News About Goats

by VICTOR L. SIMMONS

GOATS, being useful and personable animals, are attracting more and more interest among Americans. Consumers want to know more about goat milk, mohair, and chevon. Breeders look for guidance to develop better animals and better products.

As with other animals, progress in breeding milk goats depends upon selecting and mating animals that inherit the ability to give more milk and butterfat. Physical appearance alone is an unreliable index. A newer and better method is genetic selection by basing the choice of breeding stock on records of individual performance and progeny and on the pedigree, if other records are unavailable. Data of this kind will enable breeders to develop constructive breeding programs and to identify individuals most likely to improve their herds.

Through a Star Milker award, introduced by the American Milk Goat Record Association, new opportunity is provided for obtaining performance records for does tested at Official Milking Competitions. This 24-hour test is particularly important to goat owners who keep does only for the family milk supply or as a hobby. Such animals may now be tested without the expense of the usual Advanced Registry 10-month testing. Goat raisers may obtain information about entering their does in official milking competitions or qualifying them for "Star Milker Certificates" by getting in touch with the American Milk Goat Record Association, Sherborn, Mass.

Most does breed only in the fall and early winter, and a way to spread the period over which they come in milk is greatly needed by dairymen and others who must have a regular supply of milk. The simplest and most practical plan at present, provided there are enough does in a herd, is to breed some of them early and some late in the
breeding season. A relatively large number of dry does may result, however, from their failure to come in heat as regularly or to breed with as much certainty during the latter part as in the early months of the breeding season.

Research with Hormones

The selection of does that tend to breed out of season gives some opportunity to develop strains that breed at all times of the year. But such natural methods take time, so scientists have been exploring the chances of artificially inducing lactation and stimulating extraseasonal breeding. Work by A. A. Lewis and C. W. Turner at the University of Missouri, and S. J. Folley, F. G. Young, and F. H. Malpress, at the University of Reading and the National Institute for Medical Research, London, first pointed to the possibility of inducing lactation in virgin goats by injections of stilbestrol, a synthetic chemical product having the properties of the natural estrogenic hormones. Later the scientists found that lactation induced in virgin and dry does by stilbestrol could be augmented with treatments of anterior pituitary gland extracts. This combination gave quicker results than injections with estrogen alone. In some cases, in which estrogen failed to induce lactation, the injection of anterior-pituitary extract was followed by heavy milk secretion. These experiments indicate that artificial induction of lactation depends on the maintenance of the proper relation of the estrogen level in the circulation to the activity of the anterior pituitary.

Research with hormones in their relation to lactation has suggested a rather peculiar phenomenon. The administration of estrogens and stilbestrol in certain amounts may effectively stimulate the initiation of milk secretion in virgin or dry animals but at the same time established lactation may be seriously depressed by the same hormones. J. P. Mixner, J. Meites, and Turner, working at the University of Missouri, initiated lactation in yearling virgin Toggenburg goats by daily subcutaneous injections of 0.25 milligram of stilbestrol, but in milking goats doses varying from one to four milligrams a day reduced the milk yield, apparently in proportion to the dosages given. The lactation-stimulating effects of small dosages of the hormone are explained as due to its stimulation of the anterior pituitary to the secretion of lactogenic hormone, while the lactation-inhibiting effects are thought by one group of workers to be the result of an overstimulation of the adrenal cortex.

The importance of hormones in udder growth and development has been shown experimentally. Mixner stimulated the mammary glands of virgin females to extensive lobule-alveolar growth by daily injection of estrogen (stilbestrol), and progesterone and indicated the need for both of these in causing complete mammary growth. Similarly, the British re-
searchers found that either natural or synthetic estrogen will cause teat growth in virgin females.

The theory that goats breed normally in the fall because the days (periods of light) are becoming shorter may have much practical logic. T. H. Bissonnette, in experiments at Trinity College, Hartford, and at Hillshire's Goat Farm, Killingly, Conn., has shown that breeding cycles in goats may be induced by artificially shortened days or inhibited by lengthened days. He also concludes that the annual "temperature cycle is not a major factor in environmental control of sexual or breeding cycles in goats."

Stimulation of extraseasonal breeding in does by use of gonad-stimulating hormones has been emphasized in experiments by Department workers at Beltsville. In a preliminary test, Ralph W. Phillips, Ralph G. Schott, and I found that a dose of 200 rat units, or four cubic centimeters of pregnant mare serum (PMS) was without effect, but a dose of 400 rat units was enough to bring dry does into estrus. Lactating does were more difficult to bring in heat than dry does. We made a second experiment with similar treatments, but followed by an examination of the ovaries; it revealed that follicular growth and ovulation were frequently produced without visible estrus. If this condition occurs naturally, it may explain the difficulty in getting some does bred.

The inconsistency of inducing estrus in anestrous does indicates a need for study of the physiological mechanisms controlling estrus in the goat. Dr. Phillips, R. M. Fraps, and A. H. Frank report that very small doses of estradiol benzoate (0.05 milligram) will induce estrus in spayed does. The duration of estrus increases as the dosage of estrogen increases, but the latent period (hours from injection to estrus) does not vary consistently with the dosage of estrogen. For full estrous response in laboratory rodents, estrogen should be followed with progesterone, but there is little evidence that this procedure gives the same reaction in the doe. On the contrary, progesterone seems to shorten the duration of estrus induced by estradiol benzoate. Once the factors involved in the production of estrus are clearly understood, the induction of estrus and ovulation properly synchronized in anestrous does will have practical possibilities.

Control of Hermaphroditism

Hermaphroditism or intersexuality occurs more frequently in milk goats than in any other farm animal. It is usually possible to recognize hermaphrodite kids at birth, but sometimes positive indications are not evident for several months. A colleague, O. N. Eaton, found in anatomical examinations that not only their external genitalia but also the internal structures resemble those of both sexes. Since hermaphrodites will not breed, failure to recognize the external manifestations of
this character results in disappointment and economic loss to breeders. Dr. Eaton and I, in several years of observation of the Department’s herd, calculated that 11.1 percent of the kids produced in the Saanen breed and 6 percent in the Toggenburg breed were intersexual.

Horned hermaphrodites are rare. In purebred herds where attention is given to the breeding of polled animals, the possible existence of a relation between the polled condition and the birth of hermaphrodites has economic significance. Eaton’s analysis of breeding data confirms the inheritance of intersexuality as a simple recessive and of hornlessness as a simple dominant. Close agreement was found between the observed number of horned and hermaphrodite animals and those expected if there is linkage between the genes for the hornless and hermaphroditic characters. If this genetic theory is correct, it suggests that breeders have been increasing the gene frequency for hermaphroditism. More important, it indicates that the elimination of hermaphroditism from goat herds should be fairly easy by the use of one horned parent in each mating. The rare occurrence of horned intersexes is believed to be due to the crossing over between the closely linked genes for hornlessness and hermaphroditism.

Feeding Milk Goats

Individual goats differ in their ability to turn feed into milk or growth. The variations may be due largely to individual differences in appetite and inherited ability to utilize feed. In the Department’s herd, milking does are fed at the rate of one pound of grain for each 4 pounds of milk produced. Thus, a doe that increases milk production with increased grain fed is permitted to demonstrate her maximum ability.

Because feeds vary considerably in composition, the nutritional requirements of animals can be more accurately expressed in terms of digestible nutrients than by pounds of feed in the ration. W. L. Gaines of the University of Illinois reports the development of a standard equation for calculating the feed requirements of milking goats. The equation is given as $DN = 0.016W - 0.3 FCM$, in which $DN$ equals the daily digestible nutrients intake in pounds, $W$ equals the live weight of the doe in pounds, and $FCM$ equals the daily milk energy yield in pounds of 4-percent milk. The milk production of a doe may be corrected to a butterfat basis of 4 percent by use of the Gaines-Davidson formula: $FCM \text{ (fat corrected milk)} = 0.4M + 15F$, in which $M$ represents the weight of milk and $F$ the weight of fat. By converting milk yields to a FCM basis more accurate comparisons of the productive abilities of individual does is possible.

To provide succulent feeds for milking does in winter, technicians at the New Jersey Agricultural Experiment Station stored green lawn clippings by thoroughly packing them in tight barrels with molasses as a
preservative. With 100 pounds of molasses to 1 ton of clippings, they prepared a silage on which does thrived.

We also know more about the need for proper mineral balance in rations for goats. Besides common salt, the minerals most likely to be deficient in feeds are calcium and phosphorus. The cereal grains and high-protein byproducts, such as wheat bran, linseed, soybean, and cottonseed meals, are relatively rich in phosphorus. Feeding cereal grains and protein concentrates with legumes of alfalfa, clover, lespedeza, or soybean hay that furnish calcium gives a ration that provides enough calcium and phosphorus. If necessary, mixtures of limestone or bone-meal one part, and salt, two parts, may be given to goats free choice. There have been no developments to indicate that vitamins other than A and D are needed in goat feeding.

**About Goat’s Milk**

Investigators recently have confirmed and added to many of the findings of J. A. Gamble, N. R. Ellis, and A. K. Besley. These Department workers found in 1939 that the milk of Saanen and Toggenburg goats resembles Holstein cow’s milk in percentage of water, lactose, fat, protein, and ash, although subject to greater variation with the advance of lactation than milk of either Holstein or Jersey. The percentage of total solids in goat’s milk ranged from 13.05 in February to 10.78 in August.

Goat’s milk shows a soft curd, small fat globules, and a rather high buffer index. It contains a high ratio of albumin and globulin to casein and greater quantities of the fatty acids, caproic, caprylic, and capric, than cow’s milk. Milk of both goats and cows is low in iron and copper, and in feeding tests nutritional anemia developed on the unsupplemented milk diets. The calcium and phosphorus content of the milks appeared satisfactory. In feeding trials with rats and guinea pigs, Gamble, Ellis, and Besley found goat’s milk similar to Holstein milk in vitamin A and D values, relatively high in vitamin B₁ (thiamine), and lacking in vitamin E. They also noted that spring and summer milk had more ascorbic acid (vitamin C) than did fall and winter milk, and that the exposure of milk to air and light materially reduced the ascorbic acid content. Both goat and cow milks were inadequate sources of ascorbic acid.

Because pasteurization of goat’s milk distributed for human consumption is now required by public-health authorities in many localities, its effects on nutritive values are important. According to Ellis and others, the solubility of calcium and phosphorus is slightly increased and the curd tension is reduced by pasteurization. This process improves the keeping quality more than the flavor of fresh goat’s milk. Pasteurization by holding the milk at not less than 142° F. for 30 minutes caused a decrease of from 33 to 45 percent in the content of reduced ascorbic acid. The phos-
phatase test, for the detection of improper pasteurization, is not applicable to goat's milk, as this enzyme is inactivated sufficiently to pass the test when the milk is heated only 5 minutes at 143° F.

Angora Goats

Texas, New Mexico, Arizona, Oregon, Missouri, Utah, and California lead in raising Angora goats. Because these animals can utilize certain types of vegetation that other livestock do not like, farms and ranches make millions of dollars annually from the production of mohair. A major part of the industry is concentrated in Texas, particularly the Edwards Plateau in the Southwest.

Mohair has luster, fineness, strength, and excellent spinning and dyeing qualities. In recent years many breeders have sacrificed quality (fineness) for large fleece weights; consequently, manufacturers contend that too large a percentage of coarse mohair is being produced. Despite this trend there is still a relatively large number of goats that yield mohair of fine quality that might be used more in breeding for finer quality mohair, provided breeders are encouraged to do so.

Selection of herd bucks with fine fleeces, free of kemp, is an important step in breeding for improved mohair quality. Kemp, a coarse, chalky white, stiff hair, will not take a dye, and the trade discriminates against it. Angora does selected for breeding should be well developed, carrying dense fine-quality fleeces relatively free from kemp, and showing distinct ringlets or flat locks, as contrasted to straight hair, which indicates a lack of fleece character. More attention needs to be given to constitution and development in selecting foundation stock, for without sturdiness there is no foundation upon which to breed.

Studies on the inheritance of type in Angora goats by the workers at the Texas Agricultural Experiment Station indicate that equally fine-quality mohair fleeces may be produced by flat-lock and ringlet types; also that fleece weights need not be sacrificed at the expense of average fineness. The average fleece weight per head produced during 12 months' growth by registered Angora does ranging in age from 1½ to 10 years was 7.8 pounds, and for doe kids was 4.7 pounds. Fleeces produced during the fall and winter are reported to be finer in quality than those produced on lush ranges during the spring and summer.

The Angora goat has not yet received full recognition as a meat-producing animal. Surplus animals in many herds could undoubtedly be utilized for meat purposes. On many southwestern ranches, goat meat, known as chevon, is eaten extensively and for years has been a popular barbecue dish.

Feed-lot and carcass studies of Angora goats made by the Texas station are probably the first of their kind. J. C. Miller, J. M. Jones, and
C. R. Burt report the feeding of Angora wethers in dry lot for 100 days. Average daily gains by yearlings, 2-year-olds, and 3- and 4-year-olds were 0.19, 0.12, and 0.16 pound, respectively, as compared with 0.31 pound by choice Rambouillet feeder lambs. The dressed yield of the wether goats ranging from 48 to 53 percent on an unsheared basis compared favorably with good to choice Rambouillet lambs. The goat carcass was surprisingly similar to fat lamb carcasses in the percentage of edible meat and bone. However, even the best goat carcasses lacked the thickness and plumpness found in medium to good lamb carcasses. The fat was lacking in uniformity of distribution. In palatability tests, chevon was rated favorably in juiciness and flavor.

It has been estimated that before the war 80 percent of all mohair grown in the United States was used in the manufacture of upholstery and wall and floor coverings. The rest went into yarns and fabrics for clothing. During the war, considerable quantities of the fiber were used in making sweaters, neckties, and socks. New markets for mohair may open: Upholstery for the new automobiles, airplanes, trains, and busses, in the new, modern homes, and in woven and knitted fabrics for clothing.

THE AUTHOR

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FOR FURTHER READING


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Drugs to Control Parasites, by Benjamin Schwartz, page 71.  
Developments in Sheep, by Damon A. Spencer, page 209.