FORAGE BASED DAIRY GOAT MANAGEMENT

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Pastures have not typically been utilized for milk production with dairy goats. Well, goats have been put on pastures, but for the most part, pastures have not been managed to be the major source of high quality forage for the dairy goats. Often, pastures were not fertilized and allowed to mature. Goats were usually fed hay and they nibbled some pasture as they wanted to. There is little published information about pastures for goats - a little from Mexico on brushy pastures with low levels of milk production and some from France which is in French. Nonetheless, there are a few goat producers in the US who are utilizing pasture for their milking goats.

Most of the information available for dairy production on pastures comes from dairy cow research. There has been a renaissance in pastures for dairy cows, mostly with the smaller dairies. The chief reason for going to pastures is reduced feed costs and increased profitability of the operation even though milk production levels are reduced. One economic study showed that pasturing dairy cows improved profitability as much as using bovine growth hormone. Another benefit of pasturing has been improved animal health and reduced health expenses. This is probably a consequence of reduced production level and animal stress and the benefit of sunshine and fresh air. However, the level of management required is much higher because the pastures must be managed as intensively as the animals. An additional benefit is less barn cleaning and less time required to take care of animals since the time required for feeding is reduced.

Some international literature has shown that pasture can affect the quality and flavor of cheese made from cow milk. There is virtually no work on this subject in dairy goats. Another potential benefit is that the concentration of conjugated linoleic acid in cow milk is increased by pasture. The less grain used, the greater the concentration of conjugated linoleic acid. Conjugated linoleic acid is a compound in milk that has been identified as being anticarcinogenic (prevents cancer)and antiatheroschlerotic (prevents the clogging of arteries). It is the only animal product that has been identified as an anticarcinogen. Also, since organic grain is very expensive, organic goat milk could be produced cheaper on organic pasture since a minimum of grain would be required.

Pasture management is of paramount importance if milk production from pastures is to succeed. The goal of pasture management is to supply high quality pasture starting at the beginning of lactation and maintain high quality forage in sufficient quantities throughout the lactation. The forage must be high in quality and be available when animals are lactating. Unless you are quite far south, you are unlikely to have any pasture growing between mid-December and mid-March. Therefore, it would be difficult to have pasture for kidding in February. For most of Oklahoma, cool season annuals such as wheat start producing in mid-March and kidding should be timed accordingly. Wheat and other cool season annuals (rye, oats) have the high quality that is necessary for high levels of milk production. Alfalfa is a good high quality pasture, but has the disadvantage of being later in the season (grazing beginning mid-April) and high cost of pasture establishment. Outside of alfalfa, goats like few legumes. In our experience, goats eat little of white, red, crimson, or arrowleaf clover. However, they seem to love Berseem clover, which can be overseeded with wheat. Berseem clover provides high quality forage between wheat and crabgrass. We have multiple pastures of wheat and Berseem clover. In late spring, we disk a pasture every week or two and overseed crabgrass/sudan grass into them. By staggering the planting, we can have an

uninterrupted supply of high quality forage. Crabgrass is one of the highest quality warm season grasses. There are a number of other warm season grasses that are appropriate, including Johnsongrass, millet, and sudangrass. We are planning on including annual lespedeza into our warm season pastures. We have begun using cowpeas for late summer grazing. They grow well in the hot dry summer and provide high quality forage that the goats relish.

One needs to adjust to the grazing behavior of goats. Initially, when goats were put to pasture, they bawled for the barn and alfalfa hay. After 4 or 5 days, they finally decided to accept their fate and put their heads down to graze. We have had to learn which forages dairy goats do well on and which ones are not appropriate. Initially, the goats did not like the cowpeas, but after 4 or 5 days, they decided they loved them. Goats love the Berseem clover. Water is provided in each pasture. It would be good if the water could be shaded in the hot summer to keep the water and goats cooler. Also, a portable shade is provided. It was built on a hay wagon undergear and has a corrugated metal roof about 8' off the ground and is 12 × 24', which provides sufficient shade for 50-60 goats. It was our intent to put a mineral box on the portable shade. We are experimenting with other crops for milking goats such as Puna chicory. Crops meriting investigation include perennials such as orchardgrass, which would improve sustainablility and reduce tillage needs.

We have conducted two years of research grazing dairy goats. This study also involved different levels of grain supplementation. Milk production for these two years are shown in Figure 1. This is averaged over all levels of grain which will be discussed later. The lactation curves look fairly normal, but milk production is much lower for the first year than the second year. This can be attributed to three factors. First, goats were in lower body condition in year 1 and did not have adequate body reserves for the following lactation. Another factor was that we had some gaps in our forage system, i.e., there were some times that we did not have adequate amounts of high quality forage available for grazing. Also, we had problems with internal parasites the first year that surprised us. The problem was that the dewormer that we used did not work. Since animals in the confinement part of our operation are on concrete during lactation, they do not pick up many internal parasites and therefore we did not realize that the dewormer was not working. Does were pastured October through early March when cold weather reduced parasite problems. We did not realize that our dewormer was not working until we grazed goats during the warm, moist spring. We learned from our mistakes the first year and had much better levels of milk production the second year.

Internal parasites are one of the biggest problems in using pastures for dairy goats. The first problem is that you are limited in that which dewormers can be used for lactating animals (Panacur, Valbazen, Eprinex, and Rumatel). We have dewormer resistance to the first two dewormers, but the latter two dewormers are quite effective for us. Ivermectin and Cydectin are secreted in the milk for a long time and should never be used in lactating animals. Fecal egg counts must be done every 3 weeks to stay on top of the parasite problem. Dairy does should be dewormed when fecal egg counts exceed 800 eggs per gram. Pasture rotation and the tillage of pastures helps to reduce pasture contamination. Another practice that would be useful is grazing another animal species (such as horses or cattle) on the pasture following the goats. These animals would consume the larvae and clean up the pastures. Another practice that reduces larva contamination is to make hay after grazing.

Table 1 shows the effect of different levels of grain supplementation on milk production. We calculated that animals should be able to consume enough pasture to produce about 3.3 lb of milk per day and planned on three levels of grain supplementation for milk produced above this amount. One treatment had no supplemental grain such as one may use if organic milk or high CLA milk is to be produced (treatment D). The second grain level was 1/3 lb of grain for every lb of milk over 3.3 lbs (treatment C), and the third level was 2/3 lb of grain for every lb of milk over 3.3 lbs (treatment B). Treatment A is our control where animals are in the barn and fed alfalfa hay and grain

at the same level as treatment B. We fed an additional pound of grain to treatments A, B, and C the first 8 wk of lactation as lead feeding. Does were limited to no more than 4.4 lb of grain per day to prevent acidosis. In the first year, milk yield declined with grazing and grain level, although as discussed previously, prekidding body condition was an important factor. In the second year, milk production of grazing goats with the lower level of grain supplementation was similar to control animals in the barn. It is not known why the higher level of grain supplementation produced lower levels of milk. Also in Table 1, the lactation curve characteristics for each treatment and year are shown. Does in year 1 had lower peak yields, especially with lower levels of grain because the peak yield occurred earlier than in the second year. Milk yields peaked earlier because does exhausted body reserves sooner since they had lower body condition. Persistency (ability to sustain milk production) was also lower for goats fed lower levels of grain. In the second year when does were in better body condition, milk yield peaked at similar levels for all treatments. Peak yield tended to occur earlier in the goats being fed pasture alone, probably a consequence of energy limitation. Persistency of all treatments was similar during the second year. Milk production responded to grain, but not dramatically. Figure 2 shows that milk production increased by 1.7 lb for every added pound of grain supplement fed. Also, it shows that animals were able to produce about 3.3 lb of milk with no grain, although, some animals on the study did much better.

Fat percentage of milk tended to be lower for animals with no grain supplementation (Table 1), probably reflecting the energy restriction of animals on this diet. Protein and lactose followed a similar trend presumably for the same reason. Despite this limitation, cheese made from milk produced on pasture alone or with the low level of grain was shown to have higher flavor scores.

In conclusion, dairy goats on pasture can have acceptable levels of milk production with some minor changes in milk composition, especially where grain supplementation is absent. Grazing dairy goats requires additional management demands, especially for the pasture. In areas with quite dry summers, irrigation may be necessary to insure an uninterrupted supply of forage. Internal parasites need to be monitored and controlled. For the production of organic milk or high milk high in conjugated linoleic acid, goats may produce significant levels of milk from high quality pasture alone. Pasture may offer potential for producing cheese with unique flavors.

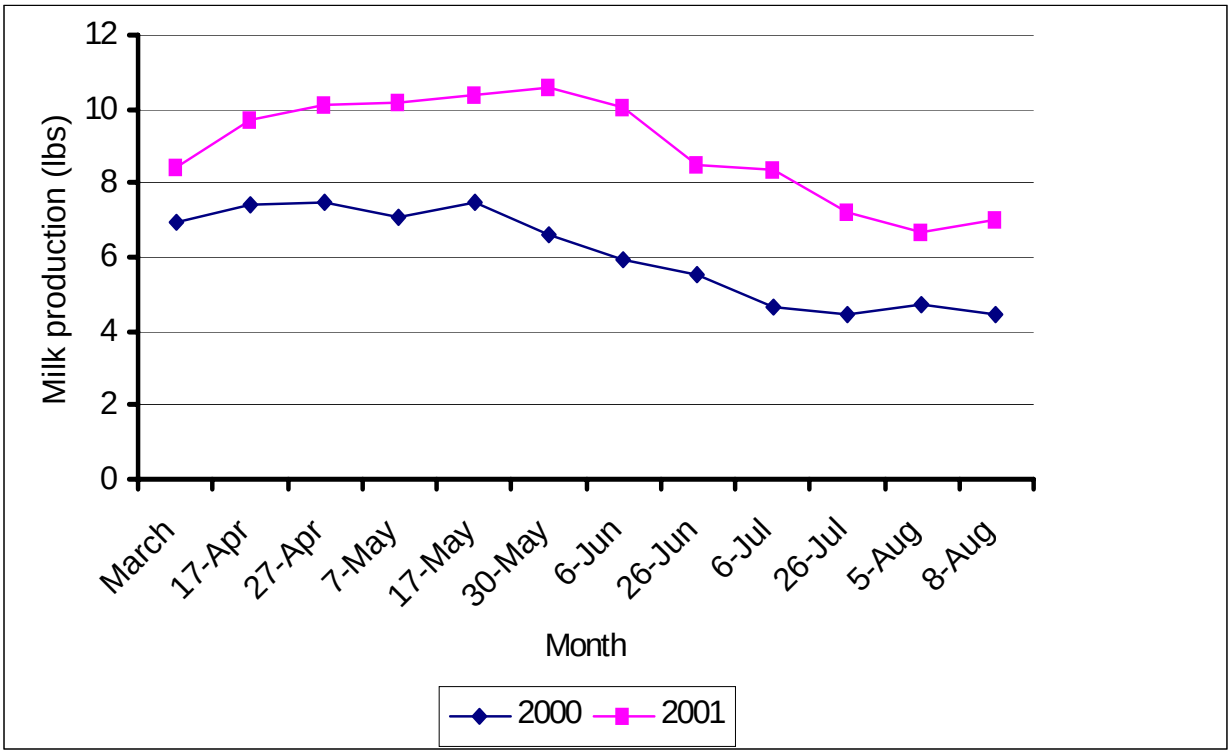

Figure 1. Lactation curve for dairy goats over two years

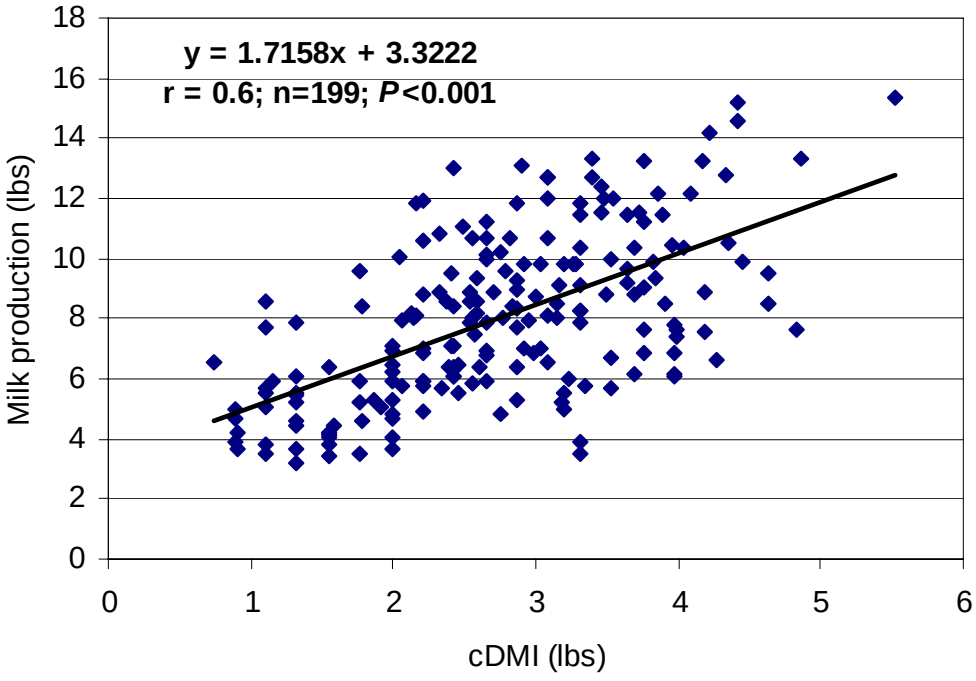

Figure 2. Effect of level of grain supplementation on milk production

Table 1. Milk production of grazing goats with different levels of grain supplementation

Item	Year	Treatment A	B	C	D
Milk production (lb/day)	1	7.55[a]	6.47[b]	5.65[c]	4.73[d]
	2	8.91[a]	8.05[b]	9.17[a]	7.74[b]
Lactation peak (lb/day)	1	8.8[a]	8.1[b]	7.7[b]	7.3[b]
	2	12.1	10.3	11.2	10.1
Days to peak	1	44[a]	32[b]	32[b]	22[c]
	2	41	37	40	36
Persistency	1	6.52[a]	6.18[b]	6.06[b]	5.64[c]
	2	6.34	6.32	6.37	6.22
Composition					
Milkfat (%)	1	3.11	3.16	3.17	3.03
	2	3.23[a]	3.16[a]	3.11[a]	2.99[b]
Protein (%)	1	3.05[a]	3.12[b]	3.19[b]	3.04[a]
	2	3.18[a]	3.07[b]	3.01[b]	2.80[c]
Lactose (%)	1	4.09[a]	4.14[a]	4.10[a]	3.99[b]
	2	4.16[b]	4.24[a]	4.19[b]	4.00c

[*]Treatment A = control group confined in the barn and fed alfalfa hay supplemented with 2/3 lb of grain for each pound of milk over 3.3 lb/day; Treatment B = grazed on pasture and supplemented with 2/3 lb of grain for each pound of milk over 3.3 lb/day; Treatment C = grazed on pasture and supplemented with 1/3 lb of grain for each pound of milk over 3.3 lb/day; Treatment D = grazed on pasture alone, no grain supplementation.

[a,b,c]Means without a common superscript are significantly different ($P < 0.05$).

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