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Development of a Niche Market: The U.S. Dairy Sheep and Goat Industries

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Introduction

Today's agricultural market is shifting in its productive patterns. With the advent of "exotic" consumptive trends, new niches have been created in all aspects of our society. Both the dairy sheep and goat industries are poised on a market that could unfold into a new awakening in production capabilities. Three ingredients are essential in the creation of a new niche market: customer demand must be there for specific products, an agricultural product in high enough numbers to support a fledgling industry and a manufacture/distribution base to supply the demand. The first criteria is definitely in place. The specialty cheese consumer is here and is being supplied by an international importation market at this time. The manufacturing/distribution base is at a grass roots level. We have large numbers of well-trained cheese makers who could easily expand their product base to include "exotic" and blend cheeses. Currently a cottage-type industry has developed to produce sheep and goat cheese. Now we are left with the need to fill the fluid milk demand. It has been a slow gradual increase in the quantity and quality of product.

Dairy Goat Production

When discussing milk production today, the term milk seems to be synonymous with the dairy cow. This is especially prevalent in the United States where over 10 million cows produce more than 150 billion pounds of milk annually. Yet if the world market is assessed, more people consume goat milk than from any other animal species.

Currently it is estimated that there are over 500 million goats worldwide producing an estimated 4.8 million tons of milk that is consumed on a local level or produced into cheese and yogurt. Though there are no real goat census statistics, there are between 4-9 million in the United States. The best estimate of state numbers come from DHIA members. California has the largest number with 35%, followed by Oregon, Wisconsin, Washington, Arizona, New York and Pennsylvania. These states contain almost 75% of all DHIA record dairy goats. Most of the original dairy goat breeds originated in Europe. Anglo-Nubian goats comprise 75% of animals; of the remaining animals: Alpine 35%, Toggenburg 25%, Saanen 21%, LaMancha 6% and other breeds make up 13%.

Goats differ in many ways from dairy cows. Seasonality of breeding and milk production occurs in goats. The milk production between February to May accounts for 80% of the fluid milk market. The peak is in March with 27%. Thirty-five percent of lactations were

at least 305 days in length, averaging 1,978 pounds of milk and 73 pounds of fat with a 3.7% fat average (this varies by breed and environment). There also can be a difference in milk production reflected in prolificacy. Saanen does delivering twins produce 27% more milk during the first 50 days of lactation than if a single birth had occurred. Those producing triplets give 47% more milk than a single birth. These differences persisted at least until 150 days of lactation. It is thought that increased levels of placental lactogen related to these multiple births resulted in increased mammary development and function.

Goat Industry Facts

- Goat milk contains a more easily digested fat and protein content
- Increased protein digestibility has formed a niche market in infant, convalescent and allergic-based diets
- Goat milk has an excellent buffering quality and is frequently recommended for ulcer patients
- Goat milk can often successfully replace cow milk in allergic patients
- Goat milk is extremely important in developing niche cheese and fluid milk specialty markets
- Curd Tension:
 - Goat range 10-70 grams
 - Cow range 15-200 grams
- Goat milk is more naturally homogenized:
 - Goat fat globules = 2.0 UM
 - Cow fat globules = 2.5 – 3.5 UM
- Goats are seasonally polyestrous
- Goats regularly deliver twins, triplets and even quadruplets

Somatic cell count (SCC) is another aspect of goat's milk that is important. The somatic cells in milk are considered an indicator of both the mammary health and the quality of milk produced. Somatic cell counts differ between goat and cow milk. Generally the goat has a normal SCC level much higher than cows. This does not reflect a disease state but a difference in milk composition. Also goat milk can easily develop off flavors if the herd is not properly managed. Genetics of a specific goat, consumption of strong flavored plants, medicines and milk handling can impart these off flavors; however, in the well-managed herd, taste differences are minimal between the two species. Table 1 below lists differences in milk composition between goat and cow milk.

Table 1. Comparative Composition of Milk

| Component | Goat | Cow |
|-------------------------|-------------|------------|
| % Fat (varies by breed) | 3.8 | 3.6 |
| % Solids – not fat | 8.9 | 9.0 |
| % Lactose | 4.1 | 4.7 |
| % Protein | 3.0 | 3.0 |
| % Calcium | 0.19 | 0.18 |
| % Phosphorus | 0.27 | 0.23 |
| P/CA | 1.4 | 1.3 |
| Vitamin A (iu/g fat) | 39 | 21 |
| Vitamin B (ug/100 ml) | 68 | 45 |
| Riboflavin (ug/100 ml) | 210 | 159 |

With the development of a niche specialty market, the product base is of extreme importance. There is a need for product diversity as well as depth of product line.

Table 2 lists common goat cheeses currently marketed in the U.S. by either domestic or overseas suppliers.

Common Goat Specialty Cheeses

- Cottage
- Pot Cheese
- Neufchatel
- Cream
- Queso Blanco
- Romano
- Provolone
- Cheddar
- Brick
- Blue

Dairy Sheep Production

Currently in the world it is estimated that over 100 million sheep are used for milk production. France and Spain produce the largest quantities. Europe is by far the largest producer of sheep milk, cheese and yogurt. France currently milks approximately seven million cows, one million goats and one million sheep. In Spain 5 million sheep are milked commercially. Italy and Greece are also leaders in production. Currently in Minnesota, Wisconsin and Nebraska milking sheep numbers small but growing. Fifteen years ago this industry was non-existent.

France has the most economically developed dairy sheep industry. Though prices may vary, sheep's milk may bring from \$35-65 /cwt as compared with \$15-25/cwt for goats milk. In France the sheep are milked for 205-210 days (December-July) with a production of about 130 liters or 286 pounds per ewe. The production of milk comes from more than 3000 sheep milk producers (mostly in the area of Rodez, France) who milk an average of 220 ewes apiece. Sheep milk in the United States brings approximately \$60-65/cwt.

The primary end product of sheep milk dairying is cheese. It takes only about 4 pounds of milk to produce a pound of cheese where as it takes 8-10 pound of cows milk to produce a pound of cheese. Wisconsin currently has the only large-scale sheep cheese processing plant in the North Central Region, the Montchevre cheese plant in Belmont.

There is another producer, the Wisconsin Sheep Dairy Cooperative but their numbers as yet are small. These two markets consume $\frac{3}{4}$ of the milk produced while $\frac{1}{4}$ is consumed for on farm cheese and yogurt production.

Direct marketing is becoming a larger market for many producers. However quality control must be extremely high to be competitive with the European market products. In Minnesota there are about 6-8 sheep milking operations while Wisconsin has around a dozen. Sheep dairying is suited to production on small farms where forage based production is the key to economic success. Sheep and goat producers are currently riding a crest in the specialty cheese market. Blending of cheese (sheep and cow or sheep and goat) can produce some extremely rich cheeses. Sheep's milk contains 200% more fat, 40% more protein and 30% more total solids than cow's milk. It has the ability to impart a distinctive texture, flavor and aroma to cheese. The U.S. imports over 65 million pounds of sheep cheese annually worth in excess of \$115 million wholesale. These cheese types are: Manchega from Spain, Ricotta and Picorino from Italy, Feta from Greece and Roquefort from France. Yogurt from sheep is even more profitable, rating very high in consumer preference tests.

The "Holsteins" of the sheep industry are the East Friesians, a German dairy sheep breed. Though these animals have an extremely high milk production, they are rare in the United States. The U.S. Department of Agriculture has severe import restrictions leading to decreased numbers and a diminished gene pool. Currently one of the few sources of this breed is from Canada. This low genetic diversity has been a limitation to the

industry. However, Friesian cross ewes have twice the production of Dorset ewes currently used in this country. Dorset ewes produce between 100-150 pounds of milk in 120 days of lactation. The introduction of 25% East Friesian breeding will double this production to 220-250 pounds in the same time period. Purebreds average 4.8 pounds per day milk production. The East Friesian breed is also very prolific with a lambing percentage of 220-230. Management of lamb weaning differs greatly from goat and cow dairies. Sheep are weaned at 30 days then started into the production milking string on many operations.

Sheep Industry Facts

- Sheep's milk contains 6-8 % fat and 5-7% protein
- There are approximately 100 sheep dairy farms in the U.S.
- In 1994 66 million pounds of sheep's milk cheese was imported into the U.S. with a value of \$118 million.
- Sheep's milk is higher in total solids than goat or cows milk
- Sheep's milk sells for \$65/cwt but sheep produce less milk
- Crossbred ewes in a Wisconsin study milked 3 pounds per day over a 150 day lactation.
- Freezing and storage of sheep milk does not hurt its cheese production capabilities
- Specialty Cheese products: Feta, Manchego, Romano and Roquefort
- Cheese makers can produce twice as much cheese from a pound of sheep's milk as cow's milk but the sheep's milk costs four times as much
- Blended cow, sheep and goat milk cheeses hold the most promise in the specialty cheese market; the quality is there and the price is reduced

One problem currently limiting commercial milk production is milking time. Producers are currently limited by the number of sheep that can be milked per hour. In the U.S. it can take over three hours to milk 100 ewes. In contrast, French farms milk 300 ewes per hour in peak production and over 400 ewes per hour in declining lactation.

Milk composition is extremely important in understanding sheep cheese production (See table 3). With the current U.S. production base it can easily be noted that blended cheeses have the greatest ability for profitable success. The sheep milk would impart specialty characteristics to the cheese, using either cow or goat milk as a blend would allow a more profitable end product.

Table 2. Milk Composition (%)

| Constituent | Sheep | Cattle | Goat |
|--------------|----------------------------|-----------|-----------|
| Fat | 6.0 – 9.0 (7.9 average) | 3.6 – 4.8 | 3.4 – 4.5 |
| Protein | 5.5 | 3.2 | 3.7 |
| Casein | 4.3 – 4.6 | 2.9 | 2.9 |
| Albumin | .9 – 1.1 | 12.6 | 12.9 |
| Ash | .9 | .8 | .8 |
| Total Solids | 18.2 | 12.6 | 12.9 |

(Reproduced from Sheep Dairying in the U.S., University of Wisconsin, 1993)

Sheep breeds as discussed above, vary greatly in respect to production and lactation lengths. Currently we are relying on mixed breed sheep for maximizing sheep production levels. Two breeds, East Friesian and Awassi are the most productive and have the longest lactation periods of the dairy breeds (see Table 4). As can be seen, production is directly dependent on genetics and as such is currently our primary limitation.

Table 3. Milk Production in Dairy Sheep Breeds

| Breed | Lactation Length (Days) | Milk Yield (kg) |
|------------------|-------------------------|-----------------|
| East Friesian | 260 | 550 – 650 |
| Awassi | 250 | 150 – 500 |
| Chios | 160 – 260 | 180 – 200 |
| Sarda | 180 – 210 | 110 – 250 |
| Garfagnana | 180 – 210 | 120 – 150 |
| Massa | 180 – 210 | 150 – 160 |
| Serra de Estrela | 200 – 230 | 100 – 120 |
| Churro | 150 | 45 – 75 |
| Manchega | 90 – 150 | 50 – 125 |
| Lacume | 100 – 210 | 130 - 200 |

(Reproduced from Sheep Dairying In the U.S., U of Wisc. 1993)

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