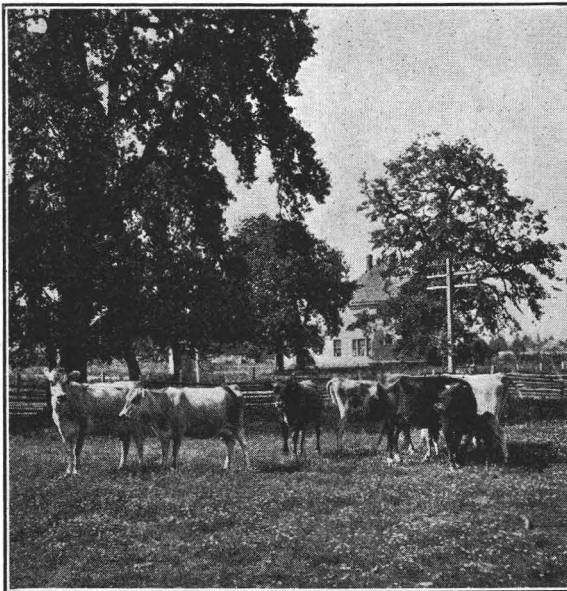


The Production of Milk and Cream of High Quality

By

G. H. WILSTER



**Oregon State Agricultural College
Extension Service**

Corvallis, Oregon

Cooperative Extension Work in Agriculture and Home Economics
Wm. A. Schoenfeld, Director
Oregon State Agricultural College and United States Department of Agriculture, Cooperating
Printed and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914

OREGON's quarter of a million dairy cows produce annually more than $1\frac{1}{2}$ billion pounds of milk. The average yearly farm cash value of the milk produced for the years 1926 to 1930, inclusive, was approximately \$20,000,000. At present, about one third of the milk is used as fluid milk, nearly one half is used for butter, and the remainder is used in the manufacture of cheese, condensed and dried milk, and ice cream.

The production of this milk on nearly 50,000 farms is a large task. Many factors must be considered if a product is to be marketed that will yield the greatest returns to the producer. Dairy products, to find favor among consumers, must have (1) good flavor, (2) attractive appearance, and (3) uniform composition from day to day. They must be free from (1) undesirable bacteria and (2) foreign matter.

Responding to a request from producers in different parts of the state for a short, concise outline of the factors which must be considered in the production of the best quality of milk and cream, the Extension Service has prepared this bulletin which it is hoped will be of some value, especially to the younger people engaged in the production of milk and cream.

Ten important factors are covered in condensed form. Briefly, these factors may be summarized as follows:

1. COWS—health, cleanliness, period of lactation.
2. FEED—type of feed, weeds.
3. BARN—construction, ventilation, lighting, sanitation.
4. MILK AND CREAM HOUSE—construction, ventilation, lighting.
5. SURROUNDINGS—yard, drainage, location of hog pens, etc.
6. UTENSILS—construction, cleaning, storing.
7. MILKER—health, cleanliness, clothing.
8. MILKING MACHINE—condition, cleaning, care.
9. SEPARATOR—condition, how and when cleaned, care.
10. COOLING AND STORING MILK AND CREAM—cooling in water, refrigerated water, air, absorption of odors, contamination with dirt, insects, etc.

Ten Factors in the Production of Milk and Cream of High Quality

1. Cows.....

HEALTH.....	Keep only healthy cows. Do not sell milk from cows that suffer from tuberculosis, Bang's disease, or mastitis. Discard bloody milk or milk containing pus.
PERIOD OF LACTATION.....	Many cows late in their lactation periods produce bitter or salty milk. There is no remedy for this. The cows should be dried up.
GENERAL CONDITION.....	Dirty cows will mean dirty milk; dirt will fall into the milk pail. Clip flanks during winter. A dirty udder should be washed, then wiped with a clean, dry cloth.

2. Feed.....

SUCCULENT FEED.....	Tainted milk results from feeding kale, silage, rape, turnips, and other strong-flavored succulent feeds one half to three hours before milking. Feed after milking to avoid tainted milk.
DRY FEED.....	Grain or hay ordinarily does not taint milk. A large proportion of alfalfa hay in the ration will cause a pronounced flavor in the milk. Weeds in hay may taint the milk.
CONDITION OF FEED.....	Tainted milk may result from feeding moldy or decomposed feed.
WEEDS.....	Remove cows from weed-infested pastures several hours before milking. Eradicate wild onion, tar weed, scale weed, and other strong-flavored weeds.

3. Barn.....

CONSTRUCTION.....	Select a well-drained location. The floor of the cow barn should be of cement or water-tight wood, the walls and ceiling should be smooth. Avoid dust-collecting ledges and rafters.
VENTILATION.....	Provide an abundance of fresh air so as to remove feed and other odors and keep the barn dry. Provide 500 cubic feet of air space for each cow.
LIGHTING.....	Allow three or four square feet of window space for each cow. It is easy to clean a well-lighted barn.
SANITATION.....	Locate the manure pit 50 feet from the barn. Clean the barn twice daily. Sweep the floor and sprinkle it with superphosphate, or lime. Remove uneaten feed from the mangers. Remove dust and cobwebs. Spray to kill flies.

4. Milk and
Cream
House.....

CONSTRUCTION.....	Select a well-drained site for the milk house. The floor should be water tight. Use either concrete or wood, and provide good drainage. Other desirable features are tight, smooth walls and ceiling; screened doors and windows; racks for cans, pails, strainers. The building should be vermin proof.
VENTILATION.....	A good air circulation prevents odors and helps to dry the utensils and prevent rust. A ceiling ventilator is desirable.
LIGHTING.....	Provide plenty of light. The window space should be equal at least to 10 per cent of the floor space.

5. Sur-
round-
ings.....

YARD.....	Grade the surroundings to facilitate drainage. Remove all trash. Manure belongs on the manure pile.
DRAINAGE.....	By means of a sloping concrete or tile drain waste can be conducted some distance from the premises.
HOG PENS, CHICKEN COOPS, TOILETS.....	Locate hog pens, chicken coops, and outdoor toilets a distance of 100 or more feet from the barn and milk house.

6. Utensils..

CONSTRUCTION.....	Use well-tinned utensils. Discard utensils that have cracked seams and that are pitted and rusty. Milk pails of the hooded type are best.
METHOD OF CLEANING.....	There are four steps in properly cleaning utensils: (1) RINSING, (2) SCRUBBING, (3) STERILIZING, (4) DRYING. A soda washing-powder is best. Do not use soap. Use clean brushes, not dish cloths. Use boiling water or steam in a cabinet, if possible, for sterilization. Other methods are: (a) immersion in hot water (170° F.) for 15 minutes, or (b) exposure to a chlorine solution containing 100 parts per million of available chlorine. Strainer cloths, if used, should be washed, then boiled.
STORING.....	Keep utensils <i>in</i> the screened milk house on racks. Invert cans and pails. Hang strainer cloths on a line to dry.
CONTAMINATION OF MILK BY UNSTERILIZED UTENSILS.....	Unsterilized utensils may contaminate the milk with millions of bacteria. Improperly washed strainer cloths are a menace to milk and cream quality.

7. The
Milker.....

HEALTH.....	Milkers and milk handlers should be healthy and must not attend persons affected with contagious diseases. Periodic health examinations of milkers and milk handlers should be required when market milk is produced.
HANDS.....	Wet-hand milking is filthy. Before milking, wash hands with soap and water, then dry them with a clean towel. Wash the milk stools.
CLOTHING.....	Use coveralls and a cap during milking. Wash them often.
CONTAMINATION OF MILK BY DIRTY HANDS.....	Dirt will add millions of bacteria. Do not soil hands during milking.

8. Milking
Machine.....

CONDITION.....	Discard old and soft rubbers. Checked or split rubber teat-cup liners or tubes cannot be cleaned.
METHOD OF CLEANING.....	Wash the machine after each milking. Rinse with cold water, then brush all parts, using warm water containing an alkali washing powder. Rinse in warm water. Place parts in hot water, 170° F., for 15 minutes or immerse them in a chlorine solution containing 100 parts per million of available chlorine.
CARE OF PARTS.....	Leave the parts in the water or chlorine solution until the following milking or remove them to a rack to dry.
CONTAMINATION OF MILK BY UNCLEAN MACHINE.....	Milk containing thousands of bacteria per cubic centimeter results from using unwashed and unsterilized machine parts. Milk containing few bacteria can be produced when a clean and sterilized machine is used.

9. Cream
Separa-
tor.....

CONDITION.....	All parts of the separator bowl and the covers should be either well tinned or made from a rust-proof material such as stainless steel. Discard broken or dented parts; they are difficult to clean.
METHOD OF CLEANING.....	The State Law requires that the separator parts be washed within three hours after the separator has been used. Rinse the parts first in cold water then wash in warm water containing an alkali (not soap) washing powder. Use a brush, not a dish cloth. Rinse all parts with BOILING water.
CARE OF PARTS.....	Place the sterilized parts on a rack to dry. Cover with a clean muslin cloth to protect against dust.
CONTAMINATION BY UN- WASHED SEPARATOR BOWL.....	A separator left unwashed over night will contaminate the milk the following morning. The cream and the skimmilk may contain several million bacteria per cubic centimeter. Separator slime may contain several billion bacteria per gram.

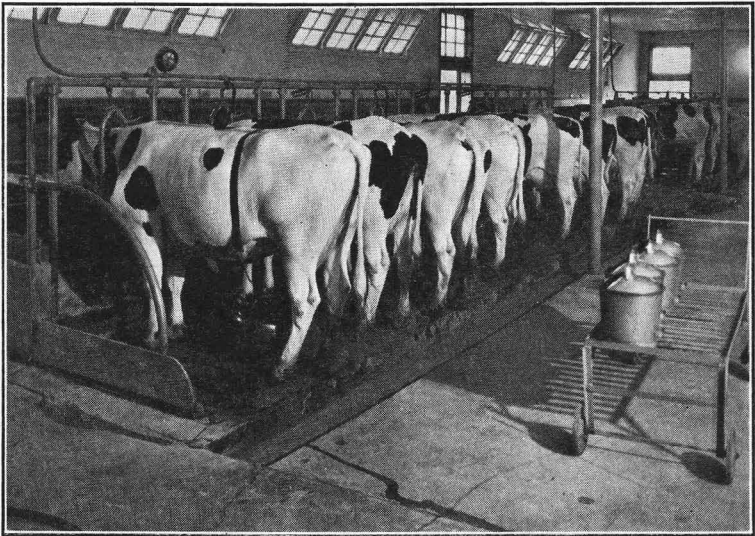
10. Cooling,
Storing.

MECHANICAL REFRIGERATION.....	Milk in ten-gallon cans cools from 95° F. to below 50° F. in one hour when set in 35° F. circulated water. Cream held in five-gallon cans set in circulated water, at a temperature of 35° to 40° F., cools from 80° F. to 56° F., in one hour and remains sweet and of good quality for three days.
COOLING IN WATER.....	With a surface cooler, using water as the cooling medium, the cooled milk in the can will be only a few degrees above the temperature of the cooling water. Experiments with cooling in a can placed in a tub of water at a temperature of 54° F., with the water flowing into the bottom of the tub and leaving at the top at a rate of four gallons per minute, showed that 80 pounds of milk could be cooled from 90° to 58° F. in 90 minutes. To cool cream, use flowing water, the colder the better. Set the can of cream in this water. Do not mix warm and cold cream.
COOLING IN AIR.....	Air is a poor conductor of heat. Air cooling is therefore an inefficient method. Bacteria grow rapidly in warm milk and cream.
ABSORPTION OF ODORS.....	Milk and cream absorb odors readily. Keep the products away from odors of gasoline, unclean barns, musty cellars, and strong-flavored fruits and vegetables.
SCREENING CANS.....	Cover cans of milk and cream, when held over from one day to another, with clean wire screens or tea towels.
GROWTH OF BACTERIA DURING STORAGE.....	Tests at the Oregon Agricultural Experiment Station showed that bacteria increased in milk in 24 hours from 8,000 per c.c. to 10,600 per c.c. at 42° F.; to 42,000 per c.c. at 52° F.; to 730,000 at 60° F.; to 179,000,000 at 72° F., and to 218,000,000 per c.c. at 98° F.

CLEAN MILK AND CREAM

Clean milk and cream containing a minimum number of bacteria can be produced by—

1. Having clean barns, clean cows, clean hands and clothes.
2. Using clean, sterilized pails, strainers, cans, and separators.
3. Using flowing water, as cold as possible, for cooling.
4. Protecting the milk and cream from dust, insects, and vermin.

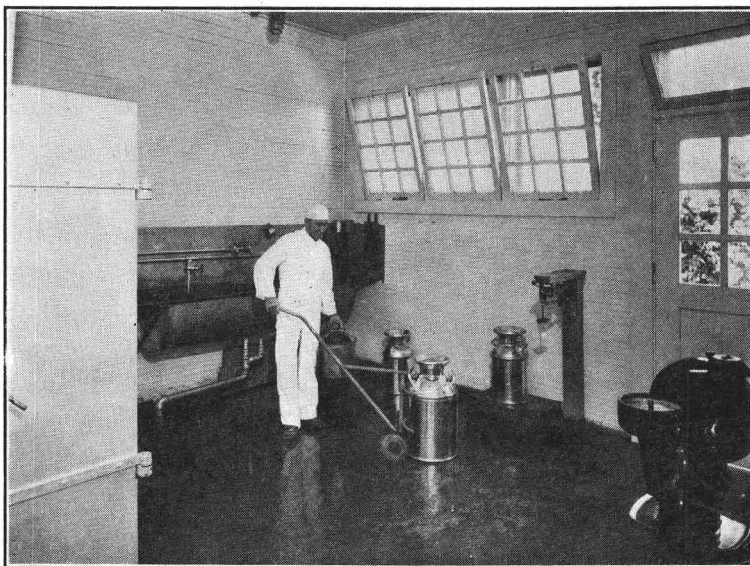


HIGHER QUALITY —————>

CLEAN MILK AND CREAM

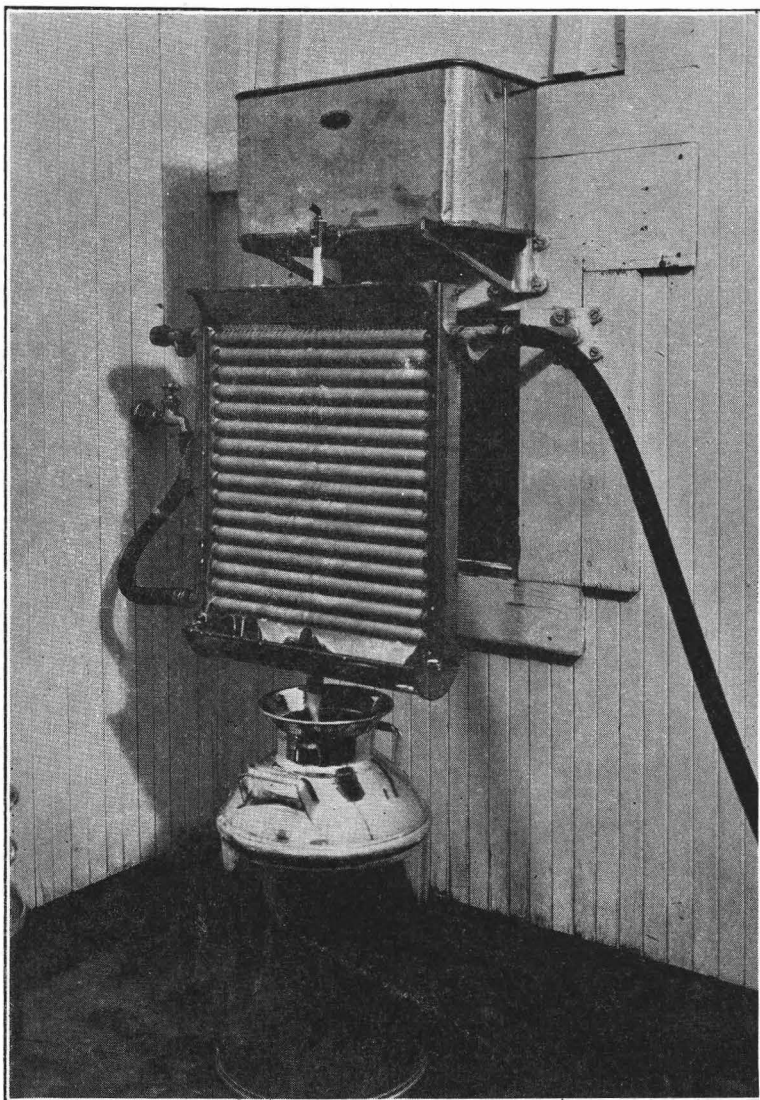
Below: Interior of a sanitary milk and cream house.

At left: An example of a clean barn, clean cows, and sanitary milking utensils.



→ HIGHER PRICES

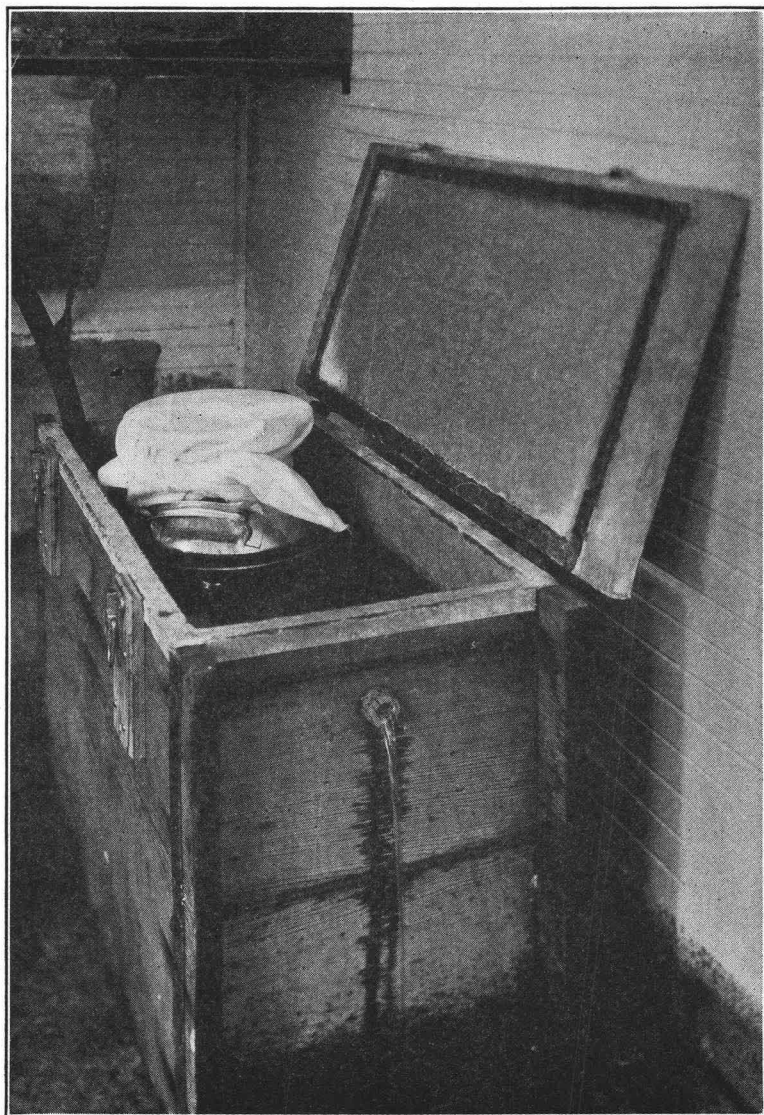
COOL AS QUICKLY AS POSSIBLE



Cooling milk by a surface cooler—an efficient method.

HIGHER QUALITY —————>

COOL WITH WATER—Flowing if Possible



Cooling cream in flowing water—an efficient method. Note clean tea towel over mouth of can.

→ HIGHER PRICES

CARDINAL POINTS IN THE PRODUCTION OF MILK AND CREAM

1. Use milk from healthy cows. The milker should be free from contagious disease.
2. Strong-flavored feeds should not be fed to cows less than three hours before milking.
3. Milk that is bitter, salty, or bloody should not be used.
4. The milking should be done in a clean barn. Protect the milk from dust.
5. The cows should be clean. Clip udders and flanks.
6. If soiled, wash and dry the udder before milking. Always wipe the udder with a clean, damp cloth before milking.
7. The milker's hands should be clean and dry. Wear clean clothes while milking.
8. If a milking machine is used, it should be clean and free from bacteria so that the milk does not become contaminated.
9. Use a hooded, well-tinned pail for milking.
10. Remove the milk from the barn as soon as it has been obtained from the cow.
11. Strain the milk through a cotton disk pad.
12. Wash and sterilize the separator bowl after each separation.
13. Use clean, sterilized cans for milk and cream.
14. Cans and other utensils should be free from cracks, holes and rust.
15. Cool milk and cream as quickly as possible to 50° F. or below.
16. Do not mix warm and cold cream. Such a practice will favor bacterial growth. The warm cream should be cooled first.
17. Keep milk and cream at a temperature between 40 and 50° F. until shipped to creamery or milk plant.
18. The air in the room where milk and cream are handled and kept should be free from objectionable odors.
19. Cover cans of milk and cream with clean screens or tea towels while they are stored.
20. Keep the cleaned and sterilized utensils on racks in a screened room when not used.
21. Deliver milk and cream to the dairy plant as often as possible.
22. Protect cans of milk and cream during transportation against dust and the direct rays of the sun. Use a wet blanket as a cover during the summer.