# QUALITY MILK MANAGEMENT

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## Introduction

Quality milk is produced to predetermined standards, some are regulated other standards are set by the producer and processor. Measurements such as bacteria levels, somatic cell count, butterfat, protein and others are dependent upon management strategies implemented during milk harvest. Pre-milking hygiene procedures influence both bacteria counts in milk and incidence of infection. At the same time, adding steps to milking routine can reduce milking parlor profitability. How to manage for both quality and profitability can be a challenge.

Until recently sheep dairying did not have a strong scientific background in the development of sound quality production methods. It is only since the mechanical milking of sheep was introduced in France in 1962 that research on sheep milking has been undertaken in most European countries where sheep are kept for dairying (Bencini, 1997). Quality of sheep milk refers to its capability to be transformed into high quality dairy products, and to produce high yields of these products from each pound of milk. High protein, fat and total solids concentrations in the milk are associated with high yields in the resulting dairy products. However other measures of quality such as Somatic cell count (SCC), Bacteria count (Standard Plate Count –SPC) and freezing point also influence the quality of manufactured products like cheese and yogurt. As a consequence, the milk of sheep has a higher yield of dairy products than the milk of cows and goats because it has higher concentrations of protein, fat and total solids. Once the milk is harvested and delivered to the cheese maker there is little to be done to improve milk quality. The milk received should be of high microbiological quality, free of antibiotics and have quality components (fat, protein) within acceptable limits.

Farm factors influencing milk quality include biosecurity, milking procedures, milking system performance, environment & housing, nutrition, culling, record keeping and monitoring milk quality parameters, and treatment protocols.

## Biosecurity in Dairy Flocks

Biosecurity refers to the management practices that are undertaken to prevent the introduction and spread of diseases. The introduction of new animals poses the single greatest risk to biosecurity. Anytime a new animal is introduced to the flock, there is a potential risk of that animal introducing a new disease. You should not purchase animals from flocks or farms in which you observe lameness, abscesses (contagious lymphadenitis), sore mouth, ringworm, or other clinical signs of disease. Other diseases that may be of concern and affect productivity and milk quality include Q fever, Johne's disease, *Staph aureus* and mycoplasma mastitis. When planning flock expansion consult with a veterinarian with expertise in small ruminant health and management.

## Milking Routine and Procedures

Although the distinction between these two terms is not universally recognized, milking routine can be described as “the system by which milkers move through a milking parlor”. Milking procedures are appropriately defined as “the steps that define the routine” (e.g. cowside activities performed by each milker). Prep time has been defined as the time to manually clean and dry the teat surface. Strategies for milk harvesting and sanitation vary around the world. Specific milking procedures such as pre dipping and forestripping have been proven to be beneficial to improve milk quality. There is mounting evidence that pre-milking procedures to stimulate milk let down improves milk yield although this concept is not universally accepted. Apparently the milk let down reflex of sheep is complicated and the exact stimuli to maximize milk let down and harvest milk efficiently is not clearly elucidated.

Milk quality goals of the manager dictate the number and type of milking procedures utilized within a milking routine. Milker training is crucial to successful milking parlor management. Ewes can be milked by hand or by machine, regardless of the method use, hygiene is of primary importance. Ewes are usually milked on an elevated platform from the rear. There are several different designs for parlor milking systems. Each design has its advantages and disadvantages as discussed earlier. Difficulties in managing the sanitary quality of sheep milk derive from a series of factors including the low level of production per head, the milking system, the difficulty involved in machine milking, the conditions under which the herds or flocks are raised, adverse climatic conditions and the spread of production over a wide geographic arear (Klinger 1997). In the absence of pasteurization, all cheeses made from raw milk should be subjected to strict periodic controls.

## Somatic Cell Count

The health of the sheep in general, and of the mammary glands in particular, influence both the quantity and the quality of the milk produced. The most common pathology of the mammary gland in sheep dairies is mastitis, an inflammation of the udder caused by infection of the mammary tissue. Mastitis is economically important for sheep dairies because it reduces milk production and causes qualitative changes in milk composition which alter the processing performance of the milk and the qualitative characteristics of the dairy products obtained. This is due to a decreased capacity of the mammary secretory cells and to an increased permeability of the mammary epithelium that causes the passage of blood components directly into the milk. The somatic cell count is correlated with the health of the mammary gland though the somatic cell count and the bacteria count of the milk are not necessarily correlated. The somatic cell count (SCC) is a regulated measure of milk quality in the US (upper limit = 750,000 cells/mL) and represents the level of the inflammatory reaction in the face of infection. The SCC a component of the innate immune defense of the mammary gland, and number of somatic cells increases considerably in the event of an inflammatory reaction within the mammary gland

The milk of dairy cows and sheep suffering from mastitis does not clot and is not suitable for cheese production. A high somatic cell count results in changes in the composition of milk, with a reduction in fat, casein and total solids, and an increase in total nitrogen, non-protein nitrogen and whey proteins. Milk minerals have also been reported to change, with increased chloride and

decreased phosphate, citric acid, potassium and magnesium, and a consequent increase in pH. These changes are also accompanied by a deterioration of the clotting parameters such as rennet-ing time, rate of curd formation and curd consistency, and a reduced cheese yield due to an in-creased loss of fat in the whey. More research is required to establish if high somatic cell counts are of relevance to the manufacture of sheep milk cheese.

**Bacterial Count (Standard Plate Count)**

The regulated bacterial count in milk is due to the presence of microorganisms some of which can be advantageous for transformation into cheeses (Lactobacillus spp., Lactococcus spp., Streptococcus spp.), while others can cause human diseases (e.g. Listeria, Salmonella, Bru-cella), problems in the maturation of the dairy products (e.g. Enterobacteriaceae, coliforms, psy-chrotrophs, Clostridium spp.). Psychotropic bacteria such as pseudomonas and paenibacillus thrive at temperatures below 7oC and produce lipolytic and proteolytic enzymes which destabi-lize the casein micelles and alter the clotting properties of milk. Enterobacteriaceae and coli-forms are generally of fecal origin and ferment the lactose in the cheeses producing large quanti-ties of gas, causing early spoilage of the cheese.

**Environment & Housing**

When confined to a building, a bred ewe requires 12 to 16 square feet of living space. Lamb-ing pens should be 16 to 25 square feet in size. In group housing, a ewe with her lambs needs 16 to 20 square feet. Feeder lambs need 8 to 10 square feet. Less space is required if sheep are raised on slatted floors or if they have access to an exercise area or pasture. Shearing before housing will allow stocking rates in the barn to be increased by up to 20%.
(http://www.sheep101.info/201/housing.html)

Table 1. Recommended housing space (square feet) for sheep and lambs.

| Sheep | Dirt lot | Open shed | Confinement (dirt floor) | Confinement (slatted floors) |
|---|---|---|---|---|
| Bred ewe | 20 | 8 | 12 to 16 | 8 to 10 |
| Ewe with lambs | 25 | 12 | 16 to 20 | 10 to 12 |
| Ram | 20 | 8 | 20 to 30 | 14 to 20 |
| Feeder lamb | 15-20 | 6 | 8 to 10 | 4 to 6 |

Source: Midwest Plan Service, Sheep Housing and Equipment Handbook, 1982

Adequate ventilation is necessary to provide a healthy atmosphere in the barns. Acceptable bedding materials should provide a clean, dry and comfortable area for resting.

**Milking system performance.**

Milking system performance should be checked according to manufacturer's specifications. Performance should be evaluate at least annually using methods established by the National Mastitis Council.

## Nutrition

Metabolic disease can be a common problem in early lactation in most dairy ruminant species. Common problems such as ketosis/pregnancy toxemia can endanger the life of the ewe and greatly limit milk production. Ensuring that ewes have a balanced diet which includes minerals and vitamin supplementation that meets her nutritional needs is extremely important. They rec- ommended that the energy and protein content of the ration must be adequate to support mainte- nance as well as milk production. Assuming 7% fat content in milk, the production of each liter of milk requires 1.7 Mcal, or 7.1 MJ, of metabolizable energy. Excessively high doses of concen- trates can reduce the intake of fiber and therefore reduce chewing times and rumen pH. This can depress milk production and reduce the concentration of fat in milk probably because they cause rumen acidosis.

## Culling

Culling may be the only means of managing some ewes that are compromising milk quality. Animals with clinical mastitis unresponsive to therapy or with contagious pathogens such a *Staphylococcus aureus* are obvious cull candidates. Ewes with udder conformation issues that make milking difficult or are a mastitis risk should also be considered for culling.

## Record keeping and monitoring milk quality parameters

All flock managers should develop production and quality goals for their dairies. At the very least measures of milk quality (BMSCC, Standard Plate Count) should be recorded on a regular basis to allow for early recognition and intervention if and when problems occur.

## Treatment protocols

Concise records of treatments and identification and segregation of treated animals should be kept. The Food and Drug Administration (FDA) has specific record keeping requirements for food producing animals.

## References


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