

PRACTICAL SANITARY ASPECTS OF PIPE LINE MILKING

D. M. DOWNING

The production of milk with pipe line milking equipment is becoming more important daily. Every inspector should be thoroughly familiar with each unit and know the rules or regulations which apply. The unit must be installed properly and in such a manner that it can be examined by observation, feel, and swab or rinse tests. It must be installed to provide protection from both inside and outside contamination and must be constructed of a material that can be easily cleaned. A proper washing system is a must and no unit should be accepted without one.

In 1950, Mr. Ghiggoile, Chief of the Bureau of Dairy Service, stated, "It is my feeling that regulatory officials, unless strictly prohibited by law, should look to the end results rather than stay with old practices, particularly if such developments are a decided advantage and accomplish results in a more practical and economical manner. We should take the position that our main concern is to have a properly cleansed and sterilized pipe line, regardless of the manner by which it is accomplished so long as public health and the quality of the product is not jeopardized."

This is what the Department officials have done, and in formulating the regulation all interested parties were contacted for their ideas, experiences, and opinions—a good system.

I believe the California regulations pertaining to installation and cleaning of pipe lines are practical, based on facts and practical dairy conditions, and designed to include practices in common usage insofar as they are consistent with good housekeeping and in the interest of public health.

The regulation which became effective on December 1, 1951, pertaining to pipe line installations was primarily intended for dairy farm operations. However, the principles of the system should be carried over into plants that desire to install permanent pipe lines.

When it became evident that a regulation was necessary for the control of pipe lines, we found all kinds of installations, some good

and some very poor. Everyone agreed that some control was necessary, especially milk inspection departments, dairymen, and manufacturers.

One of the first items of importance in considering pipe lines is the *proper installation*. Most of the pipe lines that were in use at the time the regulation was adopted have been changed to meet the requirements. There is seldom any deviation from the regulations on new installations, and good cooperation is obtained from all concerned.

The sections of the regulation pertaining to the kind of metal permissible, grit finish, and milk pumps were taken from the 3A standards.

Inspection is important from any point of view and therefore everyone is concerned as to whether or not the system is properly washed and sanitized. We must have the equipment installed in a manner so we can examine it by observing, by feeling, and by swab or rinse testing.

Milk should be protected from contamination and even adulteration by having all the equipment installed so that it can be completely drained. Any water or solution line should be disconnected; because even with leak protector valves the drip may be drawn into the milk line when the pump or vacuum is started.

Air entering the system may need special attention in some cases to protect the milk from dust and odors.

Flies, dust, and other contamination may enter the stall cocks and other openings if not protected during milking and when not in use. Often flies will get in the ends of stall cocks to feed on the drop of milk left there as the hose is moved from one cow to another. These openings should be automatically closed as the hose is removed.

Valves, fittings, unions, and pumps present a problem in proper washing by circulation. However, this can be minimized by the installation of proper equipment. In



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considering this problem we should determine whether the part in question can be easily cleaned, taken apart and inspected, and examined as of its practicality.

The only item in the regulation that seems to cause considerable disagreement is the thermometer—mainly the location. Some wish to install it on the wash tanks where the detergent solution is mixed, instead of on the discharge end of pipe. On the discharge end it serves a two-fold purpose, especially in long lines: first, in sterilizing with hot water, the proper point to install a thermometer is at the end of the line, because of cooling which takes place between the tank and the end of the line; second, the solubility of detergents or cleaning compounds varies greatly. We have noticed a deposit from some wetting agents when low temperatures are used and also a film when other washing compounds are used at high temperatures. Proper temperature is very important in washing solutions. I believe the best system in long pipe lines would be to have a thermometer on both the wash tank and on the end of the pipe line because of the different

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requirements of various washing compounds and the cooling which takes place in long lines.

There are several systems of cleaning the pipe line units, namely:

1. Using a centrifugal pump for circulating washing solutions.
2. The use of vacuum and pulsators.
3. The use of vacuum and gravity.
4. The use of a diaphragm pump without circulation.
5. Disassembling and washing all equipment in the milkhouse.

In general, the actual cleaning of the pipeline system begins with a rinse, (until clear), using either tap water or, preferably, water near 110°F.

The circulation of detergent solution should then be for at least 15 to 20 minutes, being sure to maintain the recommended temperature for the particular product used. This should be rinsed with clear water before sanitizing solution is used.

Sanitizing may be accomplished with either chemicals or hot water.

The centrifugal pump should be large enough to discharge at least 25 gallons of solution per minute at the end of the line (1½" pipe).

Under the vacuum system of washing, a vacuum tank is installed several feet above and connected to the end of the milk line, and the other end of the line is placed in the wash tank. This permits drawing the solution by vacuum to a high point, and then as the tank fills near capacity a float cuts off the vacuum and admits air, causing the solution to return by gravity. This continues until the required time for washing, rinsing, and sanitizing takes place.

In the system where vacuum and pulsators both are used, a surging action is produced in the pipe-line, and the requirement of 25 gallons per minute does not apply.

The diaphragm pump can also be used, which causes the solutions in the line to surge back and forth.

There are some pipe-line milkers that do not lend themselves to circulating, and must be disassembled for washing.

In California we have many individuals who install pipe-line milkers by converting the units that the dairymen have on hand. These people, as well as the regular milking machine companies, have done

a good job. They are continually coming out with new ideas and inventions. For example, in nearly every different system manufactured or converted, there will be found a different kind of releaser or valve.

We have a few installations now where the releaser is eliminated by running the milk directly into a holding tank which is both a vacuum tank and a cooler. The cooling is accomplished by a cold wall. As the milk enters, it is distributed around the walls by a trough or pipe with holes properly spaced. The milk must be cooled to at least 50°F. To have a large tank under vacuum calls for much stronger construction than an ordinary holding tank, and thereby the initial cost is increased. However, it eliminates the cost of releaser, and the time and labor for cleaning the releaser after each milking.

California milking barns and milkhouses vary in size as does the number of cows milked. The barns hold from 2 to 660 cows at one time. In the Los Angeles area we have a dairy which consists of six strings of 30 cows, or 180 cows at one time using a pipe line milker. The barn is 96 feet wide by 90 feet in length. They milk from 840 to 900 cows and produce 4,300 gallons of milk daily, and have 1,000 feet of pipe line, three milk pumps, and three 1,000 gallon holding tanks to handle this milk.

One man milks cows for 8 to 8½ hours daily and takes care of from 75 to 90 cows each milking. The average number of cows per dairy in the Los Angeles area is 150.

I do not want to give the impression that all dairies in California are of this size. Throughout the remainder of the state the dairies usually vary from 30 to 100 cows per dairy.

Since dairying is the largest division of California agriculture, we have an excellent opportunity to study pipe-line milkers, and if our observations and experiences have been of any value, my trip has been justified.

PIPE-LINE MILKING MACHINE INSTALLATIONS

480.5. All pipe-line milking machine installations must comply with the following conditions and must have a satisfactory circulating system for washing and sterilizing

which has been approved by the Director; or such system must be disassembled, washed and sterilized after each time used, except that deviations from the minimum requirements and specifications may be made after approval in writing by the Director:

(a) All equipment having any surface in contact with the milk and all solution lines, wash tanks, fittings, vacuum lines from air separator to moisture trap shall be constructed of stainless steel, nickel alloy, heat resistant glass or equally corrosion-resistant material that is nontoxic and nonabsorbent.

(b) All milk contact surfaces shall be finished to an equivalent of not less than 120 grit finish, properly applied.

(c) The milk pipe-line system shall be installed in a manner to permit being disassembled for inspection.

(d) Sanitary milk pipes which are not washed in place shall be no longer than the washing and sterilizing facilities will accommodate.

(e) The entire milk line shall be installed so as to have a positive slope and be completely drained.

(f) The vacuum line from the air separator shall have a positive drain to a moisture trap.

(g) The vacuum line from the air separator shall not extend in a vertical position above the separator more than six inches including the elbow.

(h) The entire milk pipe line and solution pipe line shall be of the same inside diameter.

(i) No connecting valves are permitted between the milk line and the solution or water lines. Solution line and water lines must be disconnected from the milk line during milking period.

(j) All milk pumps and attachments shall be protected from possible contamination. If legs are used, they shall be smooth with rounded ends and no exposed threads. Legs made of hollow stock shall be sealed. On pumps with legs designed to be fixed to the floor, the minimum clearance between the lowest part of the base and the floor shall be four inches. Readily portable pumps not permanently attached may have leg heights of two inches. (Readily portable pumps are defined as those having a base area of not more than one square foot, or, in the case of motor mounted pumps, an area en-

compassed by the legs that does not exceed one square foot.) Bases when used shall be constructed without ribs or flanges and shall have a smooth top and bottom surface. Pumps which because of their size and type cannot be mounted on legs, shall be mounted on a base designed for grouting and sealing. All milk pumps and attachments must be a sufficient distance from walls to permit proper cleaning.

(k) When a dump tank is used in milking barn, it must be located in accordance with Article 481.5 (g) of the Administrative Code and must be kept covered except when milk is being poured. Milk on test days and strippings shall enter the milk pipe line through the dump tank. If dump tank is located next to the barn wall between milkhouse and barn, the barn wall must be at least six feet high.

(l) The wash tank shall be located in the wash room if the teat cup assembly is a part of the circulating system; if the pipe line in the milking barn is the only equipment to be washed and sterilized by circulation, then a covered wash tank is permissible in the passageway; any other method must be approved by the Director.

(m) A thermometer must be installed on the discharge end of the circulating system.

(n) Milk tanks, dump tanks, releasers, when located in passageway shall be constructed so as to protect milk from flies, dust and contamination.

(o) Ends of milk lines, stall cocks and other pipe-line openings subject to contamination shall be capped or otherwise protected.

(p) Sight glasses shall not be permitted on milk pipe lines installed after the effective date of this regulation when such lines are to be cleaned by circulating systems.

(q) The circulating pump shall be of a size sufficient to fill the pipe lines and cause enough turbulence to insure adequate cleaning and shall deliver not less than twenty-five gallons of solution per minute at discharge end of 1½ inch lines and corresponding volumes for other size pipes.

(r) Air line from moisture trap to milk releaser or air separator shall be washed and sterilized after each time used.

(s) The outside of milk pipe lines and equipment shall be kept

clean.

(t) Vacuum pumps, motors, or any machinery that may emit oil, fumes, grease, odors, or any objectionable material shall not be located over or near milk equipment.

(u) Milk pipe lines connected by the so-called slip joint method with "O" ring gaskets shall be disassembled for cleaning.

(v) Any gasket used in milk lines must be of a type that will not interfere with proper cleaning by circulation.

JOSEPH S. GAVIN—1891-1953

Joseph S. Gavin, 62, of 200 Stockbridge Ave., a bacteriologist, milk analyst and head of the Gavin Dairy Laboratory, at the Stockbridge Ave. address, died September 15 at Millard Fillmore Hospital. He had been ill about three weeks.

Born in Buffalo, Jan. 16, 1891, Mr. Gavin attended public school, Central High School and was graduated from Cornell University in 1915. An Army veteran of World War I, he served in the Chemical Warfare Division in Washington.

He was a city health inspector for about six years before he established the dairy laboratory more than 30 years ago. His firm analyzed milk for various milk dealers in and around Buffalo.

Mr. Gavin was a member of the American Dairy Science Association, the American Public Health Association, the International Association of Milk Sanitarians, the New York State Association of Milk Sanitarians, the American Rabbit and Cavy Breeders Association, and the Society of American Bacteriologists.

He also held membership in Buffalo Council 184, Knights of Columbus, Buffalo Assembly, Fourth Degree, K of C Cordova Caravan 26, Order of Alhambra, the Holy Name Society of St. James Church, Kensington Post 708, American Legion, and The Cornell Club of Buffalo.

Surviving are his wife, the former Margaret Sell, two sisters, Mrs. Catherine Kavanaugh and Sister Mary Stella of the Sisters of Mercy, stationed at St. Jerome's Hospital, Batavia, and two brothers, James M. and Edward L. Gavin.

LETTER OF ACKNOWLEDGMENT OF CITATION

Grand Rapids 7, Michigan
1839 Union Blvd. S. E.
September 26, 1953

Dear Red:

Due to the extreme heat during the week of the meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS at Lansing, we left immediately afterwards for Beulah, Michigan, where we had been spending the summer. We arrived back home in Grand Rapids this week. We had a wonderful summer with an opportunity for relaxation which has helped my physical condition considerably.

When the announcement was made at the Association banquet that I was to receive the Annual Citation and Award, I was so emotionally affected (which disgustingly frequently happens the last few years, when occasions like this take place) that I fear I did a very unsatisfactory job of acceptance.

It was wonderful to receive this recognition and my family and I will always cherish the memories of this memorable occasion.

If it is possible I would appreciate having you as Executive-Secretary of the Association convey through the Journal to the recognition committee, the sponsoring corporations of the award, and the membership of the Association my sincere thanks and appreciation.

Sincerely,

E. F. Meyers