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Milk Goats

By C. A. Matthews and Earl Weaver

AGRICULTURAL EXPERIMENT STATION
IOWA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

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ANIMAL HUSBANDRY SECTION
Dairy Husbandry

AMES, IOWA
Milk Goats

By C. A. Matthews and Earl Weaver

Greater use is made of milk goats in many European countries than in the United States. Italy, France, Germany and some of the Balkan countries have from 20 to 75 percent as many milk goats as dairy cows. In the United States census of 1920 milk goats were classified with common American goats under the heading of goats not kept for fleece. As the number included in this classification was 6 percent as great as the number of dairy cows in this country, it is obvious that the relative number of strictly milk goats is small.

The development of the milk goat industry in the United States has been slow. Americans generally do not value milk goats highly. This lack of esteem is largely due to the observations that have been made upon the lack of utility and the undesirable habits of the unimproved variety of American goat. Another serious hindrance to the increase in interest in milk goats has been the quarantine laws against the importation of livestock from Europe because of foot and mouth disease. The result has been a scarcity of good stock for use in building goat herds. Probably the most serious handicap to the development of the milk goat industry comes from the competition with the dairy cow in the production of milk. The cow is well established and very well adapted to most American farm conditions.

Undoubtedly the greatest development in milk goat dairying in this country has taken place in California. Not only are more breeders and more large herds located there, but more effort has been made toward the commercial use of goats’ milk for cheese making and condensing purposes. However, a few herds are found in nearly every section where goats have proved adaptable or where the peculiar properties of their milk have made a small local supply desirable. Such an interest in milk goats is found in Iowa and the Middle West.

Adaptations

That the milk goat will ever compete seriously with the dairy cow in producing the bulk of the milk supply of the country is unlikely. On a basis of relative bodily weights good does are as efficient producers of milk as dairy cows. A good doe should produce 8 to 15 times her own weight in milk during a lactation.
However, milk can be produced on a commercial scale more cheaply from dairy cows, when all costs are taken into consideration. Any economical advantages for milk goats must be found under conditions where they may be kept cheaper than dairy cows or where there is a sufficient price advantage for goats' milk.

A large percentage of the milk goats are in small herds producing milk for family use. Some families are able to have a milk supply from a doe or two when they would not have the means to keep a cow. A few goats may be kept economically on small tracts of land and on feeds that might otherwise be wasted. Often a goat is satisfactorily tethered in a vacant city lot, by the side of the road or kept on a small acreage on a fruit or truck farm. Altho goats will consume many things that cows will not eat, it is a mistake to expect does to do well without a sufficient amount of good wholesome feed. However, use may be made of lawn clippings and by-products from the garden and kitchen. Where a part of the feed may be secured from what would otherwise be wasted, a family may have an economical milk supply by keeping a doe or two. Goats are good foragers and do well on a rough, poor range where cows would not thrive.

The milk goat is hardy and adaptable to the climate of any part of the United States. There are a number of herds of short-haired milk goats in Canada. The natural environment of goats is a mountainous region and a dry climate. It is natural that they do not thrive so well on low, damp land. Foot-rot and similar troubles often develop under such circumstances. Young kids have to be well protected from rain and dampness.

Characteristics of Goats' Milk

Goats' milk, like cows' milk, varies with the breed, stage of lactation and individuality of the animal. Variations either way are to be expected from the averages given below for its composition. Goats' milk more closely resembles cows' milk than it does sheep's milk. In the following table the average analysis of goats' milk reported by Voorhies is compared to the average analysis of cows' milk as reported by Babcock.

AVERAGE COMPOSITION OF MILK

<table>
<thead>
<tr>
<th></th>
<th>Cows' Milk (percent)</th>
<th>Goats' Milk (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>87.17</td>
<td>86.09</td>
</tr>
<tr>
<td>Protein</td>
<td>3.55</td>
<td>3.55</td>
</tr>
<tr>
<td>Fat</td>
<td>3.69</td>
<td>4.79</td>
</tr>
<tr>
<td>Sugar</td>
<td>4.88</td>
<td>4.85</td>
</tr>
<tr>
<td>Ash</td>
<td>.71</td>
<td>.72</td>
</tr>
</tbody>
</table>

Goats' milk is nearly white in color and butter made from it is likewise white. The fat globules of the milk are small, causing
the cream to rise very slowly. In fact, gravity systems of separation are out of the question. It has also been noticed that in digestion in humans the casein in goats’ milk forms a finer, more flocculent curd than cows’ milk. It is believed that this is the reason that infants and invalids are sometimes able to digest goats’ milk when they can not digest cows’ milk.

Goats’ milk produced under sanitary conditions does not have an unpleasant “goaty” flavor and odor altho it does have a flavor different from that of cows’ milk. The buck may be a source of bad flavor or odor in the milk if he is not kept separate from the does and the milking quarters. There is no difference in the keeping qualities of goats’ and cows’ milk.

**Uses of Goats’ Milk**

Most of the goats’ milk in the country is produced for direct consumption as milk by families that do not have room for or can not afford a cow. It is often recommended for feeding to infants and invalids. It is more easily digested than cows’ milk by many people with impaired digestive systems. As goats are only rarely troubled with tuberculosis, their milk is also unlikely to carry tubercle bacilli. Malta fever may be carried to humans in goats’ milk, but cases of this disease in both goats and humans are rare in this country.

Much goats’ milk is used in Europe in the manufacture of cheese. The goats’ milk may be used alone or mixed with cows’ milk. It makes a fine quality of cheese owing to the way in which the casein coagulates, to the small fat globules and to its peculiar flavor. Cheese from goats’ milk bears a large variety of names, but in this country Neufchatel and Roquefort are the principal kinds in which it may be used.

A limited amount of condensed goats’ milk is produced and put on the market. It is largely for use in infant feeding. Goats’ milk also may be used in the manufacture of ice cream and sherbet. This is a home use for the milk.

Goats’ milk is not adapted for the making of butter. It makes butter of a different texture than that from cows’ milk; it is more difficult to churn, and the fat is very white. As goats’ milk usually sells for more than cows’ milk the butter would cost more.

**Breeds**

Altho there are many breeds and types of milk goats, only four breeds are of major importance in the United States. These are the Toggenburg, Saanen, Anglo-Nubian and French Alpine breeds. The common or American goats, which are numerous in some sections of the country, especially the South, are really the scrubs of the milk goat industry. They have not been con-
Fig. 1. A typical Saanen Doe.*

sistently bred for any one type or purpose and, consequently, variations in type and performance are common. They differ from the milk producing breeds in being rather short legged, more compact and meaty, and in having small, short teats. It is only occasionally that individuals of good producing ability appear among these common goats. Both sexes in the common goats usually have horns and many color combinations are found although white is frequent. The use of purebred milk goat bucks on common does is recommended as a means of building up a good herd of milk goats.

The Toggenburg, which originated in Switzerland, is the most popular and numerous breed of milk goats in the United States. The prevailing color is a light brown shading to white on the legs and underline. A white bridle mark on each side of the face is characteristic of the breed. A purebred Toggenburg doe is shown on the cover page. Toggenburgs are generally considered a hornless breed, although individuals are found with horns. Wattles may or may not be found on the neck. These goats usually have a beard. Both long and short-haired individuals are found. Long hair is common for bucks. The breed standard calls for bucks weighing 150 to 175 pounds and does weighing from 100 to 135 pounds. The Toggenburg is known as a milk producing breed. Their milk tests from 3.5 to 5.0 percent fat. The doe, Althea May, holds the highest 24-hour milk record.

*All pictures are thru the courtesy of the American Milk Goat Record Association.
for the breed under the advanced registry rules of the American Milk Goat Record Association. She is credited with 16 pounds 1¾ ounces production in 24 hours. In the University of California herd a Toggenburg doe, Polly Mae, produced in a year 4,350 pounds of milk and 139 pounds of fat.

The **Saanen** is another popular Swiss breed similar in conformation to the Toggenburg. Figure 1 shows a Saanen doe. The Saanen is the largest of the Swiss breeds, the breed standard calling for does weighing 135 pounds or more and bucks weighing 180 pounds or more. Saanens are white to creamy white in color and are usually short-haired. Altho generally considered to be a hornless breed, horns often occur. Saanens rank with the Toggenburg in regard to milk producing ability and butter-fat test. The Saanen doe, Panama Louise, holds the record for all breeds under the advanced registry rules of the American Milk Goat Record Association. In 24 hours she produced 20 pounds 11 ounces of milk.

The **Anglo-Nubian** is probably the result of a cross between the common short-haired does of England and Nubian bucks of Eastern Mediterranean or African origin. Figure 2 shows an Anglo-Nubian doe. Anglo-Nubians are large, rangy individuals, and the breed standard calls for bucks weighing 165 pounds or over and does 125 pounds or over. There is no definite color for the breed. Black, tan, red and combinations of these colors

![Fig. 2. A typical Anglo-Nubian doe.](image-url)
with white are found. The hair of both the does and bucks should be short and glossy. Most individuals are hornless. The ears, which are characteristic of the breed, are long, wide and pendant. Anglo-Nubians are more sensitive to cold than the Swiss breeds. As a rule they do not produce so great a quantity of milk as the Swiss breeds but the milk has a higher percentage of fat, usually testing more than 5.0 percent. The highest official record on an Anglo-Nubian doe is that on Spring Beauty Anderson. She is credited with 10 pounds 3½ ounces of milk in 24 hours.

**The French Alpines** are not numerous in the United States. They are similar in conformation to the other Swiss breeds and have fine short hair. Figure 3 is of a French Alpine buck. The characteristic color is a combination of black and white (Con Blanc type) or black and fawn (Con Clair type). The lighter color predominates in the fore quarters and under parts, and the black predominates on the back and rear quarters. The French Alpines are hardy and of good size. They are persistent producers of milk with a good fat content.

**Establishing the Herd**

A good herd of milk goats must have does of ereditable producing ability. The producing ability of a doe is usually measured in terms of quarts per day, or in pounds per 24-hour day if official. Many does are sold on the assertion that they produced a stated number of quarts a day when fresh. A
doe that produces but three pints a day is only a fair milker and not likely to be very profitable. Two quarts or more a day is necessary to be classed as good production. Exceptional does have produced six quarts daily. A good doe should also be a persistent milker, continuing with a fair yield for 7 to 10 months.

The use of a good purebred buck may be the means of building up a creditable herd from common American does. When good does of the milking breeds are scarce and high in price, this is an economical way to start in the business. The buck should be out of a doe known to be a good producer and a persistent milker. It is desirable that as many individuals as possible in the buck’s pedigree have good production records.

Besides having creditable production behind him, the buck himself should be of the desirable conformation and size. It is of primary importance that he have a long, deep barrel with well-sprung ribs; a deep, broad chest, a straight back, broad rump and clean, strong, straight legs. He should have every appearance of vigor, masculinity and good condition. Breed characteristics should be sought in selecting a buck.

In selecting the does similar body conformation is desired. The body should be long with well-sprung ribs and a deep, well-developed middle. The back should be straight and the rump broad and not too sloping. Legs should be lean, straight, and strong with rather fine bone and thin thighs. The spinal processes should be well defined and the hips prominent. The neck should be thin and the head neat and hornless. The breed standards for judging calls for cuts on all bucks or does having horns or the indication that they have had horns disbudded. The udder should be well developed, free from fleshiness, strongly attached to the body, attached high behind and rather globular in shape. The teats should be symmetrical and large enough to be grasped easily. Milk veins should be large, long and tortuous.

Breeding and Management

Altho does will breed when 6 to 8 months of age, it is recommended that they be first bred at 15 to 18 months. Early breeding leads to small individuals and mediocre milkers. If it is particularly desirable to have a milk supply continue throughout the winter, some females may be bred at 12 to 15 months of age.

The doe usually comes in heat every 18 to 21 days. Altho some does may come in heat at all periods of the year, there is a tendency toward a distinct breeding season. Does are most commonly bred between the months of August and April. It is also during these months that the buck has his rutting season. There is a tendency for the breeding season of Anglo-Nubians to be more general throughout the year. The gestation period for goats is about 150 days; thus the greatest number of kids are
born in the spring and early summer. A doe should be dry from six to eight weeks before kidding.

It is a good plan to keep pregnant does apart from the rest of the herd for two or three weeks before kidding in order to prevent a possible accidental abortion from injuries received in fighting with other does. It is to be recognized also that abortions may be due to infection and as a precautionary measure the does that abort, as well as all does at the time of kidding, should be separated from the rest of the herd for a period. It is desirable to wash the doe and to disinfect her quarters. Grain should be given to pregnant does, and warm bran mashes are desirable at kidding time. Garget, or caked udder, is most likely to occur immediately after kidding. Difficulties in this direction may be reduced by feeding less grain for a few days before kidding and by giving a mild laxative. In a few days the doe can be gradually brought up to a regular ration.

The does usually produce twins, altho frequently three and sometimes four kids are born. Twins are desirable because they are usually more vigorous than the kids when larger numbers are born.

The bucks should be kept separate from the does, especially during the breeding season when the former have such a strong disagreeable odor. If they are kept in or near the milking quarters the odors will be absorbed by the milk to give it an unpleasant "goaty" flavor. If the bucks and does run together, the does are likely to carry some of this odor on their coats and thereby impart an undesirable flavor to the milk. Keeping the bucks separate from the does also prevents the possibility of breeding the does too young and makes it possible for the owner to know the approximate time each doe will kid.

Young bucks should not be used too heavily. A vigorous buck less than a year old may be used to breed a few does. Bucks 12 to 18 months old can be used to breed about 25 does, while a mature buck can breed 50 does in a season.

The hoofs of goats that are confined or do not get out in rough flinty soil should be occasionally trimmed with a sharp knife or with pruning shears. Foot-rot develops at times, particularly on wet ground. A good treatment for foot-rot is to stand the foot for a few minutes in a solution made up of 1 pound of copper sulphate in 5 quarts of water. Goats are occasionally affected with lice and for such a condition may be treated with sheep dip.

Feeding

The same fundamental principals apply to the feeding of milk goats as apply to the feeding of dairy cattle. It is estimated that six or eight goats can be kept on the amount of feed required for one cow. The feeds suitable for dairy cattle are also suitable for
milk goats. Like dairy cows, the milking does, for best results, should receive all they want to eat of a legume hay such as alfalfa or clover and a succulent roughage such as silage or roots. Corn fodder, corn stover or other non-legume roughages may be fed with the expectation of poorer returns.

Pasturing is an excellent means of feeding goats. They are good foragers and do well on rough unimproved pasture as well as on improved pasture crops. The milk goat is a good destroyer of brushwood, but the does must not be expected to produce satisfactorily if required to subsist by browsing. It is better to use growing kids or the bucks for browsing purposes. In a small herd use may be made of leaves, lawn clippings, prunings, or even kitchen garbage, as part of the roughage for the goats. However, only wholesome feed should be used.

In addition to the roughage, milking does should receive a concentrate mixture fed according to their production. A possible concentrate mixture for feeding with a legume hay would consist by weight of 4 parts of cracked corn, 4 parts of ground oats, and 1 part of a high protein concentrate such as linseed meal, gluten feed, gluten meal, soybean meal or cottonseed meal. Cottonseed meal, however, should not comprise more than 20 percent of the ration nor be used at all if no succulent feed is given. For use with mixed hay in the ration a concentrate mixture of 4 parts of cracked corn, 4 parts of ground oats, and 3 parts of a high protein concentrate is advised. Where no leguminous roughage is fed, the mixture should consist of equal parts of cracked corn, ground oats and a high protein concentrate.

Numerous substitutions may be used in these mixtures. A part or all of the cracked corn may be replaced by an equal weight of corn-and-cob meal, or rolled or ground barley. Bran may be substituted for a part or all of the ground oats, or for one-third of the corn and one-third of the oats.

A mineral supplement such as equal parts of steamed bone meal and finely ground limestone is advisable to feed with the grain for milking does, particularly for those receiving no alfalfa hay. Milk goats should have access to plenty of clean salt and clean fresh water.

Grain is usually fed twice daily at the time of milking. Hay is fed in a rack or in a large feed box with slats over the top to prevent waste or in stanchions similar to calf stanchions. The goats are usually fastened for hay feeding. Silage and such roots as turnips should be fed after milking to prevent bad flavors in the milk.

From one to two pounds of grain per day should be fed to milking does, depending upon their production. Occasionally a heavily producing doe is given more than two pounds daily. It is well to give them from one to one and a half pounds of
grain while they are on pasture. The widest mixture would be suitable for this purpose. The does should have all the hay and succulent roughage that they will readily eat.

During the breeding season the buck should be given about a pound and a half of grain daily in addition to a generous allowance of hay and silage or roots. The buck should have exercise. If a separate lot is not available he may be tethered out.

Raising the Kids

It is a frequent practice to allow the kids to nurse their dams. They are put with the dam and allowed to nurse three or four times daily. Kids raised in such a manner require very little attention and make good growth.

Many kids are raised by hand. Kids to be raised by hand should be allowed to nurse their dams for two to five days in order to obtain the benefits of the colostrum milk. The young kids may be taught to drink from a bottle or from a tank equipped with nipples, or they may be taught to drink from pans or troughs. Some can be taught to drink at the start while others have to be bottle fed for a month or two. It is essential for the health of the kids that all the utensils used be kept clean.

Kids less than a month old are very delicate. Precautions should be taken that they, or even older kids, be kept in dry, comfortable quarters and not allowed to be out in rainy weather. Pneumonia in young kids is often caused by such exposure. However, a form of pneumonia may be caused by navel infection and for this reason the navels of new-born kids should be treated with iodine.

Hand fed kids are fed three times daily for about two months and twice daily thereafter. The kids should receive at first from one and a half to two pounds of milk per day. Cows' milk is sometimes used with good success.

Kids also can be raised successfully on skimmilk. The change from whole to skimmilk should be made gradually. After the change two or three pounds are fed daily. The kids may be weaned at 3 to 4 months of age, but many breeders prefer not to wean them until they are 5 months old. They can then be maintained on pasture, alfalfa hay and grain.

The doe and buck kids should be separated at an early age as does may breed at 4 or 5 months of age. Poor or grade bucks should be destroyed or castrated.

The meat from young goats has a mild gamey flavor and is sometimes sold as "venison" or "lamb." The term "chevon" is now being largely used for goat meat.
Because of the small size of milk goats, they are usually milked upon milking stands 1½ to 2½ feet high. These are equipped with a stanchion at one end and with some sort of a manger for feeding grain. The cover shows a doe on such a milking stand. With the exception of a few high producers, most does are milked twice a day. The does may be milked from the side as cows are or they may be milked from the rear. Thoro, regular milking helps to keep production up to the end of the lactation.

For the production of the best quality of milk, milking should be done in a place separate from that in which the does or the buck is kept. This may be another building or out of doors or a special place in the stable that is partitioned off. The doe should be brushed off and her udder washed with a damp cloth before milking. If milk produced under such conditions is promptly cooled, and kept cool in clean containers, it will not have disagreeable flavors and will keep as well as cows' milk.

Goat Quarters

The quarters for many milk goats are frequently adaptations of buildings already on hand. There are many varied and ingenious arrangements. It is important, however, that the quarters be clean, dry, well ventilated and lighted, and easily cleaned and disinfected. The does may be tied in stalls by means of chains snapped into the collars, which they usually wear, or they may be kept in small box stalls. In many localities goats are kept tied up very little and are allowed freedom in sheds and other
sheltered inclosures. Except for the purpose of keeping the stalls dry, little bedding is needed. Goats do not care to rest upon soft litter.

Inclosures for goats are usually fenced with ordinary four or five foot stock fencing. Barbed wire should not be used, and common chicken wire netting would soon be cut to pieces by their hoofs. Goats have a habit of climbing up on the fences, especially if confined in small inclosures or near the pasture gate. For such a place a five-foot wooden paling would have some advantage over the woven wire fence.

Literature

A number of organizations foster the interests of milk goats in America. Some are state or sectional organizations and others are especially devoted to one breed of goats. The American Milk Goat Record Association conducts a register for milk goats of all breeds. It also supervises records of production for all the breeds. The secretary of this organization is W. L. TeWalt, Vincennes, Indiana. He is also editor of the Goat World, the official publication of the association.

For those who may desire further information relative to milk goats the following list of publications is appended.

- Care and Management of the Milk Goat, by E. C. Voorhies; extension service circular No. 6 (1926), California Agricultural Experiment Station, Berkeley, Calif.
- The Casein and Salts in Goats' Milk, by A. W. Bosworth, and L. L. Van Slyke; technical bulletin No. 46 (1915) New York Agricultural Experiment Station, Geneva, N. Y.
- Goat-keeping for Milk Production, by C. Davis; published by Chas. Scribner's Sons, New York City.
- Goat-raising in British Columbia, by G. Pmlmer; bulletin No. 64 (1918), British Columbia Department of Agriculture, Victoria, B. C.
- Goats' Milk for Infant Feeding, by W. H. Jordan and G. A. Smith; bulletin No. 429 (1917) New York Agricultural Experiment Station, Geneva, N. Y.
- Information Concerning Common Goats, by G. F. Thompson; circular No. 42 (1903), Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.
- Information Concerning Milch Goats, by G. F. Thompson; bulletin No. 68 (1905), Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.
- Malta Fever with Special Reference to Its Diagnosis and Control in Goats, by J. R. Mohier and A. Elchhorn; circular No. 215 (1915), Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.
- Manufacture of Roquefort Type Cheese from Goats' Milk, by S. A.
Hall and C. A. Phillips; bulletin No. 397 (1925), California Agricultural Experiment Station, Berkeley, Calif.


Milk Goat Improvement, by O. G. Cunningham; bulletin No. 154 (1926), New Mexico Agricultural Experiment Station, State College, New Mexico.

The Milk Goat in California, by E. C. Voorhies; bulletin No. 285 (1916, reprinted 1921), California Agricultural Experiment Station, Berkeley, Calif.

Milk Goats, by E. L. Shaw; farmers' bulletin No. 920 (1918), United States Department of Agriculture, Washington, D. C.


Money in Goats, by W. Sheldon Bull; published by the author, Buffalo, N. Y. (1915).


Some Milk Goat Problems Observed in California, by W. Dwight Pierce; special publication No. 22 (1922), California State Department of Agriculture, Sacramento, Calif.

Takosis, a Contagious Disease of Goats, by J. R. Mohler and H. J. Washburn; bulletin No. 45 (1916), Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.