brush and briar goats, frequently uncounted, across the land. The 1987 Census data shows that nearly 82% of all goats in the U.S. are kept primarily for milk and fiber production. Production of goat meat, from
Figure 1.- U.S. Born and Citizenship During Last Thirty Years

- Naturalized Citizen
- Not a Citizen

Year

1970: 9,739,723
- 64% Naturalized
- 36% Not a Citizen

1980: 14,079,906
- 51% Naturalized
- 49% Not a Citizen

1990: 19,767,316
- 40% Naturalized
- 60% Not a Citizen

Source: U.S. Department of Commerce, Bureau of Census
Figure 2.- Total Goats and Goats Raised Primarily for Meat in the USA

Figure 3.- Goats of Southern Origin: Percent of Total South and Goats per Square Mile

Source: 1987 Census of Agriculture
2. Structure and Function

Many goats move into marketing channels as "trader" animals, frequently changing hands three or more times prior to slaughter. Certain entities, filling the broker and/or slaughter function, act as "vacuum cleaners," making periodic sweeps through the South, taking everything offered for sale. These sweeps average once per week and, near holidays, more frequently. One large goat processor in the New York City area slaughtered 36,000 goats purchased mostly from Georgia and the Carolinas during 1991, and later stated he could use another 25,000 head annually.

The marketing system for handling lower quality goats is in place and operating, although many consumers are forced to accept alternative products or go without. In a "functional" sense, the system performs well. In the inner cities, security problems abound and difficulties with collection necessitate very specific, but informal arrangements. Most goat meat movement is on a strictly cash basis; only minimal instances of credits being extended are apparent at any point in the chain.

Higher quality goats are being produced, and they find a significantly better market. Opportunities for market growth seem very good, but improvements in genetics and expansion of qualified producers are needed. Even for goats of good quality, however, producers should attempt to access markets only through established channels. To do otherwise could lead to frustration and financial pain; contrarily, market knowledge might be much improved by harsh experience. Processors and brokers with systems of marketing other animals could perhaps expand into the marketing of goats, but it would require careful planning and execution. There is little question but that the demand for quality goats, particularly those of young age, is such that many more animals could be accommodated.

3. Market Flows

Goats flow from producer to consumer in unorthodox fashion as compared to cattle and sheep for at least two reasons. First, organized movement of goats and goat meat, as an industry, is only now beginning to emerge. Secondly, the industry is built around ethnic demand, an issue largely unexplored in marketing economics.

Traditionally, principal players in the purchase, transport, and processing of meat goats were entrepreneurs who carved out a portion of the goat trade
through shrewdness, determination, and political or economic leverage. Because the industry is now rapidly developing, market channels are becoming discernable, points of origin are better defined, and new processing plants and marketing techniques designed to meet the needs of ethnic consumers are in the planning stage.

Figure 1 depicts the dramatic growth of foreign-born citizens in the U.S. over the last three census periods. Little has been written about how better to understand the existing demand, characterized by foreign-based traditions, religious celebrations and unique consumption patterns.

Figure 4, adapted from Gudahl (1987), presents a flow chart of goat and goat product movement. The chart depicts a relatively complex industry structure involving a number of middlemen who function as traders, brokers, and purveyors. The heavily marked lines in Figure 4 indicate the major routes goats take from producer to consumer, but there are regional differences in these marketing pathways. The nation’s largest goat auction is at Junction, Texas. Other high volume auctions are located at San Angelo and Goldthwaite, Texas; Hackettstown, New Jersey and Lancaster, Pennsylvania with lesser volumes moving in Georgia, Tennessee, Alabama and elsewhere in the South and Midwest. The largest processors are located in Texas, Connecticut and New Jersey; privacy laws preclude more detailed information.

B. Goat Production

1. Overview

Figure 5 illustrates not only the overwhelming importance of Southern goat production to the country, but separates inventories in the South among the various states. When comparisons between goat inventories, auction runs and slaughter numbers are made, seemingly irreconcilable differences develop. Auction runs and slaughter numbers exceeded what inventory counts suggested is possible. Inventories report total goat number; meat goats are computed as a residual after deducting dairy and fiber goats. Auction reports include goats and sheep in one total. Slaughter data fail to include non-federally inspected plants.

An economist tends to think of goat production in terms of supply. Supply, in economic terms, is more than simply an amount. Rather, it is a schedule of corresponding amounts and prices over a period of time designed to reflect the "production personality" of an industry. The concept of economic supply can be used to predict how a change in goat prices, for instance, would cause adjustments in the number of goats being produced.
Figure 4. Existing channels for meat goat sales.
Figure 5: Meat Goats in US Southern States

States: TX, TN, GA, AL, AR, FL, NC, OK, SC, MS, LA

Thousands

- TX: 223
- TN: 18
- GA: 9
- AL: 8
- AR: 7
- FL: 6
- NC: 5
- OK: 4
- SC: 3
- MS: 2
- LA: 0
Because the meat goat industry is rapidly developing, and because useful price data up to this point have been largely unreported, any definitive estimate of economic supply would be poorly supported.

However, the supply function, mainly in response to improved potential for profits, is shifting to the right. Figure 6 gives evidence of this in federally inspected slaughter numbers. There is also evidence that demand for both slaughter and breeding stock in various production areas has recently cut into established inventories, particularly in Texas.

Supply response is often triggered by changes in farm policy programs. The demise of the Wool and Mohair Act, announced in mid-October 1993, will likely encourage some fiber goat producers to change to meat goats. Moreover, better conditioning of surplus Angora goats prior to sale might lead to increased acceptability in the slaughter trade.

The economic concept of "elasticity" also relates to supply and measures the sensitivity between changes in production and price. A product with an elastic supply function would respond more dramatically to changes in price than a supply calculated to be inelastic. We can say the supply of meat goats is probably elastic, meaning that some improvement in price offered would result in substantial increases over time in the production of meat goats.

Many producers of goats in this country face resource limitations. These limitations may be mostly financial, but they may also be either knowledge, time, or land area and suitability. Goat production potential arouses interest in many smaller farmers. Others express extreme disappointment that, currently, even the better quality goats do not yield profitable returns. Beyond stating that the supply function for meat goats is shifting outward and appears to be elastic, it is best to concentrate at present on how many and what kind of meat goats there are and how and where they are being produced.

2. Types and "breeds" of goats for meat

With the exception of the South African Boer goat imported via New Zealand in early 1993, there are no true meat goat breeds in the U.S. There are, however, three types of goats used for meat: dairy, Angora and "Spanish." There is much diversity between and within these types as to production and carcass traits. Indeed, it is so great that many goat industry players feel it is a serious impediment to orderly
Figure 6.- Number of Goats Slaughtered in USDA Inspected Plants and Number of Plants Reporting in the US (1982-1991)
production and marketing. The lack of scientific research to characterize these types of goats for meat and the lack of sustained producer participation in goat evaluation programs are also cited as obstacles to industry growth. Four key traits amenable to genetic improvement in goats used primarily for meat production have been identified (Shelton, 1990). These are: a) adaptability to environmental and production conditions, b) reproductive rate, c) growth rate and d) carcass value. To date, no single U.S. breed or type possesses an acceptable array of these traits.

Spanish Goats:

Of approximately 500,000 meat-type goats in the U.S., the 350,000 or so in the southwest are commonly called "Spanish" or "brush" goats. Similar goats elsewhere are called by various regional aliases, e.g., "woods" (Florida), "briar" (North Carolina, South Carolina), "hill" (Virginia), and "scrub" (midwest and Pennsylvania). The term "Spanish" is largely one of convenience and is used to distinguish such goats from dairy goats and mohair producing goats (Shelton, 1984). In point of fact, these goats did not originate solely in Spain or Mexico. Their ancestry also reflects goats brought to colonial America and, lately, infusions of dairy blood, particularly the Nubian.

Spanish goats are usually characterized as being very hardy, able to survive and thrive under adverse agroclimatic conditions with only limited management inputs. Typical Texas herds may wean kid crops of 1.25 to 1.50 per doe per year; lesser crops are also experienced if rainfall is scarce and predators numerous. Weaning usually occurs at 4-6 months of age with kids weighing 30 to 55 lbs. and males exceeding females by 5 to 8 lbs. Doe kids are usually 8 to 10 months of age and weigh 50 to 65 lbs. at first breeding. Typical mature weights for does and bucks are 75 to 85 lbs. and 120 to 140 lbs. respectively, although well bred, well managed bucks may weigh 160-180 lbs. with a few in excess of 200 lbs.

Dairy Goats:

The five major dairy goat breeds in the U.S. are, in descending order of popularity, Nubian, Alpine, Saanen, Toggenburg, and LaMancha. In former times the Nubian was considered to be dual-purpose, producing both milk and meat; however, U.S. breeders have emphasized milk production, selecting animals exhibiting desirable "dairy character" over those showing "meatiness" on a more compact frame. Within the five breeds, milk-fed kids in proper condition are taken equally by U.S. traders and processors. Nevertheless, Nubians are generally regarded here and in Canada as superior to the other dairy breeds for meat and for crossbreeding programs using female goats of indiscriminate breeding.
On the other hand, producers with Spanish goats commonly report that dairy blood in excess 25% can lead to increased incidence of pendulous udders and ill-shaped, overly large teats that can decrease kid survival and rate of gain. Using dairy bucks is thought to increase kid body size and scale and, secondly, improve rate of kid gain through improved milk yield from F-1 females. Fertility and survivability may or may not be improved in dairy x Spanish crosses.

Many individual dairy goats within a given breed exhibit considerable musculature yet produce sufficient milk for acceptable kid growth (1 qt/kid/day). However, a cull dairy animal is not usually a good prospect for profitable meat goat production.

**Angora Goats:**

The Angora breed has long been highly selected for quantity and, to a lesser extent, quality of mohair as well as for survivability. Although some selection has been practiced for size and scale, musculature and meat-to-bone ratio have never been serious criteria. Thus, at their usual market age and condition, Angoras typically produce less desirable carcasses than either Spanish, Spanish dairy crosses or pure dairy stock at similar weights. However, Angora kids and yearlings in good condition usually do not suffer as much price discrimination as the older animals do.

Mature Angora females range from 85 to 105 lbs., with yearling females weighing 60 to 70 lbs. at breeding time (17 to 19 months). Kids weaned at 5-6 months of age may weigh 25 to 40 lbs., depending on their plane of nutrition.

**Boer Goats:**

The ancestry of the Boer goat is obscure at best, but the present-day, improved Boer goat emerged in the early 20th century, when ranchers in the Eastern Cape province of South Africa started breeding for a meat type goat with good conformation, high growth rate and fertility, short white hair, and red markings on the head and neck (Teh and Gipson, 1993). The South African Boer Goat Breeders' Association was founded in 1959 to establish standards for the emerging breed. Since 1970 the Boer goat has been incorporated into the national Mutton Sheep and Goat performance Testing Scheme, which makes the Boer goat the only known goat breed routinely involved in a performance test for meat production. There are approximately 5,000,000 Boer Goats in Africa, of which 1,600,000 are of the enhanced (improved) type.
New Zealand and Australian parastatal companies have imported the Boer goat into their respective countries for improving their respective meat goat industries. In April of 1993 the quarantine restrictions for the New Zealand Boers expired and the animals became available for importation into the U.S. The Australian Boers will be released in October 1995. In June of 1993 the North American Boer Goat Association was chartered, breed standards were established and registry of animals was begun.

The initial public sale of Boer goats in the U.S. in August, 1993 found 19 head of adults selling for an average of $8,100. Extensive importation of Boer semen and frozen embryos from New Zealand in mid-1993 will result in a nucleus of full and half-bloods in 1994. Further importations and domestic increases through embryo and semen collections will lead to increased availability of Boer breeding stock. While purebred seedstock herds will draw major attention, the greatest practical benefit to current meat goat producers will probably accrue to those using full and percentage blood Boer sires to produce crossbreeds from their commercial herds. Texas A&M University and Prairie View A&M University are the only U.S. Institutions currently conducting research in Boer x Spanish crosses; Prairie View is also crossing Boers with Nubian and Tennessee Wooden-leg goats. Similar work is needed with Angora goats.

The following compilation describes the performance of kids born at the Landcorp New Zealand Quarantine Station from 1987 to 1992.

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<th>BUCKS</th>
<th>DOES</th>
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<td></td>
<td>AVE.</td>
<td>MAX.</td>
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<tr>
<td>Birth wt, lb</td>
<td>8.60</td>
<td>13.80</td>
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<tr>
<td>Weaning wt, lb, 106 days</td>
<td>51.50</td>
<td>91.30</td>
</tr>
<tr>
<td>Pre-weaning gain/day, lb</td>
<td>.42</td>
<td>.84</td>
</tr>
<tr>
<td>Yearling wt, lb, 378 days</td>
<td>98.10</td>
<td>177.10</td>
</tr>
<tr>
<td>Post weaning gain/day, lb</td>
<td>.16</td>
<td>.37</td>
</tr>
<tr>
<td>Ave. daily gain, lb, 0/378 days</td>
<td>.24</td>
<td>.44</td>
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Research on Boer goats of South African origin in Germany has shown body weights of adult males to range from 176 to 198 lbs. and adult females 110 to 165 lbs. (Burendiaga, 1986). For females kidding once a year, kidding percent was 160-220, with an average of 60% being twins and 15% triplets; kid birth weights were 6.6 to 8.8 lbs. From birth weight to slaughter weight of 77-88 lbs. for males and 66-77 lbs. for females (ages not given), daily gains were .31 to .55 lbs. (combined sexes).

Erasmus et. al. (1985) reported the results of a study from 1976 to 1982 of 826 Boer goats. The maximum body weight was reached at 48 months of age (figure not given). Kidding rate (parturitions/does exposed) was
84%. At 3.5 years of age, does kidding averaged 2.26 kids/litter and weaned an average of 1.96 kids (weight not given). They had 7.6% singles, 56.5% twins and 33.2% triplets with 2.4% quads and .4% quintts. Kid mortality was highest in triplets (20.8%) and quads (31.3%).

Raats (1983) reported twinning and tripling increased average daily milk yield (12 week period) across ages of Boer Goats. Yield increased with age and ranged from 1.5 qts/day for 2 year olds with singles to 2.6 qts/day for 6 year olds with triplets. Neither litter size nor age affected the composition of milk. Milk fat ranged from 6.4 to 9.4% and protein from 3.9 to 4.5; total solids in the milk ranged between 15.8 and 19.2%. Typical Nubian milk in the U.S. contains 4.5 to 5.5% milk fat with protein in the mid 3% range, occasionally over 4%; Swiss dairy breeds yield lesser fat percentages but generally produce more volume than Nubians.

Nubians:

Although the inherent utility of Boer goats has engendered intense interest in both veteran and prospective goat producers, many long-term ranchers express extreme caution about premature use of this, to them, exotic breed. Their reservations are: a) indigenous Spanish goats may be too small, i.e., dystocia may be engendered by using the larger framed sire, b) the typical rainfall pattern and forage availability may not provide sufficient, economical nutrients needed by heavier animals, c) levels of milk production needed to support rapid growth of the crossbred kids may not be inherent in their base herd, and d) the traditional levels of goat herd management may be insufficient to take full advantage of superior germplasm. Too, initial prices for Boer breeding stock are quite likely to be relatively high viz-a-viz prices to be realized from the sale of offspring for meat purposes (but perhaps not for sale of percentage bloods for breeding stock). As with the introduction of any other exotic breeding stock, the initial players may well reap disproportionately high returns, at least in the short term.

Other breeds:

The Tennessee Wooden-leg goats, also called stiff-leg, fainting, nervous, and crazy goats, have a condition called "hereditary myotonia." When startled, they experience muscular stiffness in the hind limbs and shoulder/neck area for a few seconds and may, if unbalanced, fall over. This nuisance trait is apparently not found in Tennessee crossbreeds. These goats, numbering about 3 to 5 thousand are considered to be a novelty. However, their musculature and conformation is such that some ranchers have found them useful for crossing with Spanish goats. In general, they are somewhat smaller than typical brush goats, but do exhibit good reproductive traits and longevity in selected herds. Twinning is common with birth weights in the 4-5 lbs. range; singles weigh 5-6 lbs.
The Pygmy goat originated in West Africa and came to the U.S. in the early 18th Century. It is an achondroplastic dwarf with disproportionately short legs. Although there are about 30,000 registered animals in the U.S., the small mature size of this animal seems to preclude its use in crossbreeding programs.

3. Geographic Areas of Goat Production

By informal estimates, Texas is home to approximately 350,000 Spanish goats; another 150,000 head are found primarily in Tennessee, Georgia, Alabama, Florida, Virginia and the Carolinas. Texas also has about 90% of the 2,000,000 Angora goats with the remainder in New Mexico, Oklahoma, Arizona and Michigan plus smaller quantities in North Dakota, South Dakota, Minnesota, Ohio, and Alabama. The U.S. dairy goat population, totaling about 1,000,000 head, is widely scattered, but the major areas are the west coast, the mid-west, the northeast, Texas, Pennsylvania, New York and Florida.

4. Systems of Goat Production

**Extensive:**
The majority of Spanish goats and almost all Angora goats are managed within an extensive system, primarily in arid and semiarid regions, with brush, forbs and grasses being the primary sources of nutrients year round. In commercial practice, supplemental feeding of protein and energy is restricted to winter and drought periods. The seasonal availability of nutrients markedly affects production facets such as rate of gain in kids, body weight changes in adult animals and, of course, reproductive performance. The ability to survive stems from goats' being more selective in their feeding habits and also being able to conserve critical nutrients such as water, protein and minerals. They can not, contrary to popular opinion, digest poor quality, trashy feeds, and in fact, seem to require more quality in their diets than cattle and even sheep.

In the southeastern U.S., many Spanish goats are also raised under extensive conditions. Since the temperatures, rainfall and soil types differ markedly from southwestern goat lands, the available type, quantity and quality of forage are considerably different. Carrying capacities in these "wet brush" areas may be 2-3 goats/acre initially and thereafter 1-2 for the long growing season as compared to 2-4 acres/goat in the more arid southwest.

**Intensive:**
These goat enterprises are usually smaller (20-100 head) and use fewer but more productive acres. Many feature improved pastures, rotational grazing, supplemental forage and concentrates and better medical care than
usually found in extensive units. When well managed, does kidding may approach 100% and weaning rates may be 180%, with kids considerably heavier than their extensively grown counterparts. The relative profitability of intensive versus extensive systems is subject to many variables reflecting site-specific operations.

**Dairy Goats:**

Relatively few dairy goats are kept for commercial milk production; the majority are kept for home milk consumption, for showing, for hobbying and for sale as breeding stock. In all cases, there is a surplus of male kids, non-replacement doelings and cull does and bucks. Currently most are being sold for slaughter. In the past, however, prevailing meat market prices discouraged deliberate growing of kids for this purpose and many were simply killed at birth. Milk usage is the overriding economic concern of producers, because kids cannot be economically fed milk that could be sold for fluid and/or cheese use. Even kid milk replacers may be price prohibitive for meat kid production.

Regardless of the system used for producing meat goats, herd reproductive rate is of paramount importance to gross income and net profit. According to Shelton (1984 b), most meat goat producers follow a practice of running males with the females on a more or less continuous basis. This is the simplest management practice and may well contribute to maximum production, typically 1.25 to 1.5 kids weaned per doe exposed. Most meat and dairy goats are seasonally polyestrous, with recurring estrus periods from mid-summer through mid-winter. Some matings occur outside these dates. Under Texas range conditions, kids tend to be born in and around December and May. Dairy goat kids tend to be born February, March and April.

A more controlled breeding/kidding sequence may be useful to: a) exploit special market situations, b) avoid mid-winter kidding, or c) more closely fit seasonal forage supplies. Breeding "out-of-season" has been accomplished both by taking advantage of the well-known buck effect to induce and synchronize estrus and (in dairy goats) by "lighting" both does and bucks to mimic natural photoperiod-induced estrus; where legal, hormones may also be used for this purpose.

To meet Christmas, Easter, and Ramadan demand, producers need to have 25-40 lbs. kids ready for sale in mid-December and mid-February through late March. Well managed kids can usually reach these weights in 6-12 weeks. The gestation period for goats is about 150 days.
C. Goat Consumption

1. Overview

The economic concept of demand holds just as it does with supply; that is, demand represents a schedule of amounts and prices over time, and the sensitivity between price and quantity can be expressed in terms of elasticity. Demand is thus a reflection of the "consumption personality" of the industry.

There is apparently a substantial unfilled demand for goat meat in the major cities of the U.S., which are also likely to be the home of new immigrants; one in six chooses the New York metropolitan area as a destination; see Figure 7. This demand can be categorized on an ethnic basis and relates to habits and consumption patterns brought over "from the old country."

There are indications that consumption has moved up substantially since the mid-1980's at more or less stable prices. Figure 6 shows that total goats slaughtered at federally inspected plants has more than doubled since 1980 from a base of less than 100,000. This apparently reflects the continuing satiation of demand, a phenomenon strengthened by significant levels of immigration. With supply and demand both shifting upward, indications of a growing industry are in place. Figure 6 also reveals the number of goat slaughter plants in operation has declined by more than half since 1984, probably reflecting development of more mature, solidified industry.

Just how sensitive is the relationship between consumption and price? Ethnic and religious identity is often a significant component of a consumer's self-concept. Ethnic persons may expend great effort to keep their identification from being merged into the dominant society. Both food preference and religious affiliation show evidence of this determination (Solomon 1992). The consumption of goat meat is interwoven into the fabric of tradition and religious observation; e.g., the price of goat meat rises dramatically each year at Easter, Christmas and Ramadan.

Because of a persistence in maintaining ethnic practices, whether related to habit, tradition, or religious beliefs, the demand for goat meat is thought to be relatively inelastic. This means the demand for a certain volume of goat meat will hold in the face of strengthening prices. It also means a decrease in price will not do much to create additional goat meat sales. Increased consumption, however, will come with
Figure 7.- Foreign Born Persons in Houston, Los Angeles, Miami and New York City

Houston, TX
Total Foreign Born
220,861

North Central & South America 51%
West Indies 4%
Other 21%
Europe & USSR 12%
China & Korea 9%
India & Vietnam 3%

Los Angeles-Long Beach, CA
Total Foreign Born
1,664,793

North Central & South America 67%
India & Vietnam 6%
Other 3%
West Indies 3%
Europe & USSR 18%
China & Korea 9%

Miami, FL
Total Foreign Born
578,055

West Indies 64%
India & Vietnam 9%
China & Korea 13%
North Central & South America 13%
Other 0%
Europe & USSR 13%

New York City, NY-NJ
Total Foreign Born
1,946,800

Europe & USSR 43%
India & Vietnam 4%
China & Korea 14%
North Central & South America 13%
Other 15%
West Indies 9%

increases in ethnic populations and possibly by increased purchases among the more upscale and health conscious consumers.

One additional element could modify our assumption about an inelastic demand for goat meat. Ethnic income, on a per capita basis, largely comes from employment in the blue collar and service industries, and is, therefore, more subject to economic aberration than salaried employment. The current economic recession has had an impact on goat meat consumption, particularly in and around New York City. This impact has come in terms of prices processors are willing to pay and perhaps also in terms of quantity and quality taken.

In the prepared food industry, there also appears to be an emerging demand for goat meat as a gourmet item. To date, it is a relatively minor force, but this niche seems open to development. Thus, these two demand forces (ethnic and gourmet) are at the extreme ends of the economic consumption spectrum.

Prospects for an increase in general demand for goat meat appear to be good. As shown in figure 8, immigration, which averaged 61,150 per month in the last decade, will likely continue at an unabated pace; many will be goat meat consumers. The economic status of many immigrants continues to improve. Acceptance of goat meat as standard fare will likely increase much more slowly among middle income consumers. Goat meat is a relatively "high ticket" item. While this may seem incongruous with low income economic consumption, it is not, for at least three reasons: 1) ethnic households have a higher proportion of wage earners than households of other consuming groups, 2) immigrants are accustomed to paying more of their discretionary income for food, and 3) goat meat is regularly featured as holiday fare, particularly during religious celebrations.

2. Population demographics

Until recently, the majority of American immigrants came from Europe, but immigration patterns changed dramatically after WW II (Solomon, 1992). Recent arrivals are more likely to be Asian or Hispanic. For example, in Detroit, the largest share of recent immigrants comes from India.

Hispanic populations are highly concentrated. More than 50 percent of the total live in only six cities: Los Angeles, New York, Miami, San Antonio, San Francisco, and Chicago (LaFranchi, 1988).
As might be expected, the makeup of foreign born in the various metropolitan areas differs in rather extreme degree. While foreign born residents in Houston and Los Angeles come mostly from Central and South America, persons with European ancestry comprise the larger group (or groups) in New York City. In Miami most foreign-born immigrated from the West Indies. Figure 7 pictures this separation of ethnic cultures for the four cities just described.

Ethnic restaurants are a fast-growing segment of the food industry. In a recent study (Zelinsky, 1987), restaurant patronage in the U.S. increased by only 10 percent in a four-year period, but rates increased by 43 percent for Mexican eating establishments and 54 percent for Asian restaurants. Chinese is the most frequently served cuisine, followed closely by Mexican and Italian. These three groups account for more than 70 percent of the total, and goat meat consumption is common to all three cultures.

Many Hispanics, and some Orientals, are illegal immigrants, a group understandably difficult to count. It is estimated anywhere from 1.8 to 5.4 million persons enter this country illegally each year; again, their preference for goat meat is well known.

The Hispanic subculture, until quite recently ignored by marketers, is characterized by rapid growth and increasing affluence. Now numbering more than 19 million, it is projected that Hispanics will outnumber blacks as the nation's largest minority group by 2015. The average Hispanic household, at 3.5 people, compares with 2.7 average of other households. Hispanics are also a group of youthful consumers. Their average age is 23.6, compared with the U.S. average of 32.

Mexican-Americans make up 62 percent of all Hispanic-Americans and are the fastest growing segment. In contrast, Cuban-Americans are by far the wealthiest segment but are also the smallest group, and are older on average than other Hispanics (Schwartz, 1988).

Asian-Americans are the fastest growing minority group, although their numbers are still relatively small. Composed of 12 nationalities, Asians are culturally diverse and speak many different languages and dialects. Chinese are the largest subgroup, with Filipinos and Japanese second and third, respectively. The most frequently spoken languages among Asian-Americans are Mandarin Chinese, Korean, Japanese, and Vietnamese.
Although their birthrate is increasing at almost four times the rate of most other groups, Asian-Americans still comprise only about two percent of the population (Kern, 1988). Typically, they save more of their wages and borrow less, and tend to invest conservatively. In 1990, the median income of an Asian-American household was $31,500, compared to $28,700 for whites, $20,000 for Hispanics, and $16,000 for blacks.

Religion per se has not been studied extensively in marketing, possibly because it is seen as a "taboo" subject. However, accumulated evidence indicates religious affiliation can be a valuable predictor of consumer marketing behavior (Hirachman, 1983). The teachings of Mohammed, identified with several religious groups collectively known as followers of Islam, appear mysterious to most Americans. A goat is often slaughtered for special occasions, holidays or celebrations. In the Mohammedan calendar, there are two important feasts, the "small Eid," celebrated at the end of the fasting months of Ramadan, and "the great feast of Eid." According to the Islamic doctrine of salvation, everyone who is financially in a position to do so should slaughter a sheep or goat for these feasts (Ecker, 1981). There are said to be some 14 million Muslims now in the U.S., almost all in the urban centers.

3. Consumer preference

Hispanics spend 15 percent to 20 percent more of their disposable income than the national average on groceries. Goat meat is frequently holiday fare in most Hispanic homes. Family activities are important, and spending time en famille influences the structure of many consumption activities.

Native language and culture are important components of Hispanic identity and self-esteem (about three-quarters of Hispanics still speak Spanish at home). About 38 percent of all Hispanics live in barrios or predominantly Hispanic neighborhoods, which tend to be insulated from mainstream society. Mexican-Americans prefer to serve "cabrito," preferring young high quality, milk fed kids (live weight 15-25 lb) for this purpose. Chinese and Koreans prefer young goats of good quality, but in the 70 lbs. liveweight range. They typically consume goat meat only during the cool weather months. Jewish ethnicity exerts an exceptionally strong influence on consumers, since it incorporates both cultural and religious dimensions. Jewish celebrations of their New Year and Passover are similar to Greek and Italian observations of Christmas and Easter. Preferences among the three groups are for high quality kids weighing from 30 to 40 pounds live. To satisfy an increase in demand
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for kosher food, each year about 500 new kosher products appear on
the market. This trend is driven by 1) increased religious observance by
young Jews, and 2) the belief among many Gentiles that kosher food
is of higher quality.

Certain people, predominantly of the Moslem faith, but also groups
of African descent from the West Indies, prefer older goats of lesser
quality, and many times want intact males. Many wish to perform the
slaughter function themselves; strongly felt religious significance is a
part of this observance. Near the major cities of the northeast and
southeast, rather extensive facilities exist on nearby farms to
accommodate their particular wishes.

Advertisers have learned it is easy to overlook the complexities
among Asian and other subcultures, and to be insensitive to cultural
practices (Westerman, 1989). For example, Kentucky Fried Chicken
experienced a problem in describing their product as "finger-lickin'
good," because Chinese do not lick their fingers in appreciation when
food is good.

4. Slaughtering and Processing

Goats arriving at slaughter plants may have been in transit for
4-40 hours without feed or water. If slaughter is to be done within a
few hours, they may or may not be watered, but they are seldom fed,
primarily to reduce quantity of offal and associated disposal costs.

Goats may be slaughtered by stunning, bleeding, hiding,
eviscerating, and removing head and feet. The carcass is washed and
thereafter refrigerated, preferably for not more than 24-48 hours to
reduce shrinkage and decrease surface dryness. In the case of animals
destined for the Moslem and Jewish trade, stunning is not practiced and
certain religious ceremonies are also followed.

For kids weighing under 40 lbs, the hide is frequently left on to
retard carcass shrinkage. Such carcasses are usually sold with the
hornless head and kidneys intact and the heart and liver "attached." In
the case of goats slaughtered under private treaty in non-USDA or
non-State approved facilities, the method of slaughter varies widely.
Such enterprises also allow the owners to retain additional carcass
components (lungs, pancreas, intestines, stomachs and testes) not
permitted in government-supervised abattoirs.
Commercial and private abattoirs report a vast majority of their sales to be of the whole goat carcass, the remainder being mostly in halves with very few in quarters. Apparently fewer yet primal cuts (shoulder, rib, loin, leg) are sold by processors, wholesalers, or retailers; typical retail cuts (steaks, chops, or roasts) are rarely offered. Older, thinner goats in poor condition yield carcasses that enter the "bone trade," i.e., as boneless meat scrap or ground meat or as bone-in, random size pieces for soups and curries.

As a consequence of widespread consumer aversion to frozen goat meat, U.S. processors freeze carcasses only in unusual circumstances, e.g., to stockpile for special holiday needs or to store a temporary surplus kill. Frozen domestic goat is usually thawed by the processor prior to sale, with or without the customers' knowledge. Contrarily, frozen imported goat carcasses from New Zealand and Australia are sold unthawed but at discounted prices.

5. Carcass Characteristics

Carcasses of meat animals are generally evaluated commercially in terms of yield and quality of lean (Hale and Griffin, 1992). In beef carcasses, yield refers to the percentage of closely trimmed, boneless retail cuts (edible lean) on a carcass weight basis. Quality of lean refers to the palatability (taste appeal) of the lean and is perceived as being strongly influenced by the degree of marbling (intramuscular fat deposition). Since goat carcasses are not presently marketed in typical retail cuts and since goat meat is currently valued for its unmarbled lean, this evaluation scheme seems somewhat inappropriate for goats, at least for now.

Instead, goat processors seem to pay particular attention to dressing percent and to "muscling" or "meatiness," both terms reflecting an assessment of meat-to-bone ratios. Also, processors prefer young goats (less than 40 lbs. live weight) to show considerable fat deposition around the kidneys and heart. Experienced goat buyers are quite adept at palpating the loin/rib area of a live kid and predicting degree of muscling and kidney fat and, accordingly, the visual appeal of the carcass to buyers. Older, heavier carcasses are discriminated against, however, if they have more than a (poorly defined) minimum of fatness.
The dressing percentage of slaughter goats may be influenced by age, weight, sex, body condition, amount of gut fill at slaughter, whether the carcass is weighed hot or cold and, of course, by the number of body components included in the yield calculation. Dividing the un-shrunk liveweight into the weight of the hot carcass with liver, heart and kidney but without skin, head, feet and viscera will yield dressing percent values in the 45-52 range. The interactions among the individual factors affecting dressing percentage are great, making it difficult to predict carcass yield (or quality) accurately by visual examination of the live goat.

Presently, the goat industry has no formal set of grade standards for slaughter kids, yearlings, or mature goats. But, while we found no interest among industry players, we did encounter expressed need for a grading systems from goat producers and consumers of goat meat. Perhaps the present situation redounds to industry advantage.

Although goat processors usually do not sell primal and retail cuts, considerable university and government agency research, worldwide, has been done on wholesale cuts and on lean-fat-bone ratios. For example, Hale and Griffin (1992) found young, intact male Spanish goats weighing 71 lbs. to have a dressing percent of 51.7; carcasses averaged 65.4% lean, 13.5% fat and 22.1% bone; comparable figures for aged female Spanish goats were 90 lbs., 50.8%, 57.7%, 21.4% and 21.3%, respectively. Wholesale cuts for young, intact Spanish males were: leg 32%, loin 8%, rack (rib) 8%, shoulder 45%, shank 7%, breast 9% and kidney/pelvic fat 1%.

6. Nutritional Composition

Goat carcasses are very lean with little external fat cover and minimal marbling. U.S. consumers are becoming more lean conscious when purchasing meats; therefore, the leanness of goat should be a marketing plus. Carcass components vary in their physical composition, in both raw and cooked states as shown in Table 1. (James, et al, 1990). The data are from seven intact Spanish males weighing 55 lbs., with a dressing percent of 51.6 (warm weight basis); they were about 1 year old.

Comparing the results with similarly cooked lamb and veal, Anderson (1989) found similar protein values, but the goat meat had 49-65% less fat than lamb and 2-22% less fat than veal. Similar types of cut comparison were not possible with beef, but the cooked chevon cuts had 45-65% less fat than a composite of cooked retail cuts of beef and always had lower fat contents than all cuts of beef similarly cooked (Anderson and Hoke, 1990).
TABLE 1. Physical Composition of Raw and Cooked Cuts of Goat Meat.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Shoulder</th>
<th>Rib</th>
<th>Loin</th>
<th>Leg</th>
</tr>
</thead>
<tbody>
<tr>
<td>% lean, raw:</td>
<td>62.1</td>
<td>55.8</td>
<td>65.5</td>
<td>70.7</td>
</tr>
<tr>
<td>cooked:</td>
<td>55.9</td>
<td>55.1</td>
<td>58.8</td>
<td>66.5</td>
</tr>
<tr>
<td>% bone, raw:</td>
<td>22.1</td>
<td>26.3</td>
<td>19.2</td>
<td>18.5</td>
</tr>
<tr>
<td>cooked:</td>
<td>25.9</td>
<td>28.9</td>
<td>25.8</td>
<td>22.3</td>
</tr>
<tr>
<td>% connective tissue, raw:</td>
<td>9.2</td>
<td>9.2</td>
<td>7.8</td>
<td>6.8</td>
</tr>
<tr>
<td>cooked:</td>
<td>10.8</td>
<td>7.7</td>
<td>7.1</td>
<td>6.4</td>
</tr>
<tr>
<td>% fat, total, raw:</td>
<td>6.6</td>
<td>8.7</td>
<td>7.5</td>
<td>4.0</td>
</tr>
<tr>
<td>cooked:</td>
<td>7.5</td>
<td>8.3</td>
<td>8.3</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Further analysis of data from James, et al (1990) is presented below:

TABLE 2. Approximate Composition of the Lean of Cooked Cuts.

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>Cuts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shoulder</td>
</tr>
<tr>
<td>% Moisture</td>
<td>61.06</td>
</tr>
<tr>
<td>% Protein</td>
<td>34.42</td>
</tr>
<tr>
<td>% Lipid (fat)</td>
<td>5.47</td>
</tr>
<tr>
<td>% Ash (minerals)</td>
<td>1.18</td>
</tr>
</tbody>
</table>
in the Carolinas and retail in New York City a few days later for as much as $4.50 per pound, with head, hide, and certain internal organs intact. The animal would have moved through three entities (auction, processor, and purveyor) and increased in price on a weight basis perhaps threefold.

High volume auction markets, like those found in Texas, do vary widely in price over time, but not as much on a percentage basis as do retail prices. Figure 9 shows auction prices in 1992-93 for three classes of meat goats at San Angelo, Texas. Figure 10 shows the monthly fluctuations in prices paid for goats at the Ada, Oklahoma, goat and sheep auction during 1990/92. This pattern of higher winter/lower fall prices was reflective of prices paid in the larger auction markets in Texas, New Jersey and Pennsylvania. Some of the variation in prices at auction is a result of seasonally fluctuating supplies and some as a result of amounts demanded at any given time. The high demand times (Christmas, Easter, Ramadan) occur at lower supply times and, accordingly, retail prices typically rise sharply; producers may also benefit, but not usually proportionally. Industry speculators are said to have had only limited success anticipating pricing peaks. The vagaries in pricing of goats and goat meat would astound players in the more organized cattle and hog trade. However, as shown in Figure 11, the pattern of average price per pound of auction goats (all ages and sexes, aggregated) does mimic the cattle industry in that price/lb falls with increasing weight categories.

E. Prospects and Recommendations for Industry Development

The present status of both goat production and marketing is rather haphazard with substantive variations in animal availability, body weights and condition at slaughter, variable carcass characteristics, lack of standardized processing techniques and an inadequately developed market distribution (Hale and Griffin, 1992). Rationalization of production and marketing of slaughter goats seems essential if future demand is to be met and if all players in the marketing channel are to receive reasonably equitable returns. The following sections identify certain modifications in industry practices and in publicly supported extension and research programs which could contribute to industry rationalization.

1. Modification in production systems

   a. Breeding

      1) institute practical recordkeeping system to identify animals in order to assess performance and thus enable selection and retention of superior herd replacements.
Figure 9. Monthly Auction Prices of Goats at San Angelo, TX
(Source: USDA Market News Service)
Figure 10.- Average Price Paid for All Goats During 24 Months at Ada, OK Auction
Figure 11.- Price Paid for Goats by Weight Range at Ada, OK Auction
procure and use in a controlled manner superior bucks for herd improvement.

where possible, use artificial insemination from elite sires to improve and standardize herd characteristics rapidly.

b. Reproduction

1) use available endocrine technology for controlling breeding schedules for production of kids to meet market-specific age/weight demands.

2) increase use of "flushing" procedure and "buck effect" to increase ovulation rates/conception rates and to group kidding dates better so as to improve labor utilization, weaning rates and market returns.

c. Nutrition/Management

1) apply available veterinary technology for improving herd health to increase kidding rates, weaning rates and rates of gain.

2) use supplemental feeds as needed to maintain adequate animal performance during periods of nutritional stress.

3) practice kid creep feeding for improved gains and conditions to enhance market appeal and returns where cost-benefit ratios seem favorable,

4) establish "growing/conditioning" enterprise for growing weaning goats to heavier slaughter weights and/or adding weight and improving condition of older slaughter goats.

5) establish a "contract grower" enterprise in which kids and other goats are scheduled for sale to a processor at specific weights, times and prices.

2. Changes in processing

a. packers should use currently available technology for processing carcasses, such as:
1) electrical stimulation to prevent cold-shortening of muscle fibers and increase tenderness,

2) blade tenderization of boneless cuts,

3) cryovacing of primal and retail cuts, and

4) freezing whole carcasses or components.

b. prepare and test market primal and retail cuts and also fabricated products such as:

1) fresh sausages,

2) smoked sausages,

3) dried sausages, and

4) jerky

3. Novel marketing targets and distribution systems

1) packers/wholesalers/retailers should evaluate and test market goats and carcass components in non-traditional consumer groups such as upscale restaurants, health food outlets, delis, and supermarkets selling lines of specialty food for the "health conscious" consumer.

2) wholesalers/retailers should test market novel goat meat products, particularly sausages and traditional retail chops and steaks, as well as precooked roasts and loaves.

3) current or new packers should consider the economics of processing and packaging operations near goat producing areas with distribution of refrigerated and frozen goat products to distant outlets.

4) current or new packers should consider the concept and practical application of contract growing of slaughter goats in conjunction with forward contracting of products to wholesale and retail outlets; the current structure of the broiler and turkey industry could, with appropriate modifications, possibly serve as a model.
4. Extension education opportunities

The final objective of this study was to disseminate the findings via this report and, subsequently, through publication of fact sheets, leaflets, etc., and also by presentations to interested audiences. Following public announcement through the Langston University Quarterly Goat Newsletter of the approval, funding and initiation of this study in late 1991, interest among goat owners has been strong and unremitting. Using non-SRDC funds, one or more of the authors have made 31 presentations of partial findings of this study-in-progress to Goat Field Days, Alternative Farming Enterprise Seminars, and extension training sessions for goat owners or prospective owners in 16 states, 3 Canadian provinces and at one U.S./Mexico International Conference; see appendix A for details.

Only Texas A&M University and Langston University currently field full-time goat extension specialists. Because of the rapidly increasing interest in meat goat production and marketing, it is suggested that those institutions now conducting goat research (Fort Valley State College, Georgia; Florida A&M, Tallahassee, Florida; Tuskegee University, Tuskegee, Alabama and Virginia State College, Petersburg, Virginia) add goat extension activities. It is further suggested that 1862 and/or 1890 institutions in other southeastern states and possibly Missouri and West Virginia add an extension component in meat goat production; Tennessee, North Carolina, South Carolina and Virginia seem particularly well situated for such activities.

Furthermore, it would seem both rational and economical for extension personnel in the southeast to share personnel for educational purposes, to develop and produce publications jointly, and to work with their respective State Departments of Agriculture and Commerce and also their respective SCS/RC&D Districts to promote vigorous development of the meat goat industry. Such cooperation in pursuit of common regional goals is not without precedent; it does, however, require uncommon effort and non-competitive good will among institutional and agency players.

5. Research needs and opportunities

Resources for goat research have historically been minuscule as compared to other classes of livestock. Angora goats and mohair have received the majority of the attention; while meat goats have been studied primarily for their roles in brush control, range management and multispecies grazing schemes. However, relatively recent changes in the
supply-demand situation and resulting prices for goats and goat meat have engendered serious interest in meat goat production. As a result of this demonstrated public interest, certain institutions and agencies have initiated more precisely focused research activities; still others are areas of concern seem to merit priority research efforts:

a) breeding

1) evaluation of Boer goats under southwestern and southeastern ranching and farming conditions; evaluations to include Boer x Spanish crosses with back crosses to Boer bucks and, secondly, Boer x Nubian crosses.

2) evaluation of Angora x Boer, Angora x Nubian, and in those states with appreciable Angora populations, Angora x Spanish crosses.

3) comparison of "Texas Spanish" and southeastern "briar/hill" goats under southeastern growing conditions.

4) comparison of pre- and post-weaning performance and carcass characteristics of Boer, Nubian, Alpine and Spanish kids.

b. reproduction

1) field studies to evaluate current and novel methods for out-of-season estrus initiation and for estrus synchronization.

2) economic comparison of kidding annually or three times in 24 months

c. nutrition/management

1) assess cost-benefit ratios of applying one or more improved management practices to herds currently managed in the traditional low input/low output manner (improved practices to include protein/energy supplementation, rotational grazing, parasite control and predator control, etc.).
2) economic evaluation of creep-feeding kids pre- and post-weaning and, secondly, marketing at 3, 6, and 9 months of age.

d. meat technology

1) comparative yield and quality of carcasses from different breeds and types of goats and their crosses.

2) performance response to "feed-lotting" kids, yearlings and older goats on carcass characteristics and on enterprise profitability.

3) evaluation of post-mortem carcass treatments to improve tenderness of goat muscle.

4) elucidation of biochemical properties of goat meat, with particular emphasis on human dietary concerns.

e. marketing

1) development of live and carcass grading standards for slaughter kids, yearlings and older goats.

2) ascertain consumer acceptance of primal or retail cuts vs whole or half carcasses.

3) comparison of current procedures for freezing on organoleptic characteristics of goat meat and on consumer acceptance studies of frozen goat.

4) fabrication and consumer acceptance studies of processed goat products, e.g., sausages, preformed roasts and dehydrated specialty items.

5) identification and quantification of non-ethnic potential markets for goat meat.

6) quantification of demand for goat meat during special holidays.
III. CONCLUSIONS

1. The meat goat industry is trying to achieve some measure of maturity, even at a time when, to most observers in the American main stream, it is hardly recognizable. Efforts to measure activity inevitably fall back to efforts to characterize the industry. Extensive data collection and interpretation from both public and private sources will help illuminate the industry.

2. The present systems of both goat production and marketing are rather haphazard, with substantive variations in animal availability, body weights and condition at slaughter, variable carcass characteristics, lack of standardized processing techniques and an inadequately developed product distribution system.

3. Rationalization of production and marketing of slaughter goats is essential if future demand is to be met and if all players in the marketing channel are to receive reasonably equitable returns; modifications in industry practices, though obviously needed, will likely be slow in coming.

4. Currently, goat supply is not in close accord with consumer demand across time; accordingly, there are wide fluctuations in prices paid to producers and paid by consumers; these tend to discourage improvements in production and to slow increases in demand.

5. The geographic disparity between areas of goat production and areas of goat processing and consumption adds substantially to marketing costs; more slaughtering in or near present and future production areas could reduce consumer costs and increase demand.

6. The southeastern area of the U.S. has appreciable, but as yet largely unrecognized, comparative advantages in goat production capability and in proximity to east coast ethnic markets relative to the traditional southwestern area; these advantages, if properly exploited, could alter the industry markedly over time.

7. The current industry practices of marketing mostly whole or half carcasses should be altered over time and place to sales of primal and retail cuts and value-added products.

8. University research and extension programs in production, processing and marketing of goat meat are scarce and should be implemented and sustained to assist in rapid, orderly industry development.
9. While yet a predominately adolescent industry, signs of maturity are beginning to emerge. Major players, with some notable inter-city exceptions, will not likely be the same five to eight years from now. As sale volumes continue to increase, so will sophistication in transportation, processing, and marketing.

10. Mass marketing to ethnic sub-culture consumers began receiving enormous play, principally in marketing journals and trade magazines only recently; consumption of goat meat will likely be favorably affected by these investigations and exhortations.
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APPENDIX A

Presentations of goat marketing study (partial) results by one or more authors.

1. Feb. 92: Alternative Farming Enterprises Workshop, TX Dept. of Agri., Austin TX.

2. Mar. 92: Goat Field Day, Tuskegee University, Tuskegee, AL.


5. Apr. 92: Missouri Goat Producers Annual Conference, Eldon, MO.


11. July 92: Extension Administration Conference, Clemson University, SC.

12. July 92: Goat Field Day, VA Dept. of Agri., Charlottesville, VA.


17. Nov. 92: Meat Goat Field Day, Kerr Foundation/Langston University, Poteau, OK.
19. Mar. 93: Goat Production and Marketing Seminar, Clemson University, Blackville, SC.
22. May 93: Grazing Short Course, Clemson Ext. Ser., Walhalla, SC.
23. May 93: Livestock Producers Meeting, Clemson Ext. Ser., Hampton, SC.
27. Aug. 93: Alternative Farming Systems Field Day, Clemson University, Edisto, SC.
29. Aug. 93: Mohair Producers Meeting, Lequire, OK.
30. Aug. 93: Dairy Goat Producers Meeting, Grove, OK
31. Sept. 93: Livestock Producers Meeting, Clemson Ext. Ser., Newberry, SC.
34. Nov. 93: Meat Goat Marketing Seminar, Mid-Carolina Council of Governments/Agriventures/CES, Raleigh, NC.
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