Nathan 2/5/99
RSA8 History

Modern Milk Production

by Nathan Shepard

I. Definitions
   A. Milk- (n) mixture of water, fat, protein, sugar, and inorganic salts. Contains all amino acids, calcium, and phosphorous, Vitamin A, and carotene
   B. Pasteurization- (n) partial sterilization accomplished by raising the milk to a temperature high enough to destroy all disease-causing bacteria. Does not destroy all bacteria. The remaining are harmless and have retarded growth when stored in low temperatures; however, they can cause unpleasant flavors and odors.
   C. Homogenization- (n) process in which milk is forced through a thin filter to evenly distribute the fat throughout the milk. Vitamin D is sometimes added during this process.
II. Steps in Producing Milk
   A. Grassland Production
      1. Climate and soil
         a) 5-10°C minimum temperature
         b) Abundant rainfall or irrigation
         c) Perennial Ryegrass
            (1) Best grass for grazing cows
            (2) Best grass for conserving the soil's nutrients
         d) Nitrogen- place in soil to help fertilize it
   B. Feeding Dairy Cows
      1. Regular Feeding: Food Constituents
         a) Water
         b) Hay
            (1) Making Hay
               (a) Cut
               (b) Dried naturally by wind and rain in recovering fields or in a barn
               (c) Stored for winter feeding
                  (i) Ventilation

(ii) Moisture
(iii) Cool temperature

(2) Good for conserving grasslands

c) Grazing systems
(1) Continuous grazing
(2) Rotational grazing
(3) Paddock grazing (many small areas grazed one per day)
(4) Strip grazing (constantly moving electric fences to evenly graze the field every day)

d) Dry Food
(1) Organic
(a) Proteins
(b) Oils
(c) Fiber
(d) Carbohydrates
(e) Vitamins
(2) Inorganic
(a) Minerals
(3) 2.5-3 kg of dry food per 100 kg of cow per day

2. Winter feeding
a) Cows forage for themselves in bulk feeding
b) Feed(hay) is distributed in the field or in the barn
(1) Barn- use stocks
(2) Field- use tractor
c) Water distributed to the cows
(1) In stocks- in a long traugh
(2) In the field- cows have to come near the barn to get water

C. Milking
1. One minute of increasing flow followed by a period of maximum flow, then a period of decreasing flow until milk runs out
2. Ideal to milk every 12 hr.s
3. Milking machines
a) Vacuum sucking milk from the teat
b) Regulator allows rest periods to avoid damage to the teat and keep blood flow moving

D. Processing
    1. Original inspection and conveyance
        a) Stored in 23 liter jar and accepted or discarded upon visual inspection of the milker
        b) Taken to the dairy and pumped for milk against the vacuum
    2. Pasteurization
        a) Invented in 1865 by Louis Pasteur when trying to discover a way to prevent the fermentation of wine and milk
            (1) He also disproved spontaneous generation, studied Silkworms and Anthrax, submitted a theory of disease relating to the germ, and found a vaccine for Rabies
        b) The process of heating milk to a temperature between 55° and 70° C (131° - 158° F) to destroy harmful bacteria without materially changing the composition, flavor, or nutritional value of the liquid
    3. Homogenization
        a) The process of forcing milk through a filter in order to spread the globules of fat evenly throughout the liquid
    4. Circulation cleaning
        a) Cold-water rinse
        b) Circulation of a hot detergent and disinfectant mixture through the liquid
        c) Cold-water rinse
        d) Top 10 liters disposed of
    5. Acidified-Boiling-Water process (ABW)
        a) Cleans out pipes, containers, and other frequently used purifying instrument quickly and thoroughly
        b) 14-18 liters of boiling water mixed with 1 liter of dilute nitric or sulphamic acid
E. Distribution and Storage
    1. Kept until next morning in vacuum at temperature under 4.4° C, stored only 30 minutes after the morning milking
    2. Collected every morning in refrigerated bulk tanks and distributed to local stores where it is tested again.

3. At all times in a vacuum and in a temp under 4.4° C in order to retard reproduction of bacteria