MEAT GOAT PRODUCTION AND MARKETING

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INTRODUCTION

Production of goats for meat has historically centered in the Edwards plateau and adjacent drylands of Texas and the southwest. In recent times, however, TN, GA, AL, AR, MO, FL and OK have increased meat goat inventories and numbers of enterprises. While some of the increased sales of kids and young goats have originated from numerous small dairy goat enterprises, the major sources of goats for meat in the U.S. are the Angora goats and brush goats found in the southwestern rangelands and southeastern woodlands. Meat goat production from these feature extensive management schemes with the foci on near year-round grazing schemes, minimum supplemental feeding, limited environmental protection, and minimal health care practices.

Marketing of meat goats and goat meat is unorganized and erratic over time and place as to price and availability. In a 1986 study, "Strategies for Expanding Goat Meat Production, Processing, and Marketing in the Southeastern United States", Winrock International Institute for Agricultural Development, Morrillton, AR (Glimp, et. al., 1986) assessed the economic and technical feasibility of production of meat goats and evaluated potential consumer demand for goat meat and its processed products. This

study focussed on two southern subregions, the westernmost one encompassing Arkansas, Missouri, Oklahoma, Louisiana, Mississippi, Alabama and Tennessee. The eastern subregion included Kentucky, the Carolinas, Florida and, again, Alabama and Tennessee. This analysis also recognized the influences of Texas meat goat production and markets on the southern region and concluded that there was a real need for expanded meat goat production and improved marketing mechanisms.

Precise statistics concerning the production of goats for meat are scarce. Texas has long been the premier meat goat producing state with numbers ranging around the half million mark. Recent figures show a decline to 350,000 perhaps caused by a heavy sell-off of inventory possibly due to the good prices prevailing in 1989 and 1990.

The U.S. Agricultural Census did not show any meat goats present in Oklahoma in 1974, but in 1978, 168 farms reported 1,165 meat goats; for 1982 the respective figures were 260 and 4,734. Although the 1986 census figures showed 763 farms with 6,229 meat goats, the Winrock study estimated 10,000 meat goats in Oklahoma that year and suggested a further rapid, sustained rise in the near-term. Long-term observers of the livestock industry, particularly in southeastern Oklahoma, state that meat and/or "brush" goats have been in Oklahoma for over 40 years and that census figures consistently underestimate actual numbers by a substantial margin. The Oklahoma Crop Reporting Service does not count meat goats in it annual review, which reports only Angora and "other" goats (dairy and meat combined).

Historically, prices for meat-type and cull dairy goats in Oklahoma have been erratic and relatively low compared to Texas prices. Animals typically sell by the head with little regard to size, sex or condition. In the past 36 months, individual and auction sales have been increasing and prices have risen substantially in eastern Oklahoma auctions.

Local opportunities for selling more goats at higher prices have heightened interest in small-scale commercialization of meat goats in Oklahoma. To assist in the development of this opportunity, GIGR is pleased to publish this Factsheet as a contribution to prospective industry development and rationalization. Factsheets concerning Angora goat production, mohair marketing and reproduction are also available (Pinkerton, 1991a, 1991b; Pinkerton and Scarfe, 1991).

MARKETING OF GOATS AND GOAT MEAT

A marketing channel describes the movement of a product or commodity from the site of production to the place of final consumption. It may include transportation, handling and storage, ownership transfers, processing, wholesale distribution, retailing, etc. A farm-raised goat may be marketed many ways, the simplest is on-farm slaughter and consumption. Note that this procedure eliminates all middlemen--the bane of efficient, economical marketing. Alternatively, the goat may be sold to a second owner who then slaughters it and consumes the carcass and perhaps selected offal. If this owner elects to have the goat custom slaughtered, a second, intermediate step is introduced. Moving beyond these simple transactions, one encounters the complexities of the modern food marketing chain which appreciably increase the cost-spread between primary producers and ultimate consumers.

To illustrate, a weanling goat may be sold to a grower who after a period of time sells it through an auction or to an order buyer. The new owner may elect to hold the goat further or to sell immediately, perhaps to a slaughter facility. In some cases, goats may pass through four to six owners from producer to processor. If so, great variations in time span, geographic movement, and interim feeding and management may occur. The end results are a wide range in body weight, body condition, and number of goats available for slaughter at a given place and time. Such variations are not conducive to orderly marketing and contribute to erratic farm-gate sales and prices which adversely influence producer profits and production of goats. Current marketing channels for live goats are generally poorly organized, inefficient, and inconsistent. This industry problem is only partially explained by the fact that the areas of lower cost goat production (Texas, Oklahoma and the Southeast U.S.) and the areas of relatively high goat meat consumption (east and west coasts) are widely separated.

A somewhat similar situation exists with regard to the marketing channels for goat meat, regardless of its final sale form. A slaughter and processing firm may do custom work only or it may purchase goats for carcass sales. In either case, the meat usually moves through one or more intermediate firms, wholesale or retail, before reaching the consumer. This movement obviously creates added costs; it may, however, also promote wider product availability and greater sales.

Organizing and simplifying marketing channels for goats and goat meat should enable higher farm-gate prices and lower retail prices, but, given the current marketing situation, the required changes would be difficult, though not impossible, to achieve. Major goat meat marketing constraints appear to be: 1) lack of widespread consumer demand, 2) low per capita consumption levels among current buyers of goat meat, 3) seasonality of demand, 4) relatively high marketing costs, 5) competition from traditional red meats, 6) seasonality of supply, 7) erratic carcass quality, 8) commercial trade resistance and 9) uninformed, negative consumer attitudes.

Recognizing that the sustained and expensive efforts by the U.S. sheep industry have not yet achieved appreciable increases in per capita consumption of lamb and mutton, it is suggested that limited resource goat owners and goat meat processors and purveyors should concentrate their efforts primarily on identifying and supplying those population groups who already have a preference for goat meat. The recent expansion in commercial goat meat sales may be viewed as a manifestation of this marketing strategy, which is based on ethnic groups that like goat meat and who have only recently acquired sufficient levels of income to purchase it more frequently.

These ethnic groups tend to be concentrated in metropolitan areas, and their disposable incomes tend to be only average to well below average. Nevertheless, their discretionary dollars available for meat purchases could be the motivation for further goat market development. Moreover, goat producers and meat sellers should not neglect to investigate and, where economically feasible, exploit the potential for sales to the international markets, e.g., the Caribbean, Mexico and other Latin American countries, the Mid-East, China, Korea, Maylasia and Japan.

Industry observers believe that the ethnic demand, actual and potential, for goat meat is probably sufficient to clear the existing supply of slaughter goats if only the mechanics and economics of assembly, processing, and distribution could be achieved. If this is true, the current national meat goat herd would have to be increased and both production practices and marketing channel efficiency improved in order to meet any additional increase in demand for goat meat in the future. Oklahoma has the land, water, and forage and shrub base to contribute to this expansion.

Goat producers and prospective owners should be keenly aware of the difference between product development and market development. Development of a meat product requires only sufficient resources for initial research concerning its nutritional, processing and shipping/storage characteristics and, subsequently, further research regarding consumers' acceptance of the product's organoleptic qualities, price levels, packaging, etc. Full development of existing ethnic markets and an opening of "new" markets for goat meat would be a complex and costly undertaking requiring substantial and sustained industry-wide support, cooperation, and advertising budgets. Most any University can do product development work; no University can be expected to do national or even regional market development, though it may make serious contributions to industry promotional efforts by providing pertinent data.

BREEDS OF GOATS USED FOR MEAT

Well established breed types for meat production do not exist in the U.S. (Shelton, 1984). The Swiss dairy goat breeds (Alpine, Saanen, Toggenburg) are not very popular for meat production under range and forest conditions, possibly due to their leggy conformation producing poor meat cuts and large udders which are prone to damage on range or in brush. The Nubian breed was originally considered to be a dual-purpose goat for milk and meat production, but in the U.S., it has been primarily developed as a dairy animal. However, in a few herds, primarily in Canada and Texas, some selection efforts have been made which focus on Nubian carcass characteristics and on milk yields (under grazing conditions) necessary to support rapid kid growth. Some selective breeding efforts have been conducted in Texas using "Spanish" goats or so-called native goats (Shelton 1984). Crossing of these "meat or range or brush" goats with each other and with Nubians is a common practice, by design or by accident.

To sum, there is no well-defined U.S. meat breed comparable to the African (Boer), Middle-Eastern and Indian goats. Limited research indicates that a long-term breed development program focussing on prolificacy, growth rate, carcass yield and grade, and multi-season kidding is possible. To date, the largely unorganized meat goat industry has not promised sufficient rewards to entice owners to undertake this long-term task nor has any public institution devoted sufficient resources to increasing the genetic quality of meat goats. Much breeding work is needed, and recent developments in the "ethnic" consumer market may, if sufficiently sustained, provide the necessary impetus for specialized breed development.

REPRODUCTION

Meat goats are seasonally polyestrus and typically show recurring estrus periods at about 20 day intervals from mid September through early February; however, many Texas goats continuously exposed to bucks will breed in July and August. There is considerable variation in breeding behavior among individuals, herds, and "breed- types". (The influence of nutrition on breeding performance is discussed in another section.) Many meat goat owners run their bucks (billies) with the does (nannies) more or less continuously during the year at a ratio of 1:20/30. While this is convenient and may result in the maximum number of kids born per year, it may also promote scattered kiddings. Such unrestricted breeding makes it difficult to target certain speciality markets or to avoid seasonal bad weather or to take optimum advantage of seasonal feed supplies. It may also lead to premature mating of kids which may produce stunted growth of females or problems at kidding. Meat goat kids may breed as early as four months but typically do so at 7-12 months. Body weight and condition are probably more important than age in determining initial juvenile estrus or post-partum estrus. It is not advisable to breed young females weighing less than 65% of (estimated) mature body weight range of 90-120 lb.

The gestation period for meat goats is about 150 days; perhaps 70-80% of gestations would range between 147 and 153 days with most of the remainder 3 days earlier or later. Since all does never breed on the same day, parturitions under practical breeding conditions may occur over a 30 day, or more, period. However, programming of breeding/kidding dates is possible by scheduling the timing and duration of exposure of cycling does to rutting bucks. A fair degree of estrus synchronization may be accomplished by using the well-known "buck effect" and also by using certain hormones. The buck effect is fairly useful in synchronizing most females in a herd just before, or at, the beginning of the normal breeding season. Turning bucks into a herd of does that have not been exposed for 30 days or more stimulates a fertile cycle in 8-14 days.

Synchronizing females using hormones available in the U.S. (prostaglandins or progestins) requires that does must be cycling for these procedures to be successful. Out-of-season breeding is also possible using photoperiod manipulation. Sixteen to 20 hours of natural and artificial lighting on bucks and does during January and February followed by an abrupt return to natural diurnal lighting and delaying introduction of bucks until early to mid-April tends to produce a Spring breeding season with females cycling 1-3 times. Controlling the length of the light cycles requires confinement of females and is labor intensive and expensive. It is therefore impractical in most situations. Other hormones (progestins plus gonadotropin releasing hormone, follicle stimulating hormone or pregnant mare serum gonadotropin) may be used to induce year-round cycling; however, they are currently only experimental and are not, as yet, approved in the U.S. for goats.

Reproductive efficiency of meat goats may be calculated in a number of ways. Perhaps its most practical expression is percent live kid crop or, for economic analysis, percent kid crop weaned. Well managed herds may achieve a 80-95% kidding rate (number of does kidding) and, with twining rates of 60-80%, may produce a live kid crop of 120/175%. Kid losses from birth to weaning (typically at 5-6 months) range widely and are influenced by maternal care, doe milk production, physical environment, predators, parasites and, of course, nutritional level. Many dry-land extensive enterprises can achieve 1.25 to 1.50 kids weaned per doe exposed. Oklahoma and southeastern U.S. enterprises experiencing more rainfall and better forage yields could exceed these figures (but only if herd health can be properly maintained).

Length of herd life for well managed does is, for many reasons, quite variable. For enterprise budgeting purposes, a useful life of 5 years, or a 20% per year breeding herd disappearance rate, is usually projected. Bucks may be retained to 5-7 years of age if healthy and if reproductively sound.

NUTRIENT REQUIREMENTS OF GOATS

All breeds, sexes and ages of goats require the same basic nutrients: protein, energy, minerals, vitamins and water. The diet must contain adequate protein; no other nutrient can substitute for it. However, energy needs may be derived from dietary carbohydrates (starches and/or fiber) or fats or even from excessive protein. Nutrients are required by the goat for: maintenance, growth, gestation, lactation, and fattening. Maintenance requirements are used for basal metabolism (maintain body temperature and support vital functions) and for physical activity. The daily maintenance requirements may range from 50 to 100% of total daily nutrient requirements, depending on whether the animal is also growing, lactating, gestating or fattening.

The nutritional requirements of goats managed primarily for milk production and those managed primarily for meat production are quite similar with perhaps two notable differences. First, dairy goats are expected to milk at relatively high and persistent levels throughout a 9-10 month lactation; meat goats need only achieve a 4-7 month lactation with high initial milk flow, persistency beyond 4 months being of lesser concern. Secondly, dairy goats are typically fed considerable concentrates (grain mixtures) to encourage maximum and persistent milk flow. In contrast, lactating meat goats are not usually fed concentrates in addition to their forage diet because the extra kid growth achieved from the extra milk may well not repay the added cost. As always, special circumstances may occasionally alter normal cost-benefit calculations.

The nutritional needs for goats are shown in a booklet, "Nutrient Requirements of Goats", published by the National Research Council, Washington, D.C. It is also available commercially for about $8.00. Please note that the figures given as recommendations are "approximate"; at this time, they should be considered as guidelines only. Further research and field experience will eventually increase the reliability of future published figures.

FEEDING PROGRAMS

Forage Utilization: As previously indicated, meat goats must depend almost solely on forage to meet their nutritional needs. Forages commonly utilized are grasses, browse, weeds, forbes, and, seasonally, small grains, hays, and, occasionally, silages. With rare exception, all these plants contain usable protein, energy, minerals and vitamins in some measure. It should be emphasized that goats actually prefer to browse on brush rather than on grass commonly taking about 60% browse and 40% grass in mixed plant populations. Since goats are particularly adept at selecting the most nutritious plants (and within plants, the most nutritious portions), they may do reasonably well on grazing areas considered poor to fair by man and cow alike if, of course, the amount of herbage is adequate. Like other animals, however, goats

respond quite favorably to increased quality/quantity of feedstuffs. Public perceptions to the contrary, goats can not in fact economically turn only very low quality vegetative matter into meat and milk. Successful managers know this; novices may not last long enough to learn it.

The composition of feedstuffs commonly eaten by goats varies widely. For information on composition of specific feedstuffs, see Pinkerton (1991a). In practical grazing situations, goats consume an everchanging combination of these feedstuffs with selection reflecting seasonal availabilities and relative palatabilities. The daily dry matter intakes of maturing goats range between 3 - 5% of body weight, occasionally higher. The actual quantity of feedstuffs eaten per day will be influenced by palatability, dry matter content, digestibility, and rate of passage from the rumen.

As one compares the protein, TDN and mineral values of feedstuffs, several points become apparent. First, legume roughages such as alfalfa, cowpea, lespedeza and vetch are higher in protein and calcium than are non- legumes such as Bermudagrass, Bluestems, Johnsongrass, Sudangrass and Lovegrass, either as grazing or as hay crops; their TDN values, however, are fairly comparable. Secondly, forage crops ordinarily are higher in protein and TDN in the form of pasture than in hay. Thirdly, protein and TDN levels of individual roughages are dependent on several variables, among them: variety, age of the plant, soil fertility, rainfall, harvesting procedures, and storage conditions. Fourthly, roughages are much higher in calcium than in phosphorus, while feed grains generally have more phosphorus than calcium. The mineral needs of meat goats are such that a need for phosphorus supplementation is much more likely than a need for extra calcium except perhaps during heavy lactation.

Note that the protein and TDN contents of most browse plants are quite comparable with those of more traditional Oklahoma forages. As noted before, goats are particularly adept at selecting the most palatable parts of browse plants; fortunately, palatability generally is generally associated with lower fiber, higher protein and increased digestibility. Spring growth is the most palatable and therefore has the highest nutrient value. Browse plants, particularly those grown in the more arid areas, may produce significantly less quantity of forage per acre than native or improved pastures, but initial quality of browse may be a compensating consideration. In eastern Oklahoma, pine and oak forest understory brush is a variable mixture of plants, many of which are good sources of protein and TDN for meat goats. For more information on grazing habits, see Lu (1985).

To evaluate the usefulness of pasture and browse plants for meat goat enterprises, it would be helpful to know their average annual yields per acre in addition to their protein and TDN. Unfortunately, such data are scarce and, in any case, yields can vary very widely across time and place. Thus, it is very difficult to answer basic management questions concerning grazing density (head/acre), optimum

grazing pattern (frequency and duration), and needs for supplemental feeding (protein, energy and minerals). For novice goat owners, the experiences of goat-owning neighbors are likely to be the best guidelines available.

Several rules of thumb for grazing can be typically applied, e.g., 6 mature goats equal 1 cow on native or improved pastures or 10 goats equal 1 cow on browse or understory brushy areas. As a practical matter, Oklahoma Angora goat owners have routinely grazed 10-12 goats per acre of good wheat pasture and 12-15 (occasionally more) goats per acre on alfalfa pastures. Angora producers have also reported grazing densities of 2-3 head per acre on good native pastures in the south central area and 1-2 head per acre of brushy fields (go-back land) in the southeastern area; Texas rangelands typically require 4 acres per goat.

Concerning the composition of high energy feeds, experienced livestock owners know that there are only small differences between corn, milo, barley, and wheat. Choosing one over the other is mostly a question of relative costs per cwt. However, some goat producers feel that milo should be used only sparingly, if at all, as it can promote urinary calculi in males (Ca:P ratio lower than about 1.5:1 predisposes the formation of calculi). In the absence of definitive research, wheat should probably not constitute over 50% of a grain mixture. Price frequently may preclude the use of oats, even though it is an excellent goat feed. Costly grinding of the grains for goats is seldom necessary.

High protein feedstuffs, used only occasionally by meat goat owners, are cottonseed meal and soybean meal. Whole cottonseed, cull pea seed and cracked mungbeans have also been used when conveniently available and priced competitively. Other protein feeds, such as gluten feeds, mill feeds and urea (in range blocks), are used as sources of protein. Choosing between alternative high protein feedstuffs is largely an economic decision. Dividing the price of a cwt of feed by its protein content will yield the cost of 1 lb. of protein and thus facilitate comparisons.

Forage Supplementation: In those situations in which the available forage is insufficient in protein or energy or minerals to support desirable levels of goat performance, proper supplements should be offered in adequate quantities but, as always, with due respect to the likely cost-benefit exchange involved. In actual practice, most owners provide extra minerals to their goats year round. Typically these may be in the form of trace mineralized (loose or block) salt, individual sources of calcium and/or phosphorus (offered separately or in combination with salt), or commercial mineral mixtures. Phosphorus content of forages is usually much lower than calcium content. Adequate phosphorus being necessary for reproduction and milk production, supplementation is usually economical. Goats

apparently have a much higher tolerance to copper than sheep so typical cattle mineral mixes are usually safe for goats.

In those grazing situations in which the plants are too low in protein (or in which forage quantity is much reduced), additional protein must be offered to maintain acceptable goat performance. Protein supplementation may take many forms and cost per unit of protein may vary widely. Experienced goat feeders compare protein costs, presence of other dietary components, palatability, feeding facilities required, labor cost/convenience, and likelihood of achieving fairly uniform intake per animal. Feeding a hay of sufficient protein level is frequently the optimum solution. In other cases, a lb. or so of 20% crude protein (CP) cubes or .5 lb. of 40% CP supplement or 0.5-1.0 lb. of whole cottonseed may be economically sound and nutritionally adequate. Protein blocks of about 37% CP are widely used during southwestern winters. Some owners have observed that grazing small grain pastures for only 1-2 hours per day will provide adequate supplemental protein (and energy) to their dry pastures or non-legume, lower quality hays. The continuous availability of roughage, even poor quality hay, is important during such protein supplementation; it allows the animals to economically use the protein.

When existing pastures and/or browse are unacceptably low in energy, experienced goat owners offer good quality hays to maintain performance; .5 to 1.0 lb. of shelled corn is also used, as is whole cottonseed. Cost per unit of energy is always a consideration but, without adequate energy, conception rates, milk flow, and kid growth rates will be compromised and gross income reduced. Some producers compensate in advance for expected declines in forage quality and availability by keeping protein blocks and hay available free choice, noting rises in consumption as pasture conditions worsen.

"Flushing" is the practice of feeding breeding age goats extra protein and/or energy for 30 days prior to and 30 days following the introduction of bucks to achieve a weight gain during this period. This weight gain is usually accompanied by improved fertility, increased conception and twinning. Flushing may or may not be necessary for meat goat production, depending on quantity and quality of available forage. If flushing were necessary, .5 lb. of corn and/or .5 lb. of protein supplement day/head would usually suffice.

When planning grazing and supplementation practices, it is prudent to always remember that a meat goat enterprise generates cash income from the sale of surplus kids and cull adults as well as non-cash, but real, benefits from brush control and pasture improvement -- perhaps $40-$70 per breeding female per year. Obviously, adequate year round grazing with only mineral supplementation is the optimum option; all other options increase costs but likely would be economically wise.

FACILITIES

Meat goats require only minimum shelter -- natural shade and windbreaks are adequate except in cold, windy weather when a simple shed would likely improve performance, especially if early kidding is practiced. About five square feet per adult goat is adequate; front eave height on the shed may be 6-8 feet sloping to 4-6 feet for winter usage. For summer shading, higher roofs would be more beneficial. A catch lot and simple working chute for sorting and handling is less stressful on goats and owner alike. Hay can be fed on clean sod or offered in bunks or racks or ringed round bales; unringed round bales may sometimes tilt and cripple or kill goats. Trough space for feeding ground feeds to adult goats should provide about 9-12"/head. Troughs must be constructed to keep the goats from walking or defecating in them in order to reduce wasteage and parasite contamination; they should also be easy to clean.

Kidding during the cold months may be necessary to target special holiday kid markets or to facilitate year round kidding schedules. If so, the use of kidding pens (jugs), approximately 4' x 4', under sheds or in barns, will usually improve kid survival and early doe and kid performance. In this system, does are placed in the jugs 1-5 days prior to expected kidding or just after kidding in an adjacent area and the pair remains therein for 3-5 days post-kidding. Thereafter, they can be grouped, 10-15 pairs to a larger pen with shed, for 10-14 days before returning to pasture (with shedding as needed). If at all possible, do not change feeds just prior to or during jugging or for a few days thereafter. This will reduce stress and improve milk flow and kid survival.

Jugging in warm months is not necessary and the total labor saved will usually offset any inconvenience concerning special handling of individual problem goats. Kidding difficulties do occur and successful owners do assist as necessary, even on pasture. The incidence of dystocia is usually below 5%; veterinary charges may exceed the value of the animal(s) involved.

FENCING

While it is not true that a fence which won't hold water won't hold a goat, it does much to improve neighborhood and marital relations to have a nearly goat-proof fence. Experiences and opinions vary, but owners have used goat net (10" vertical stays), 39" to 47" high, with one or two barbed wires above and sometimes one below. Other owners have successfully added 2-3 barbed (or electric) wires to existing 5 wire cow fences; the use of twist stays between the posts may be desirable. Electric fences have been used for perimeter as well as cross fences for holding goats; much depends on the

configuration and the charger unit as well as right-of-way and topography. Perimeter netwire and electric internal fences seem to be the physically optimum arrangement to date.

PREDATOR CONTROL

Goat owners recognize that a profitable goat enterprise must keep losses from predators to a minimum. Coyotes, feral dogs, packdogs, seemingly harmless neighboring dogs, foxes, eagles, owls, etc. can be killers of kids and adult goats. Control measures used are special fencing, guns, snares, traps, poisoned baits, cyanide guns, toxic collars, guard dogs, donkeys, llamas, night penning and stabling. Recently, guard dogs have received considerable attention, and many owners indicate fair to good success in reducing goat losses.

Opinions vary between owners as to effectiveness, but the three major dog breeds are (in declining frequency of use) Great Pyrennes, Kommondor, and Anatolian Shephard. Costs range from $100/$300 for young or trained dogs. Some owners castrate dogs of either sex; others run like-sex pairs or breeding pairs. Trios and quartets are also used. The dogs (usually) stay right with or close by the goats at all times, particularly if they are raised with the goats. Dogs must be fed once daily and, while self-feeders are usable, goats may also share unless special measures are taken. Periodic health care is a must. The number of dogs per herd is probably more dependent on the size of the pastures than the number of goats. Operations with 100-400 head in one pasture typically use two dogs.

USING MEAT GOATS FOR BRUSH CONTROL

Meat goats have traditionally been used in extensive grazing systems not only to produce saleable animals but also to control brush. Serious suppression or near elimination of brushy species, weeds and other undesirable plants by goats will reduce competition for scarce soil nutrients and moisture and, over time, improve carrying capacity of pastures for cattle and sheep. In Texas mixed species grazing, with the ratio of goats to cattle and/or sheep carefully chosen to fit existing plant populations, has proven biologically practical and economically feasible.

Using goats at the typically high stocking rates required to achieve effective brush control, however, may compromise off-take per acre by reducing kidding rates or kid weaning weights. The resulting trade-off between pasture improvement and cash income from goat sales should always be fully

considered in enterprise accounting procedures; unfortunately, pasture improvement is seldom properly credited.

It is sometimes difficult for landowners to accurately compare net costs of controlling brush by alternative methods: goats, fire, chemicals, and various mechanical means. Similarly, the methodology and cost-benefit ratios of using goats to control competing plant species in pine plantations and also in naturally regenerating pine and hardwood forests are inadequately known. In any case, individuals electing to establish a meat goat enterprise should decide whether they wish to treat their brush as a renewable crop resource to be used as sustainable goat browse or as an intolerable bane to pastures and trees to be removed as quickly and as completely as possible. In actual management situations, some practical, on-going combination of these two extremes is usually undertaken.

SYSTEMS OF MEAT GOAT PRODUCTION

There are two basic systems for producing goats for meat: extensive and intensive. Currently, the major U.S. supply of meat goats are those raised extensively, i.e., both the breeding herd and the salable off-spring are maintained and grown on a forage and shrub-based diet with only supplemental concentrates being fed seasonally. Spanish goat operations in Texas and similar Spanish, dairy, or Spanish x dairy goat operations elsewhere in the southeastern U.S. and Oklahoma are examples of this system. In many cases, these animals may be utilized primarily for brush and weed control, pasture improvement, and forest management with meat production being a secondary benefit. In this context, goats may be grazed solely or in conjunction with cattle or sheep or both. Multi-specie grazing practices have been found beneficial in a number of areas with widely varying environmental conditions. Brushy and weedy cow pastures may easily carry one to three goats per cow unit, simultaneously improving dollar off-take and increasing pasture quality without appreciably reducing cow numbers.

The cost-benefit ratios of raising goats primarily for meat and/or brush control in Oklahoma and the southeast have not been well documented; relevant research is needed. The Winrock study cited earlier shows budget estimates for goats used primarily for brush control (Table 1) and also for goats used primarily for meat production (Table 2). The latter enterprise returned to land, labor, and capital about $45.00 per doe compared to about $24.00 per doe for the former (in which case no monetary value for improved pastures was credited). Also, certain aspects of herd management were not the same, and productivity levels and off-take varied between these two enterprise projections.

The second basic system for producing goats for meat involves raising goats under intensive management schemes. Raising surplus male and female dairy goats purposefully for meat sales is the most frequent manifestation of this system in Oklahoma. Most such enterprises feature very small land area, maximum kidding rates, specialized feeding programs to encourage rapid growth, and the sale of animals at relatively young ages and, accordingly, lighter weights. Such kids may be raised as a supplemental enterprise to the major enterprises of producing milk and selling breeding stock. Other owners may elect to keep dairy goats not only to raise the kids born on the farm but also to produce a surplus of milk for purchased baby kids with both to be sold as "meat goats", not herd replacements. Little, if any, milk would be sold off the farm in this situation.

There are a number of ways to manage does and kids in either of these subsystems, and both Winrock and other studies as well as private enterprises indicate quite variable productivity results. Economic returns are also reported to be variable depending on prevailing marketing, and other circumstances; see Table 5 taken from the Winrock study. Labor requirements are typically higher in intensive systems, but extensive systems may necessitate higher initial costs due to land and fencing requirements which can be amortized only slowly.

There is yet another source of marketable goat meat in addition to kids produced either extensively or intensively. This source is composed of the cull does from the national dairy and meat goat herds and also from Angora nannies and muttons leaving commercial mohair producing flocks, normally at five or six years of age. Cull does of either breed or Angora muttons do not ordinarily yield superior carcasses even when in good condition. However, certain consumers prefer meat from more mature goats, including bucks. Aged animals can, of course, yield substantial quantities of boneless lean for products such as ground meat, sausages and jerky.

Expansion and/or improvement of existing goat operations, whether extensive or intensive, requires careful analysis. The initiation of a new meat goat enterprise would require much advance planning, particularly if the entrepreneur had no prior goatkeeping experience. Analysis and planning requires practical, reliable information. Some information is available from successful producers and University and industry sources; much more information is needed. Forward planning in particular requires reasonably accurate operational budgets which would reflect likely cash flow balances through time. For information on utilization and processing of goat meat, see Pinkerton (1991c); see also Pinkerton (1991b) for information on mohair marketing and pricing.

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Table 1.Meat-type goats, spring kidding program, marginal land with moderate to heavy brush or woodlands grazing, 100 does and 3 bucks.

Assumptions

1. 130% kid crop raised; 20 doe kids saved as replacements.

2. Doe purchased at $45 each; bucks at $100 each.

3. Limited supplemental feeding of hay to does during winter, and limited grain feeding during late gestation and early lactation. Kids fed 1.0 lb per day for 60 days postweaning.

100 kids @ 60 lb x $0.70 / lb $46.20

16 cull does @ 70 lb x $0.39 / lb $3.36

Gross income / doe $49.56

Expenses

Hay (10 tons x $60.00 / ton) $6.00

Grain (230 bu corn x $2.75 / bu $6.33

Salt and minerals, 10 lb x $0.12 / lb 1.20

Veterinary medications $1.50

Buildings and fences $3.00

Marketing and hauling $2.00

Vehicle, fuel, utilities, other misc. $4.00

operating capital interest (200 days @ 13%) $1.71

Operating cost / doe $25.74

Return on land, labor, and capital $23.82

Amortization of a 100% loan for does and bucks over 5 years at 13% interest would require approximately $15 per doe year. Part of the objective of this production system is brush control, for which no value is assigned to land improvements.

Source: Glimp, et al., 1986.

Table 2.Meat-type goats, spring kidding program, improved land for high production periods and marginal land otherwise, 100 does and 3 bucks.

Assumptions

1. 170% kid crop raised; 20 doe kids saved as replacements.

2. Does purchased at $45 each; bucks at $100 each.

3. Limited supplemental feeding of hay to does during winter, and limited grain feeding during late gestation and early lactation. Kids fed 1.0 lb per day for 100 days postweaning.

150 kids @ 60 lb x $0.70 / lb $73.50

16 cull does @ 70 lb x $0.39 / lb $3.36

Gross income / doe $76.86

Expenses

Hay (10 tons x $60.00 / ton) $6.00

Grain (300 bu corn x $2.75 / bu $8.25

Salt and minerals, 10 lb x $0.12 / lb $1.32

Veterinary medications $1.75

Buildings and fences $5.00

Marketing and hauling $2.50

Vehicle, fuel, utilities, other misc. $5.00

operating capital interest (200 days @ 13%) $2.12

Operating cost / doe $31.94

Return on land, labor, and capital $44.92

Assumptions

1. Kids would be started on creepfed at birth, and weaned at 28 days of age weighing approximately 20 lb. Postweaning diet would be a 16% protein, high-concentrate feed on good pastures.

2. Postweaning growth rate of 0.4 lb per day, with 5 lb concentrate feed required per lb grain. Postweaning death loss estimated at 4%.

Income Amount

48 kids @ 60 lb x $0.70 / lb $2,016.00

Expenses:

Milk @ 5 gallon per kid x $1.04 per gallon x 50 kids $260.00

Feed @ 200 lb per kid x 48 kids x $0.75 per lb $720.00

Pasture cost @ 2.00 per kid $96.00

Veterinary and medication @ $1.00 per kid $48.00

Facilities and equipment @ $2.00 per kid $96.00

Marketing and hauling @ $1.50 per kid $72.00

Miscellaneous cost @ $1.00 per kid $48.00

Operating capital interest @ 100 days x 13% interest $47.35

$1,387.35

Return to land, labor and capital $628.65

a The milk price at $1.04 per gallon is the farm rate price paid for goat milk by the milk plant in Yellville, Arkansas.

b These same kids could conceivably sell as 20-lb fat kids at weaning. Based on an estimated sale price of $0.85 per lb, the income would be $850 for 50 kids. The estimated expenses would $491.60, which would leave an estimated return to land, labor, and capital of $358.40.

Source: Glimp, et al., 1986.