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Standard Practices in Producing Milk and Cream



The University of Nebraska Agricultural College
Extension Service
and

United States Dept. of Agriculture Cooperating
W. H. BROKAW, *Director*, LINCOLN

Standard Practices in Producing Milk and Cream

M. L. FLACK AND P. A. DOWNS

IT is estimated that many thousands of dollars could be added each year to the income of dairymen in Nebraska by improving the quality of milk and cream and other dairy products. Poor-quality milk or cream in each instance means a direct loss to the farmers. Milk and its products are inseparably linked to the welfare of the nation and to the normal growth and development of its people. Nutrition specialists state that a normal growing child to be properly nourished should consume approximately a quart of milk daily during the years of rapid growth, and that every adult should consume at least a pint of milk daily, or the equivalent in butter, cheese, and ice cream. Therefore, improving the quality of milk and cream on Nebraska farms not only adds to the financial income of the farmers, but also contributes to the health of Nebraska people.

An Opportunity

Nebraska has a milk and cream quality improvement program. The 4-H Dairy Calf Club boys and girls can play an important part in advancing and pointing out the approved methods of producing high-quality milk and cream. This circular is intended to acquaint members of 4-H Dairy Calf Clubs, club leaders, and others with not only the importance of quality in milk, but also with the essential steps in arriving at ways and means of improving one of Nebraska's most important farm products. The practices outlined offer many suggestions for 4-H Club demonstrations.

There are fifteen brief outlines of approved practices for the improvement of milk and cream included in this circular.

1. Maintaining General Sanitary Conditions on Milk or Cream Producing Farms.
2. Maintaining Sanitary Conditions in Barns and Yards.
3. Maintaining Sanitary Conditions in the Milk House.
4. Preventing Objectionable Flavors and Odors in Milk.
5. Cleaning and Caring for General Milk Equipment.
6. Cleaning Milking Machines.
7. Cleaning the Cream Separator.
8. Keeping Cows Clean.
9. Milking.
10. Cooling, Storing, and Transporting Milk or Cream.
11. Testing Milk for Bacterial Content.
12. Testing Milk for Sediment.
13. Testing Milk or Cream for Flavor and Odor.
14. Maintaining the Health of the Dairy Herd.
15. Testing Cream for Sediment.

In each instance the left-hand column gives the procedure, and the right-hand column the standard accepted practice.

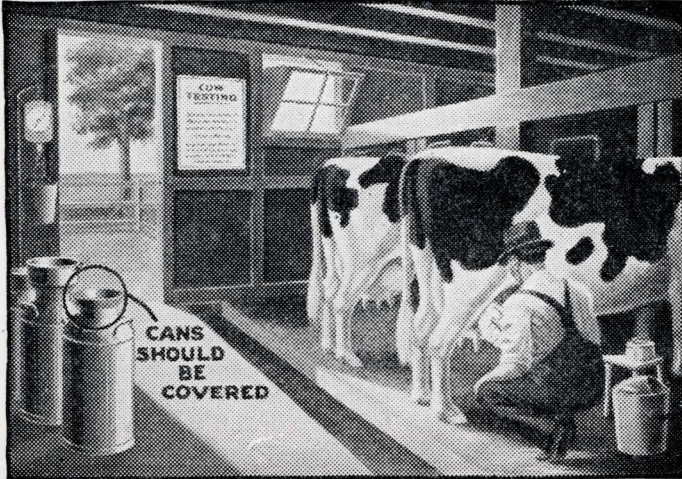
Practice I.—Maintaining General Sanitary Conditions on Milk or Cream Producing Farms.

Procedure	Standard Accepted Practice
1. Guard against human contamination of milk.	Arrange for periodical medical examination of each person on the farm to determine whether any person may be a "carrier" of typhoid, tuberculosis, or other infectious disease. Allow no person who has a contagious or infectious disease or who has sore throat to come in contact with milk or milk utensils. Consult a physician on suspicious cases of sickness.
2. Guard against contamination of water supply.	Have water tested yearly or oftener for possible presence of harmful bacteria. Do not use water from contaminated supply; locate and remove, if possible, sources of contamination. Have wells or cisterns tightly covered and curbed to prevent entrance of surface drainage, dust, or dirt.
3. Control flies.	Remove accumulations of manure daily or at intervals of not more than a week and spread on fields or place in a tightly closed or screened manure pit equipped with a fly trap. Remove droppings from barnyard, lanes, etc., at least once a week. Use effective fly sprays and fly traps.
4. Keep the premises clean.	Allow no piles of decaying refuse to accumulate.

Practice II.—Maintaining Sanitary Conditions in Barns and Yards.

Procedure	Standard Accepted Practice
1. Provide adequate light in barn.	Allow 4 square feet of window space per stall evenly distributed in the barn.
2. Provide adequate ventilation in barn.	Allow 500 cubic feet of air space per stall. Control ventilation either by an adjustable flue system or by windows hinged at the bottom. Avoid drafts or strong air currents.

CLEAN COOL CREAM DELIVERED OFTEN WILL MAKE HIGHER PRICES



Clean Cows and Barn help produce Clean Milk, which, if milked into a partly closed-top pail and strained quickly, will keep sweet a long time.

3. Keep barn clean.

Have manure removed twice daily at least one hour before milking time. Feed dusty feeds after milking, or long enough before milking to allow dust to settle out of the air. Keep barn cleared of dust and cobwebs. Have walls and ceilings painted or whitewashed at least annually.

4. Keep yards clean.

See that yards are drained away from barns and water supply and that yards are free from mud holes. Remove droppings at least once a week. Standard materials for surfacing yards are gravel, cinders, or concrete.

Practice III.—Maintaining Sanitary Conditions in the Milk House.

Procedure

Standard Accepted Practice

1. Control flies.

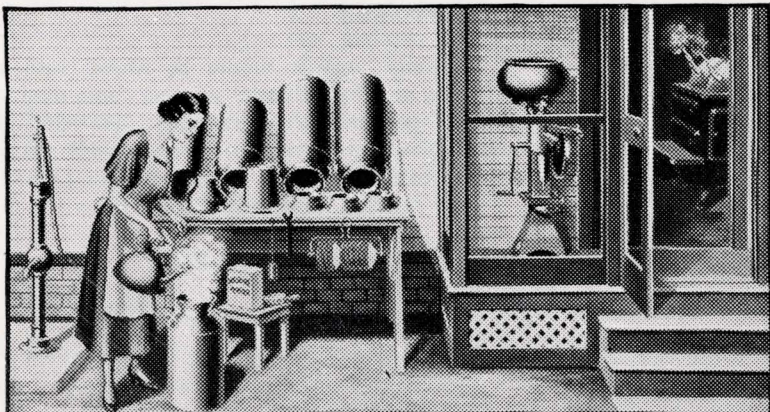
See that doors, windows, and other openings are tightly screened. Have screen doors open outward and have full-length screens on the outside of windows.

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| 2. Provide adequate light. | Allow window space equal to 10 per cent of the floor space. |
| 3. Provide adequate ventilation. | Have an adjustable outlet flue in the roof of the milk house. Ventilate with windows when necessary. |
| 4. Provide sanitary equipment. | See that floor is tight, smooth, and impervious to moisture. Have floors slope to a drain. Concrete is standard material for floors. Have a bell trap drain connected to a drain pipe leading well away from milk house. A 6-inch glazed tile makes a suitable drain when laid 2 feet underground, with fall of at least 1 foot to every 60 feet of length. Coolers, cans, and other milk utensils should be of smooth, durable material which does not affect milk. They should be free from rust and dents. Cans should have tightly fitting covers which provide no place for water or dirt to accumulate. A metal rack for holding inverted utensils should be provided. |
| 5. Keep clean. | Paint walls and ceilings and keep free from dust and cobwebs. Flush floors with water frequently and scrub with alkali powder regularly. Store nothing in the milk house except dairy utensils and supplies. |

Practice IV.—Preventing Objectionable Flavors and Odors in Milk.

- | Procedure | Standard Accepted Practice |
|--|--|
| 1. Set up a feeding schedule. | Arrange feeding time so that strong flavored feeds, such as silage, cabbage, turnips, rape, kale, and similar feeds, will be fed immediately following milking. Make out a feeding chart, if necessary. |
| 2. Inspect pastures. | Look for possible presence of plants having milk-tainting flavors and odors, such as garlic, wild onion, bitterweed, and similar weeds. |
| 3. Set up a pasturing schedule. | If objectionable plants are found growing in pastures, arrange pasturing schedule so that cows are removed three to four hours before milking time or longer if necessary. If possible, keep cows off badly infested pastures. Start a weed-eradication program; consult county agent or state agricultural college on method of weed eradication. |

CLEAN COOL CREAM DELIVERED OFTEN WILL MAKE BETTER PRICES



An efficient means of keeping cream utensils clean and sweet. Sunlight is a most economical drying agent. Plenty of hot water—Washing powder and brush should be used after each use. Rinse with scalding water, then cold water before using.

Practice V.—Cleaning and Caring for General Milk Equipment.

Procedure

Standard Accepted Practice

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|--------------------|--|
| 1. Rinse. | Use cool water to rinse utensils immediately after use. |
| 2. Wash and scrub. | Use soapless, hot water alkali washing powder,* and a stiff fiber brush, but never use soap. Scrub outside and inside. |
| 3. Rinse. | Rinse well with clean warm water. |
| 4. Scald. | Use boiling water and immerse completely. |
| 5. Inspect. | See that pails, cans, and covers are free from rust and indentations. See that covers fit tightly and protect the pouring lip of the can. See that bottles are clean, free from chips or cracks, and of clear glass. Discard or repair faulty equipment. |

* In selecting a good soapless alkali washing powder, get one that:

1. Dissolves quickly and completely in water,
2. Readily removes dirt, milk and butterfat,
3. Rinses quickly and freely without leaving chalky white coating on the utensils,
4. Will not blacken aluminum pails or rusty tinned utensils,
5. Is easy on the hands.

6. **Storage.** Clean utensils and bottles should be kept in an inverted position, up off the floor so they will not be splashed with water. A metal rack is recommended.
7. **Before using.** All dairy utensils should be rinsed with hot water, or a hypochlorite solution containing 100 parts per million of chlorine. (See directions furnished by the manufacturer.) This solution may be used again in Practice VII or IX at the same milking, and then thrown away.

Practice VI.—Cleaning Milking Machines.

Procedure	Standard Accepted Practice
1. Rinse machine.	Immediately after milking, place teat cups in a pail of cold or lukewarm water, using vacuum to draw water through machine. Break flow occasionally by pulling teat cups out of the water and then immediately immersing them again. Do this 10 or 12 times.
2. Wash machine and scrub parts.	Place teat cups in a pail of hot water containing soapless washing powder. Repeat process in operation No. 1 and scrub teat cups and tubing with a brush during the washing process.
3. Rinse machine.	Rinse machine with clean, warm water drawn through the machine as above by vacuum.
4. Treat machine and parts to kill bacteria.	Detach the long milk tube with claw and teat cups from head of pail (plug air tubes on inflation type). Place detached parts in a tank or can of clean water. See that all parts are entirely submerged. Heat the water to 160° or 165° F. Allow water to cool and leave parts in water until next milking. Instead of heating water, parts may be placed in a chlorine solution, the same as used in Practice V, and allow to remain until next milking. This solution may be used in Practices VII or IX at the same milking or the long milk tube with claw and teat cups may be treated on the solution rack using lye solution. Wash and treat pail and cover as in Practice V after every milking.

5. Take machine apart for thorough cleaning.

For best results take machine entirely apart daily and wash thoroughly with brushes and hot water containing washing powder. In any case perform this operation at least twice each week.

6. Preparing machine for use.

Assemble machine and repeat as in (1) of this exercise, using hot water or hypochlorite solution as in Practice V.

Practice VII.—Cleaning the Cream Separator.

Procedure

Standard Accepted Practice

1. Flush separator.

Immediately after separating pour about one-half gallon of cold water into top tin of separator while bowl is still running. As soon as cream is flushed from machine, turn spouts so that both will flow into skim milk container.

2. Take bowl apart.

After flushing, immediately take the tank, top, and spouts off and take bowl apart. Each piece should be placed in the separator milk tank and covered with water until washed. This prevents milk drying on them.

3. Wash and scrub parts.

Every part should be scrubbed with a stiff-bristled brush in clean warm water containing a small amount of soapless alkaline washing powder, but never soap. Care should be taken that the inside of the spouts and other small openings are thoroughly brushed.

4. Rinse parts.

Rinse with clean lukewarm water.

5. Scald parts.

Place each piece in the rinsed milk tank so that it will drain readily. Pour a teakettle full of boiling water over the parts, reaching all surfaces possible. Allow water to drain from tank by tipping to and fro. Set in clean place until used.

6. Before using.

Assemble separator and flush with half a gallon of hot water or hypochlorite solution as used in Practice V. This solution may be used in Practice IX at the same milking.

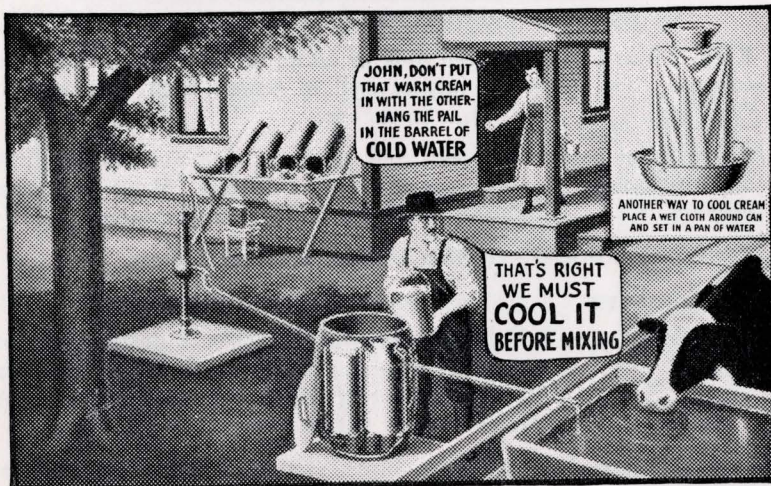
Practice VIII.—Keeping Cows Clean.

Procedure	Standard Accepted Practice
1. Bed cows.	Provide plenty of clean, absorbent material for bedding daily, such as straw, shavings, and similar materials. Remove when soiled.
2. Groom cows.	Thoroughly groom cows with brush and curry comb at least once and preferably twice a day. Groom at least one hour before milking time. Wash cows that are badly soiled.
3. Clip cows.	Keep hair on udder, flanks, and belly close clipped. Clip hair every few months as needed.

Practice IX.—Milking.

Procedure	Standard Accepted Practice
1. Provide sanitary milking equipment.	Use only milking utensils free from rust, durable, nonabsorbent, noncorrosive, free from corners, crevices, dents, and inaccessible points. Use small-top milking pail or milking machine. Avoid flimsy, easily dented utensils, and also utensils of galvanized iron or wood.
2. Change clothes.	Put on clean outer clothing made of washable material of smooth texture. Use such clothing only while milking and handling milk. Keep milking clothes clean.
3. Clean cow's udder, teats, and flanks.	Wash udders which have become soiled after cows were groomed. Wipe udder, teats, and flanks with damp, clean cloth, wet in a pail of hypochlorite solution as in Practice V or VII if available. In no case use milking pails for this purpose.
4. Clean hands.	Wash hands clean, rinse in hypochlorite solution if available and wipe them dry before starting to milk. Wash again if hands become soiled during milking. Keep hands dry.
5. Milk— a. By hand.	Before milking into pail squeeze out one or two streams of milk from each teat, noting whether milk from each teat appears to be normal. Milk quietly and rapidly with dry hands into small-top pail. Avoid any sliding or stripping movement of thumb and fingers down the teat. Keep finger nails trimmed closely.

CLEAN COOL CREAM DELIVERED OFTEN WILL MAKE BETTER PRICES



He Delivers His Cream Two or Three Times a Week

- b. By machine
(alternative).

Follow same preliminary procedure as in milking by hand, then attach milk cups firmly to teats. If the milk pails are allowed to get too full, or if they are handled carelessly so as to splash the milk inside while under vacuum, some milk is likely to be drawn into the vacuum line. If this happens the pipe should be cleaned immediately after milking. (See Practice VI.)

6. Remove milk.

As soon as a cow is milked, remove her milk from the barn.

Practice X.—Cooling, Storing, and Transporting Milk or Cream.

1. Strain milk.*

Strain milk through a sterile absorbent cotton pad or special filter cloth, either of which may be secured in sanitary packages or rolls from dairy supply houses. Use strainer pad for one milking only.

* Straining milk is only a precaution against visible dirt. Because much dirt is very soluble in milk, bacteriologically clean milk should need no straining. The dirt on the strainer indicates your ability to produce clean milk. **Keep it clean.**

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| 2. Aerate and cool. | Cool immediately to 50° F. or under by means of a surface cooler, setting can in ice water, or mechanical refrigeration. Use a clean, accurate thermometer for taking temperature. |
| 3. Keep cool and covered. | Keep milk or cream at 50° F. or under. Keep tightly covered to protect from dust and dirt while in storage. |
| 4. Protect from heat and dust during delivery. | Protect milk or cream from sun and dirt from storage to point of delivery. Shade milk stand and cover cans during transportation. |

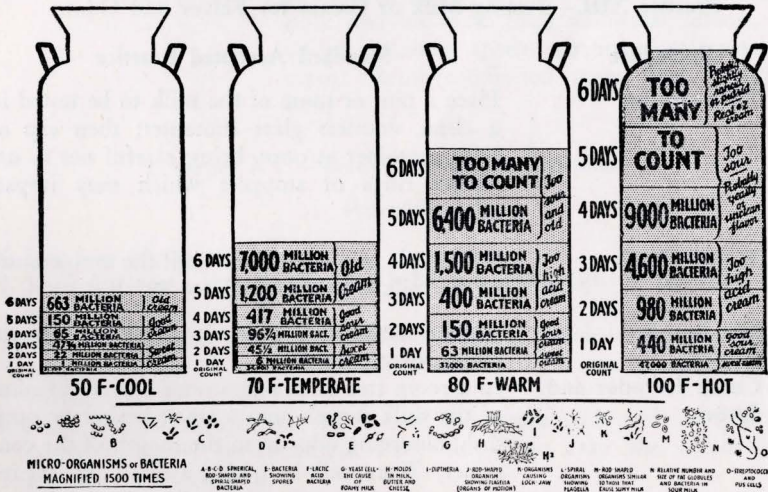
Practice XI.—Testing Milk for Bacterial Content.

Procedure	Standard Accepted Practice
1. Prepare methylene blue.	Drop methylene blue tablet in distilled water or water which has been boiled and cooled, using the amount of water recommended by manufacturers of tablets; allow tablet to dissolve.
2. Take milk sample.	Place a 10 cc. sample of milk in a clean test tube.
3. Mix.	Add 1 cc. of the prepared methylene blue solution to the 10 cc. of milk in the test tube. Place stopper in the mouth of test tube and invert tube, thereby mixing the two liquids present.
4. Heat mixture.	Place test tube containing mixture in a water bath maintained at a temperature of approximately 37° C. or 100° F. Note the time the sample is placed in the bath.
5. Observe color changes.	At the end of 20 minutes note the color change, if any, and again every hour thereafter until sample has turned white. Record the total time required for entire sample to turn white.
6. Estimate bacterial content.	Note length of time required for color change to take place and compute approximate number of bacteria present in milk as follows:

Time	Bacteria per cubic centimeter
20 minutes or less	Over 20,000,000
20 minutes to 2 hours	20,000,000 to 4,000,000.
2 to 5½ hours	4,000,000 to 500,000.
5½ to 8 hours	500,000 to 100,000.
Over 8 hours	Less than 100,000.
Good raw milk should not decolorize in less than 8 hours.	

TABLE SHOWING INCREASE IN NUMBERS OF BACTERIA IN CREAM AT DIFFERENT TEMPERATURES IN RELATION TO TIME

TIME FROM MILKING UNTIL DELIVERED AT CREAMERY



Practice XII.—Testing Milk for Sediment.

Procedure

1. Prepare tester.
2. Mix milk.
3. Take sample.
4. Remove cotton disk.
5. Estimate sediment present.

Standard Accepted Practice

Set up clean sediment tester and insert a regulation cotton disk so that milk can be poured through it. Place receptacle for milk under tester.

Stir thoroughly or pour milk from one container to the other three or four times.

Pour one pint of the milk immediately after it has been mixed into the sediment tester and force it through the cotton disk.

Carefully lift cotton disk from the tester so as not to lose any of the sediment present.

Note relative amount of sediment present as compared with other samples of milk which have been handled in different ways or compare with photographs of samples shown on page 17 of Circular 384, published by the United

States Department of Agriculture, or page 6 of Circular 54, published by the Nebraska Agricultural Experiment Station.

Practice XIII.—Testing Milk or Cream for Flavor and Odor.

Procedure	Standard Accepted Practice																
1. Take sample.	Place a pint or more of the milk to be tested in a clean, odorless glass container; then cap or close container at once, being careful not to use rubber rings or stoppers which may impart odors.																
2. Warm sample.	Set sample in warm water until the temperature of the milk is raised to 80° or 90° F.																
3. Mix sample.	Agitate sample thoroughly by inverting the container several times.																
4. Check for odor and flavor.	In a room free from odors pour a small amount of the milk sample into a small beaker or open dish, observing odor from the mouth of the container. Taste milk by taking a small amount into the mouth, but do not swallow any of it.																
5. Identify odor and flavors.	Check the terms which describe the flavor and odor present: <table><tr><td>Bitter</td><td>Disinfectant</td><td>Musty</td><td>Watery</td></tr><tr><td>Cardboard</td><td>Feed</td><td>Metallic</td><td>Sour</td></tr><tr><td>Cooked</td><td>Flat</td><td>Rancid</td><td>High acid</td></tr><tr><td>Cow</td><td>Garlic</td><td>Weedy</td><td>Unclean</td></tr></table>	Bitter	Disinfectant	Musty	Watery	Cardboard	Feed	Metallic	Sour	Cooked	Flat	Rancid	High acid	Cow	Garlic	Weedy	Unclean
Bitter	Disinfectant	Musty	Watery														
Cardboard	Feed	Metallic	Sour														
Cooked	Flat	Rancid	High acid														
Cow	Garlic	Weedy	Unclean														

Practice XIV.—Maintaining the Health of the Dairy Herd.

Procedure	Standard Accepted Practice
1. Control tuberculosis.	Consult the State Veterinarian in regard to having a tuberculosis test made. Have cows tested at least once each year. Remove reactors from the herd. Disinfect stables. Repeat in 6 months if reactors are found. Add only tested animals to the herd.
2. Control abortion.	If cows have aborted for any cause consult the State Veterinarian in regard to testing for contagious abortion. Remove reactors. Disinfect stables. Add only tested animals to herd.

3. Control udder diseases.

Milk first stream from each teat on a fine sieve or glass at least once each week to detect garget or other abnormalities. Abnormal milk is that which appears watery, lumpy, stringy, bloody, or contains flecks or specks. Discard abnormal milk and all milk from abnormal udders. If udders or milk appear abnormal call veterinarian. Remove affected cows from milking herd.

Practice XV.—Testing Cream for Sediment.

Procedure

1. Use four ounces of cream.
2. Pour the cream into the filtering bottle (if such a filter is used) or into a mixing vessel.
3. Add three-fourths teaspoon of baking soda, or commercial soda ash or sesquicarbonate of soda and stir or shake until the neutralizer has been mixed with the cream.
4. Rinse out the sample jar which held the cream with at least 180° F. water (distilled or cleaned). Pour this rinse into the cream and thoroughly mix again.
5. Add enough water 180° F. or above to dilute this mixture to about one pint.
6. Then filter through a Rapid-Flo filter disk (Johnson and Johnson). The mixture should be at least 160° F. before filtering; higher temperatures are desirable on some cream. (Do not heat the mixture.) All water and containers must be clean. Water can be cleaned by filtering it through similar disks.