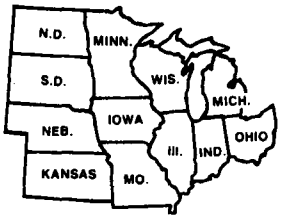
AG-FO-2533
Revised 1990

North Central Regional
Extension Publication 375



Angora Goats in The Midwest

R. M. Jordan

Angora goats and the mohair they produce are not major agricultural products in the United States and certainly not in Minnesota where there are fewer than 3,000 Angora goats. Flocks are small and often are owned by those interested in hand weaving. Nevertheless, mohair finds a ready market. In 1989, raw mohair prices in Texas were: kid hair (it's much finer), $6.50/lb; yearling hair, $2.00/lb; and adult hair, $1.00/lb. In addition, mohair incentive payments have amounted to $30 to $45 per head the past two years. These high hair prices are stimulating interest in goat production among an increasing number of Midwest livestock producers.

The United States (primarily Texas) produces about 10.0 million lb; South Africa, 15.0 million lb; and Turkey (original home) 16.0 million lb of mohair, clean basis. The United Kingdom takes 62 percent, France 9 percent, and Italy 9 percent of U.S. exports. Japan, Russia, and Western European countries are also big importers of mohair. Australia has recently imported some superior Angora breeding stock from Texas in an effort to improve the hair quality of its goats and stimulate production.

Angora goat production data applicable for the Midwest are scarce, and research from the Texas Agricultural Experiment Station (TAES) deals more with adult goats maintained under extensive grazing conditions. Data are lacking as to their husbandry requirements, reproductive potentials when kept under intensive conditions, and housing requirements. At one time, it was believed that Angora goats could not withstand cold weather. However, over 10,000 goats are kept in Upper Michigan, and Minnesota producers manage them much like sheep.

Characteristics of Angora Goats

- Angora goats are small in relation to dairy goats or sheep. Mature Angora nannies (does) weigh 80 to 100 pounds and, if fed adequately, produce 12 to 20 pounds of hair per year. Billies (males) weigh 90 to 120 pounds and shear 20 to 35 pounds of hair annually.
- Goats should be sheared in mid-September and again in mid-March. Shearing in September permits sufficient hair regrowth before severe winter weather and March shearing comes prior to kidding, when the nannies would normally be housed. While Angora goats with 2 inches of hair growth can tolerate sub-zero temperatures, they are not as immune to cold as sheep. Sudden temperature drops accompanied by wind and rain following shearing have resulted in high mortality (10 to 20 percent) in Texas.
- Goats require more frequent hoof trimming than sheep.
- Both sexes have horns. Texas and California producers favor horns. Under farm flock conditions, horns are a serious deterrent to management. However, attempts to "breed them off" by using polled dairy type goats has resulted in an excessive incidence of hermaphroditism. We have burned the horn buds off 2- to 3-week-old goats with success. Dehorning with caustic paste produced some mortality, possibly from licking the paste off each other. Rubber elastrator rings placed down over 1/8- to 1/4-inch of the skin at the base of the horn causes the horn to drop off in 3 to 8 weeks. This method works equally well with 6-month-old kids and 4-year-old nannies. Horns may also be sawed off. Horn removal, particularly by burning, destroys the scent glands at the base of the horn and reduces the smell of billies. Goats with horns need 1.5 feet or more of bunk space. (They can be vicious to one another with their horns.) Goats without horns need about 6 to 8 inches of bunk space and don't get entangled in woven wire fences or in their own hair.

Figure 1. High prices for mohair have stimulated interest in Angora goat production.

- Angora goats are not as prolific as sheep. Occasionally triplets are born, and possibly 15 to 20 percent will bear twins. A higher percent of mature nannies than mature sheep are barren. Fewer than 50 percent of our Angora kids, while fed well from birth on, kidded at 12 to 13 months of age. The kidding rate among our mature nannies that did kid, ranged between 120 and 140 percent. We conclude that Angora goats are much less prolific than sheep, owing to a much higher percent of open nannies, fewer twin births, and a much lower conception rate among 7- to 9-month-old nanny kids. However, nannies give adequate milk, are good mothers, and have little difficulty giving birth to 5- to 7- pound kids. Males reach sexual maturity at about 6 to 7 months. We have successfully used a 7-month-old billy as a sire.
- Goats appear to live and continue to produce 2 to 4 years longer than sheep.
- Goats are very susceptible to the same internal parasites as sheep. They have less ability to build up an immunity to *Haemonchus contortus* (stomach worms) than sheep. If goats, particularly kids, are not dewormed, mortality will ensue. Goats seemingly are more susceptible to coccidiosis than sheep. We use Corid or feed monensin or Bovatec to control coccidiosis.
- For Angora goats to express their remarkable genetic ability to produce hair, they must be fed well. Their smaller feed intake capacity relative to sheep creates a severe problem in providing adequate nutrient intake. They do not digest feed more efficiently than sheep (Texas research). Inadequate nutrient intake during gestation is much more apt to cause abortion than it is in sheep and in some flocks has been responsible for 30 to 50 percent of the nannies aborting.

Both male and female goats are seasonal breeders. The male commences rutting in the fall and is largely responsible for initiating estrus in the does. Well-grown-out doe kids reach puberty at 6 to 8 months, but usually fewer than 50 percent conceive. Hair production is reduced if does kid their first year.

The estrus cycle is 19 to 21 days long, and does remain in estrus for 24 to 36 hours (Texas). Gestation is 148 to 150 days.

Ovulation rate is significantly affected by condition and weight of the doe at breeding. Ovulation rate at first estrus is significantly lower than at subsequent estrus. In a study at TAES, does weighing 90 pounds or more usually produced twins. Does weighing 60 pounds or less produced no twins, and a very high percent did not ovulate.

Fetal weight accelerates after about 80 days and increases about .1 lb/day during the last two weeks. At birth, single males average 6.5 lbs; single females, 6.0 lbs; twin males, 6.0 lbs; and twin females, 5.5 lbs, with a range in birth weight from 4.5 to 7.5 lbs. Dystocia (difficult birth) among goats is rare.

Factors responsible for low reproduction efficiency in Angora does include: failure to ovulate or show estrus, 10-12%; not conceiving, 10-12%; conceiving but failing to kid (embryo loss), 8-9%; and kidding but failing to raise the kid, 18-22% (TAES).

Selecting Breeding Stock

Mohair is the product sold, and inherited traits affect the amount, uniformity, fineness of grade, and lustre of the fleece. Under the same environment and feed circumstances, the amount of hair produced per goat annually can vary 6 to 8 pounds due to superior breeding. The official score card used in evaluating goats gives equal value to body traits and to fleece traits. Fleece traits seemingly warrant 60 percent of the emphasis.

During the last ten years, several hundred Angora flocks have been established in the Midwest. However, only some 25 flocks of those are good sources of breeding stock.

When buying breeding stock to upgrade and enhance the productivity of your flock, establish minimum goals. Select bucks (billies) as yearlings with good size and conformation with fleece production records for the first two shearings. Select bucks from the top 20 percent of the crop that have sheared a minimum of 12 pounds in the two kid clips. In the fall, yearling does should weigh about 60 pounds and should have sheared a minimum of 10 pounds of hair in the first two kid clips. Try to develop a flock that will produce 16 to 20 pounds of hair annually rather than 10 to 14 pounds.

Recognize that while big Angora goats produce more kids and more hair, their hair is usually coarser, and is less valuable per pound. In the last 2 or 3 years, coarse hair has been in less demand. Therefore, a flock improvement program that includes the use of bucks with finer hair (micron of 35 to 38 rather than 42 to 45) may be in order.

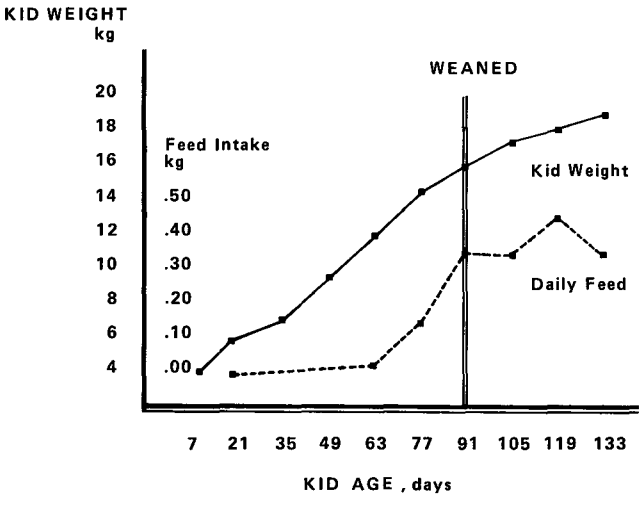


Figure 2. Growth pattern and daily feed intake of drylot-fed Angora kids.

Suggested Angora Goat Evaluation Guide	Points
Body—40 points	
Size, weight for age, and substances of bone (minimum weights: yearling bucks, 80 lbs; yearling does, 60 lbs)	20
Angora breed type (head, horns, ears, hair cover)	10
Conformation (width, length, and depth of body; level top line; and straight set of feet and legs)	10
Fleece—60 points	
Length of staple (one inch/month, uniform and high-yielding)	10
Fineness (uniform in grade over entire fleece)	15
Uniformity in type of lock (ringlet vs. flat lock), completeness of covering (neck, legs, and belly), and character of waves of staple	15
Luster and softness of fleece	10
Density of fleece (number of fibers per unit of area, minimum skin exposed when fleece is parted)	10
Disqualification:	
Body—dark horn or hoof; deformed mouth, feet, and legs; distorted horn; sway back; and abnormal testes and scrotum	
Fleece—excessive kemp; colored hair; sheepy fleece; lack of fleece on cannon bones	

Nutrition Requirements

Angora goat producers should obtain the best sources of nutrition information possible. The nutrient requirement data presented in table 1 are a modification of the nutrient requirements for goats suggested by the National Research Council (NRC) 1981. The NRC publication is the best compilation of data available but may not be specific for Angora goats under Midwest conditions; however, producers should use it to best determine how to feed their goats. Angora goats seemingly prefer high-quality grass hay to leafy alfalfa. Goats are not fond of clover pasture.

The data in tables 2 and 3 are based on research conducted at Minnesota with gestating and lactating Angora goats and with young Angora kids.

The nutrient intake values appearing in table 2 are for goats that weighed 10-20 pounds less than the goats for which values in table 1 were constructed. The hay diet and the 2:1 or 3:1 hay-corn diets were fed in different years, so a direct comparison between the diets is not intended. The data suggest that feed intake, of gestating goats as a percent of body weight, should approximate 3.2 percent when hay is the main nutrient source and 2.5 to 3.0 percent when 25 to 30 percent grain is included in the diet. It's also apparent that relatively high levels of grain can be fed gestating Angora does without adversely affecting either hair or kid production.

Table 3 contains data collected during five lactation periods that provide a picture of the response of lactating Angora does to various levels of grain feeding and the

Table 1. Nutrient requirements and typical rations for angora goats

Body wt., lbs	Daily wt. change, lbs	TDN, lb	Protein, lb	Ca, g	P, g	Vit. A, 1000's I.U.	Amt. diet to feed daily, lb	
Maintenance, summer dry period, early gestation							either	
							alf. hay	2:1 hay-corn
85-90 (15 lbs hair/yr)	0.0 to .05	1.40	.20	3	2	1.2	2.80	2.30
Late gestation, last 4-6 weeks								
							alf. hay	2:1 hay-corn
85-90	.10 to .20	1.80	.35	5	3	2.0	3.60	3.00
Lactation								
							2:1 hay-corn	1:1 hay-corn
85-90 (one kid)	0 to −.05	2.20	.40	6	4	4.0	3.70	3.40
85-90 (twin kids)	−.05	2.50	.45	6	4	4.0	4.20	3.80
Kids[a]								
							1:2 hay: corn-SBM	1:3 hay: corn-SBM
20-30	.10	.70	.15				1.00	.97
20-30	.20	.90	.20				1.30	1.25

[a]Research at the University of Minnesota indicates that weaned kids grain-fed in drylot do not eat this much feed or gain .20 lb daily. The kid grain diet should contain a minimum of 15% protein (20% SBM and 80% corn) plus alfalfa hay. During gestation, and particularly late gestation, feed intakes of 3.5 to 3.8 lb/doe daily (4.0% of their body weight) are difficult to achieve. Goats, when fed excess alfalfa hay, invariably refuse to eat all the leaves. This reduces nutrient intake below what was intended.

performance of does nursing twins or single kids. Three points are striking:

1. Lactating does are able to consume appreciably more feed daily than gestating does (4.0% vs. 3.0% BW).

2. Regardless of kind or amount of diet fed, lactating does usually lose weight during the first 8 weeks of lactation. The Total Digestible Nutrients (TDN) and protein intakes are in close agreement with table 1. To maintain weight during the first eight weeks of lactation, 90-lb does need about 2.5 lb of TDN and .45 lb of protein daily.

3. Nursing kids made satisfactory Average Daily Gain (ADG) (.31-.46 lb for singles, and .26 lb for twins), but their daily intake of creep feed during the 8-week period averaged less than .10 lb per kid. This indicates that kids are very dependent on milk and that increased ADG probably is better accomplished by increasing the does' milk yield by increasing their nutrient intake.

Table 4 contains a 3-year summary of methods of raising kids during the summer. Should they be weaned, creep feed, or fed in drylot or pasture? We have consistently noted ADG between 8 and 16 weeks to be about 50 percent as fast as ADG during the first 8 weeks. This is primarily due to nutrient intake from the milk declining faster than the nutrient intake from the creep feed increases.

Creep-fed kids nursing does literally full fed in drylot

Table 2. Effect of nutrition during gestation on the performance of angora does

Items	1982 and 1983 Hay diet	1983 to 1984 3:1 alf. hay-corn diet	1984 to 1987 2:1 alf. hay-corn diet
Days fed	77	77	128
No. does	11	11	70
Initial wt., lb	69.5	69.3	79.9
ADG, lb	.11	.10	.22
Daily intake, lb			
Alfalfa hay	2.1	1.2	1.6
Corn	.09	.48	.81
TDN	1.14	.99	1.52
Protein	.35	.24	.31
Feed, as % BW	3.1	2.4	3.0
Hair prod., 6 mos., lbs	7.5	7.5	7.5
Kidding rate, %	100	100	128
Weaning rate, %	100	100	118
Kid data			
No. kids	11	11	60
Birth wt., lb	6.4	5.9	6.6
Kid wt., 30 days, lbs	18.7	17.8	17.8

Table 3. Effect of nutrition on the performance of lactating angora does (56 days)

Items	1983 & 1984	1985		1986			1987	
	50% hay	50% hay	60% hay	50% hay-corn twins	50% hay-corn singles	70% alf. 30% corn	1:1 hay-corn	3:1 hay-corn
No. does	11	10	5	5	5	8	5	6
Initial wt., lb	83.6	84.5	85.8	107.4	95.0	99.7	96.8	106.9
ADG, lb	.06	.02	−.02	−.15	−.06	−.03	−.24	−.02
Daily intake, lb								
Alfalfa hay	1.80	1.69	2.05	2.05	1.69	2.50	1.64	2.84
Corn-SBM	1.94	1.67	1.39	2.05	1.69	1.12	1.64	1.19
TDN	2.38	2.20	2.13	2.64	2.20	2.09	2.13	2.35
Protein	.49	.48	.46	.46	.42	.47	.37	.53
As % of BW	4.5	3.9	4.0	3.8	3.6	3.6	3.4	3.8
Kid Data								
No. kids	12	10	5	10	5	8	7	9
Initial wt, lb	8.8	9.2	9.2	8.6	9.2	10.2	11.9	11.2
Wt. chg., lb	20.2	22.0	17.6	14.7	18.5	14.5	26.0	26.0
ADG	.361	.393	.314	.262	.330	.296	.462	.462
Daily intake, lb								
Creep feed	.11	.10	.09	.05	.10	.17	.21	.15
TDN	.077	.077	.066	.035	.073	.136	.161	.107
Protein	.018	.015	.013	.007	.015	.026	.035	.022

Table 4. Summer management of angora kids (summer of 1985, 1986 and 1987)

Items	Treatments		
		Drylot	
	Grazed with dams no creep	Weaned, creep fed	Not weaned, creep fed
Initial age, days	57	60	56
Days fed	70	70	70
Number of does	18	—	16
Initial doe wt., lb	98.1	—	95.9
Wt. change, lb	−5.5[a]	—	1.8[b]
Daily intake, lb			
TDN	—	—	2.09
Protein	—	—	.40
Kid data			
No. kids	20	16	16
Initial wt., lb	27.9	29.3	27.5
Wt. change, lb	10.6	10.6	14.3
ADG, lb	.154[c]	.154[c]	.198[d]
Creep intake, lb	—	1.03	.64
Creep intake/lb gain	—	6.69	3.22
Feed cost/doe[1]	$3.33	$1.67	$7.40
Feed cost/lb gain[1]	$.285	$.501	$.674

[a,b]P<.05.
[c,d]P<.10.
[1] Feed costs: Alfalfa hay and corn, $.04/lb; creep feed, $.05/lb. Pasture for lactating does and kids, $3.33/doe, and non-lactating does, $1.67/doe.

a 50 percent grain diet (2.1 lb TDN daily/doe) gain faster than weaned kids creep fed in drylot or unweaned, non-creep-fed kids grazing grass pastures (.2 lb vs. .15 lb/day). However, the high cost of feeding the lactating doe in drylot makes it the least economical management practice of the three systems tested. Kids' feed intake and ADG normally increase after their first shearing in September.

Relative Profitability

What is the profit potential of Angora goats in relation to sheep? Hair price, hair production per head, weaning rate, attrition level of mature nannies, and production costs per year are the major factors affecting goat profitability. With sheep, weaning rate and rate of lamb gains are the major factors determining profitability. While nutrient intake and internal parasites affect hair production, they have more affect on lamb gains. With sheep, successful lambing and lamb gains are paramount and wool production of minor consequence. With goats, hair is the major product. Reproductive rate in goats is also important as it affects the number of kids available to produce the high value hair. A producer can affect weaning rate of sheep but can do little to change the world price of mohair.

Table 5 provides a simple comparison of the relative profitability of the two species. No credit is given for the kids other than for the hair they produce at the first two shearings. No incentive payment for either wool or mohair is included. Currently the incentive price of mohair is over $5.00/lb. No capital costs are included.

Admittedly, some sheep producers market over 200 lb lamb/ewe bred and some goats produce less than 10 pounds of hair/goat. But the relative figures are realistic and suggest that goat flocks that are low in productivity may be more "profitable" than sheep flocks that are low in productivity. Conversely, well-managed, highly productive sheep flocks seem to have more profit potential than similarly managed goat flocks. The striking point is the similarity in profit potential, at 1987 prices, between the two species.

If the mohair incentive ($30 to $40/head), which is much larger than the wool incentive ($7 to $10/head) were included, goats would present a more profitable picture.

Table 5. Relative profitability of sheep and angora goats[a]

Items	Sheep		Goats	
	Low production, low prices	High production, high prices	Low production, low prices	High production, high prices
Gross income/head				
Fiber	8 lb @ $.60/lb = $4.80	10 lb @ $.70/lb = $7.00	10 lb @ $2/lb = $20.00	16 lb @ $2.50/lb = $40.00
Offspring	100 lb @ $.60/lb = $60.00	175 lb @ $.75/lb = $131.25	7 lb kid hair @ $6/lb = $42.00	10 lb kid hair @ $6/lb = $60.00
Total income/head	$64.80	$138.25	$62.00	$100.00
Year-round feed[b] costs for dam and offspring	$60.00	$ 70.00	$42.00	$ 49.00
Net return/female kept over feed costs	$ 4.80	$ 68.25	$20.00	$ 51.00

[a]An incentive payment that is paid on both wool and mohair **is not** included in these values. Both are sizable and approximately equal (100%). The value of the kid(s) at time of second shearing **is also not included.** Actually, there is no established marketplace, and prices of shorn 12-month-old kids can vary from $10 to $100/head.

[b]A doe and her kid raised to 12 months of age (kid sheared twice) require about 70 percent as much feed as a ewe and her lambs raised to 6 months of age. Goat feed costs were calculated on that basis.

North Central Regional Extension Publications are subject to peer review and prepared as a part of the Cooperative Extension activities of the thirteen land-grant universities of the 12 North Central States, in cooperation with the Extension Service—U.S. Department of Agriculture, Washington, D.C. The following states cooperated in making this publication available:

University of Illinois
69 Mumford Hall
1301 W. Gregory Drive
Urbana, IL 61801
217-333-2007

Iowa State University
112 Printing & Publ. Bldg.
Ames, IA 50011-1050
515-294-5247

Michigan State University
10B. Ag. Hall
East Lansing, MI 48824-1039
517-355-0240

*University of Minnesota
3 Coffey Hall
St. Paul, MN 55108
612-625-8173

University of Nebraska
Dept. of Ag. Communications
Lincoln, NE 68583-0918
402-472-3023

North Dakota State University
Ag. Comm., Box 5655, Morrill Hall
Fargo, ND 58105
701-237-7881

South Dakota State University
Ag. Comm. Center, Box 2231
Brookings, SD 57007
605-688-5628

*Publishing state

For copies of this and other North Central Regional Extension Publications, write to: Publications Office, Cooperative Extension Service, in care of the University listed above for your state. If they do not have copies or your state is not listed above, contact the publishing state as specified.

R.M. Jordan is an extension animal scientist-horses/sheep, Minnesota Extension Service and a professor, Department of Animal Science.

In cooperation with NCR Educational Materials Project.

Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and Cooperative Extension Services of Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Patrick J. Borich, Director of Minnesota Extension Service, University of Minnesota, St. Paul, Minnesota 55108.