NUMBER 191 IDAHO CURRENT INFORMATION SERIES DECEMBER 1972

Milking Management

Edward A. Fiez and George W. Cleveland

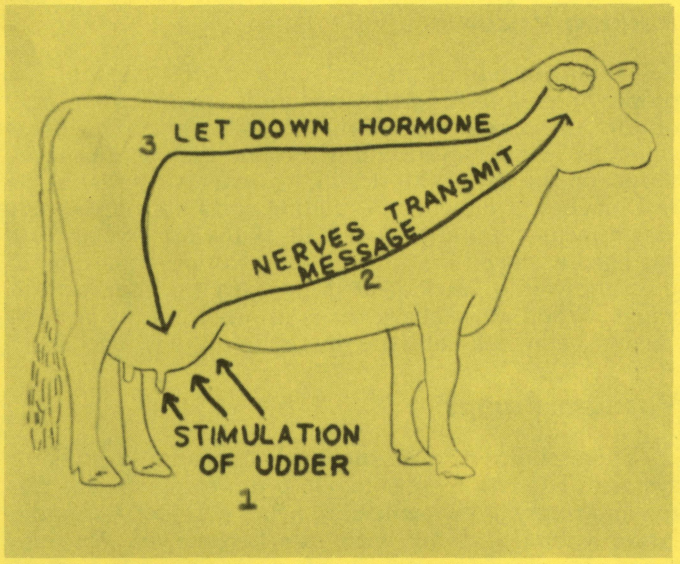
Milking the dairy cow has been referred to as the most important 5 minutes in dairying. All the efforts you put forth in areas such as feeding, breeding, and management can be lost if you fail to do a good job of milking. Udder irritation and mastitis can rob your herd of production and make the difference between profit and loss. The quality of the milk produced on your farm is also directly related to milking.

The important areas in milking are milking procedures, the design of your system, and the maintenance and operation of the system. The purpose of this publication is to provide information and suggestions in these areas to help you reach a goal of maximum milk production.

Milking Procedures

Preparing The Cow

The dairy cow must be properly stimulated (primed) before the milking machine is attached. Priming causes a chain reaction within the cow which leads to milk letdown. Your cows are well primed if they leak milk after stimulation. Until letdown occurs, the majority of the milk is distributed through the udder in milk producing cells. Priming your cows before milking is the key to *rapid* and *complete* milk removal.



Priming the dairy cow by washing and massaging the udder leads to milk letdown.

Operating The Milking Unit

The effects of "letdown" are short lived; therefore, place the milking machine on the cow within one-half to one minute. Applying the milking unit before letdown or after the major effects of letdown have passed, approximately 4 minutes, will result in slow milking and udder irritation.

Remove the milking unit when the flow of milk stops. Over-milking leads to udder irritation and excessive time in the barn. Don't use more units than you can properly operate. Fewer units properly operated will usually result in greater production and less udder damage and will also reduce the total milking time.

The dairy cow is a creature of habit. A well planned milking program that is routinely followed will help obtain maximum milk production.

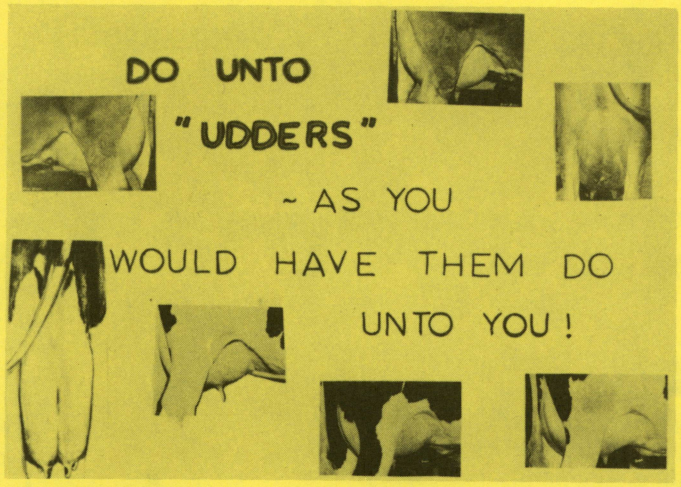
Teat Dipping

Teat dipping is an effective way to reduce losses associated with mastitis. This has been shown by research and field trials. Many dairymen in Idaho are currently dipping the teats of their cows after milking and find it successful. If you plan to initiate a teat dipping program, follow these recommendations:

1. If you use a commercial preparation, buy it from a reputable dealer or source and be sure that the solution is properly labeled.
2. Be consistent in teat dipping, following a routine in which every cow is dipped every day.
3. Teat dipping preparations should be used fresh

COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF IDAHO

AGRICULTURAL EXPERIMENT STATION
COLLEGE OF AGRICULTURE



Top production of the dairy herd depends on tender loving care. Avoid practices that upset your cows in the barn.

and kept in a room where the temperature remains constant.

Teat dipping is most effective in mastitis prevention in young cows or heifers which enter the milking string. Teat dipping here can prevent healthy udders from being contaminated with mastitis organisms that otherwise may enter the teat canal between milkings.

TLC — Tender Loving Care

Milking cows also require careful handling and kind treatment. Your cow must enjoy the surroundings in the barn. Avoid rough handling, injections, infusions or any type of physical discomfort to the cow in the milk barn. Do yourself and your veterinarian a favor and provide adequate facilities for treatment. If you have to force your cows in the barn each milking, perhaps you should review your milking and handling techniques.

Follow These Milking Time Practices

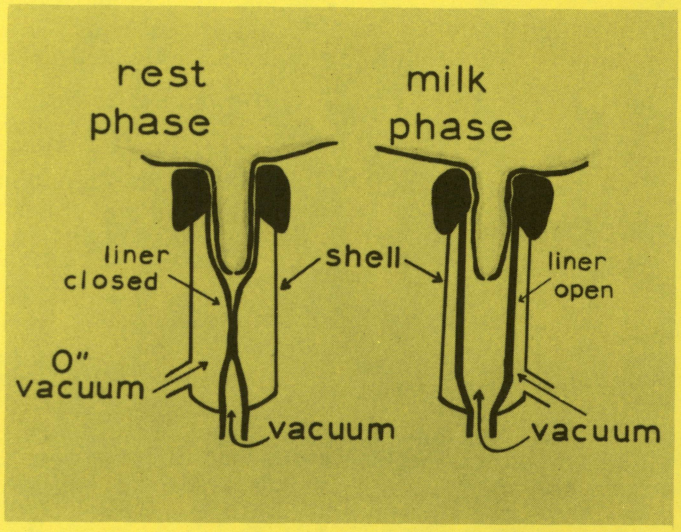
1. **Strip gently, check for abnormal milk.**
2. **Massage udder and teats with warm water (105°), using disposable paper towels.**
3. **Wipe teats and udder dry.**
4. **Attach machine after letdown — 30 to 60 seconds following stimulation.**
5. **Check for milk-out. Do not over-milk or over-strip.**
6. **Remove the milking machine gently with vacuum off.**
7. **Dip teats of cows from which machine was removed, using a commercial teat dip solution.**

The Authors The authors of this publication are both specialists with the University of Idaho Cooperative Extension Service. Edward A. Fiez is Area Dairy Specialist, headquartered at the Caldwell Branch Experiment Station. George W. Cleveland is Extension Dairy Specialist, headquartered at the District Extension Office in Boise.

Design, Operation, Maintenance Of Milking Equipment

Principle of Operation

The modern milking system depends on vacuum for operation. These systems operate on a principle far different from hand milking. The two main requirements of all systems are stable vacuum at the cow teat and proper pulsation. The pulsation of vacuum provides a rest and a milk phase. During the milking phase, the vacuum at the end of the cow's teat causes the milk within the udder to flow into the milking system. The rest phase is necessary to prevent injury to the cow's teat. The drop in vacuum at the cow's teat during the rest phase permits the blood to circulate. Milking systems with faulty pulsation or unstable vacuum usually cause problems in cows and herd mastitis.



The pulsator provides a milk phase and a rest phase.

Milking Vacuum

Milking machines depend on a partial vacuum for proper operation. A partial vacuum is created when part of the air is removed from the milking system. The amount of air removed will determine the vacuum level shown on the gauge. Most milking systems operate at 10 to 15 inches of mercury. A reading of 15 on the vacuum gauge means that about one-half of the atmospheric air has been removed from the system. Normal atmospheric pressure would be indicated by zero on the vacuum gauge. When atmospheric air is drawn from the system, vacuum increases until the operating level is reached.

Vacuum Pumps

These pumps provide the needed vacuum for milking systems. The two most common types of pumps are piston and rotary. New pumps are being designed to handle larger volumes of air with less horsepower. Vacuum pumps are rated in cfm (cubic feet per minute) at a specified vacuum level and rpm (revolutions per minute).

There are two rating standards for vacuum pumps, the American Standard method and the New Zealand method. The American Standard method measures air

Milking Units

Claws

There are many types and designs of claws on the market. Milk equipment manufacturers are continually improving the design and milk carrying capacity of the milking unit claws. Most claws have an air admission hole to aid in moving the milk. The air bleeder hole must be open to remove milk rapidly and to prevent flooding, so the hole should be checked each day before milking.

Teat Cup Inflations

Teat cup inflations (liners), the only parts of your milking system that come in direct contact with the udder, are usually the most neglected part of milk equipment. Selection, replacement, and care of liners are very important in quality milking. Some of the most common problems found in checking liners are:

1. Overuse.
2. Improper combination of liner and shell.
3. Holes or cuts in liner.
4. Careless installation of two-piece liners.

Liners are either one-piece molded or ring-type stretch liners. They can further be classified as wide bore, over three-fourths inch in diameter, or narrow bore. Currently, 80% to 90% of all liners are of the narrow bore type. Most dairymen feel the narrow bore liner milks faster with less irritation to the cow's teat. Molded liners are easier to install and clean. Synthetic and natural rubber are used to manufacture liners; however, ring type stretch liners are usually natural rubber.

Avoid Liner Overuse

Milking machine liners should be changed on a regular basis to maintain maximum milking efficiency. Failure to replace liners may lead to slow milking, teat irritations and, eventually, to mastitis. The useful life of a milk liner is based on the number of milkings it performs and can be calculated as follows:

$$\frac{\text{Number of units}}{\text{Number of units}} \times 2 \text{ milkings per day} = \text{milkings per liner/day}$$

Example: 100 Cows, 4 Units

$$\frac{100 \text{ cows} \times 2 \text{ milkings}}{4 \text{ units}} = \frac{200}{4} = 50 \text{ milkings per liner/day}$$

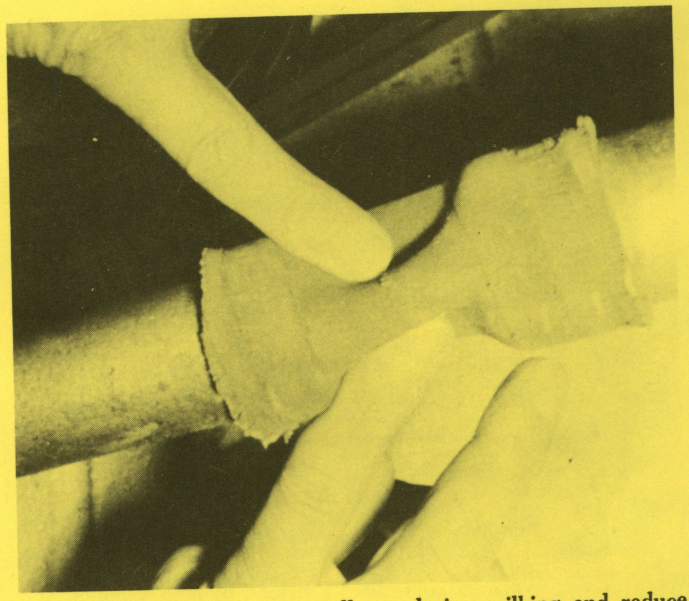
The number of milkings per day can then be used to calculate the days between liner replacement.

$$\frac{\text{Manufacturers recommend milkings}}{\text{Milkings per liner per day}} = \text{days between change}$$

Example: 1000 milkings recommended
50 milkings per day/liner

$$\frac{1000 \text{ recommended}}{50 \text{ milkings/day/liner}} = 20 \text{ days between changes}$$

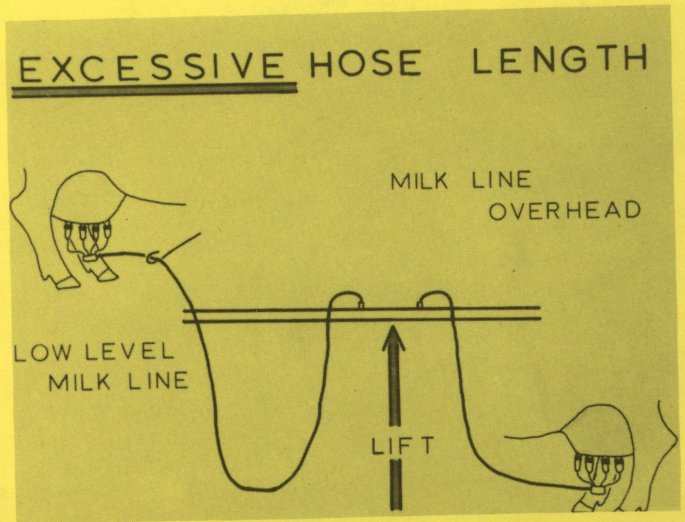
Check with your milk equipment dealer for the recommended life of your milking machine liners. Prevent udder problems by routine liner replacement.



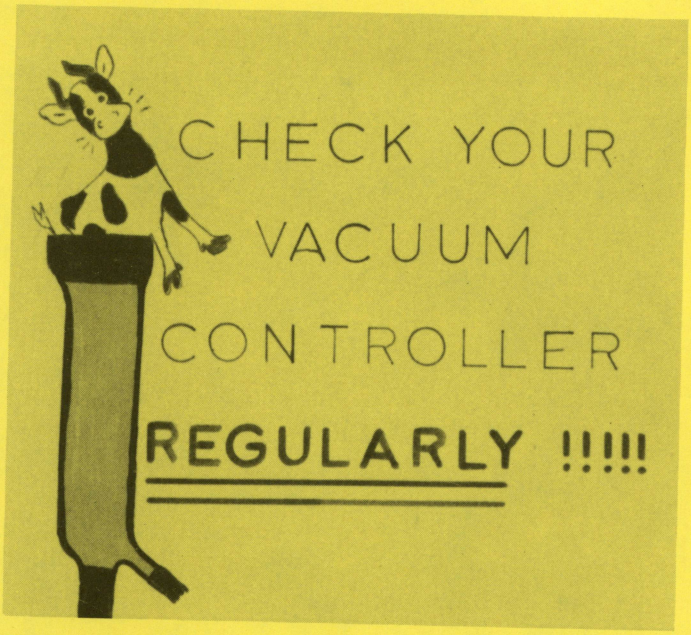
Defective rubber parts may collapse during milking and reduce vacuum.

Rubber Parts

All rubber parts used on your milking system should be inspected periodically. Vacuum hoses, milk hoses, and small connecting hoses should be inspected with vacuum in the system. Many times these hoses collapse under vacuum and limit air movement. The hose connecting the vacuum pump to the reserve tank is defective in many milking systems. The hose between the vacuum line and weigh jars is also commonly found collapsed during milking. These rubber parts should be replaced on a regular basis, not after a mastitis outbreak caused by low vacuum. The hose carrying milk from the claw to the milk line should be as short as possible. Excessive milk hose length usually causes vacuum fluctuation at the cow's teat.



Too long a hose from the claw to low-level milk line results in milk lift much the same as an overhead milk line system.

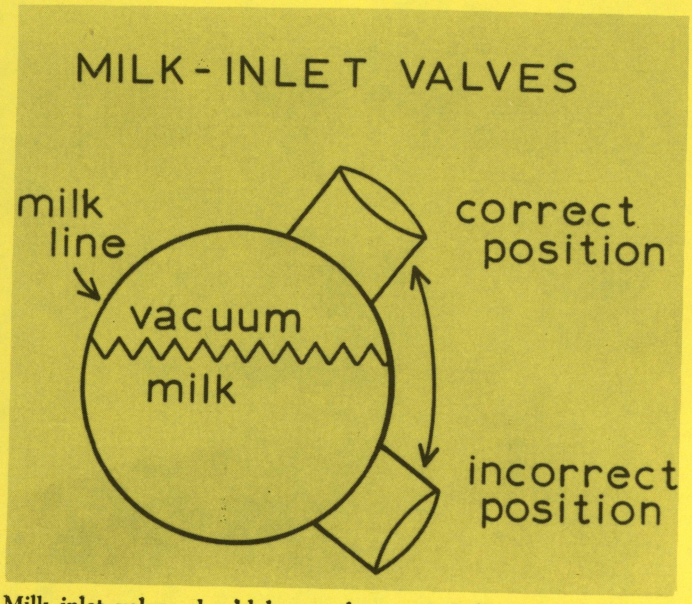


Worn or dirty vacuum controllers can lead to high vacuum, and this, in turn, is a major cause of udder irritation.

Pipelines

Milk pipelines should be installed with a minimum of risers, elbows, tees, and fittings. They should have 1 to 1½ inches of slope for each 10 lineal feet. Milklines should be large enough to carry the milk from your highest producing cows without flooding. Milk inlet valves should be on the upper one-half of the milk line to prevent vacuum fluctuations at the teat.

Milk lines can be installed below the udder (low line) or above the udder (high line or overhead line). Low-line systems provide stable vacuum at the cow's teat. With most high-line systems, the vacuum level at the cow's teat will fluctuate during periods of heavy milk flow. The vacuum drop is a result of lifting the milk from the claw to the overhead line. Well designed high-line systems have a minimum vacuum drop at the teat.



Milk inlet valves should be on the upper half of the milk line.

Weigh Jars

Weight jars can be added to either a high- or low-line system. These jars increase vacuum reserves and help stabilize vacuum at the claw. They also provide a means of measuring individual cow production. The main disadvantage of weigh jars is their original cost.

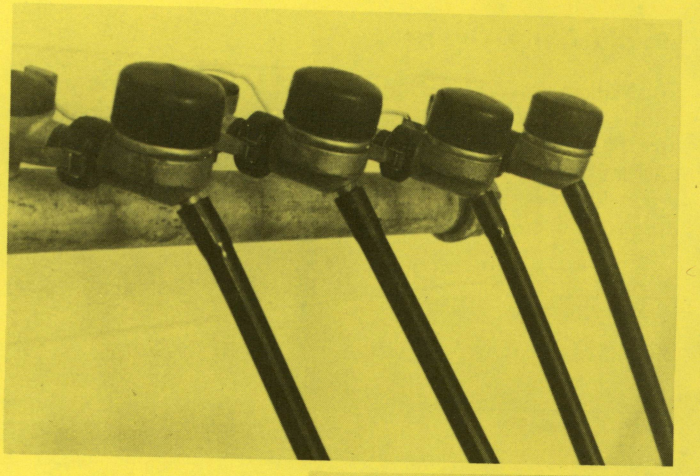
Pulsators and Pulsation

One of the requirements of a good milking system is pulsation providing rest and milking phases. The number of pulsations per minute and the ratio of milk to rest varies with different types of pulsators. Systems using a greater ratio of milking than rest usually milk faster. Milking time also varies with number of pulsations per minute. Your equipment should be adjusted to meet the specifications of the manufacturer.

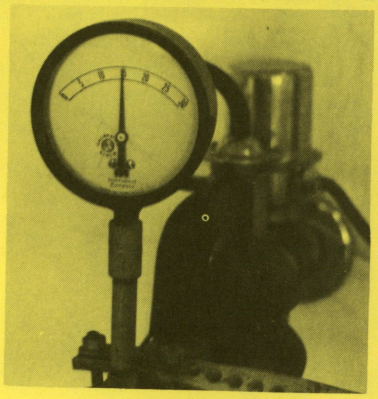
Faculty pulsators are a major cause of udder irritation in dairy herds. Pulsators must be cleaned and oiled regularly to insure good operation. Worn or damaged pulsators should be replaced to prevent udder damage. Check your pulsators routinely with a vacuum gauge. They should have zero vacuum during the rest phase and vacuum equal to milk line during the milk phase.

Vacuum Gauges

You should have a vacuum gauge on your milking system. It should be located in a spot easily seen each milking. It is also wise to have an additional gauge for checking equipment. This gauge should be kept in a dry, clean place and used weekly to check the main vacuum level in the milk line, the claw vacuum and both pulsated vacuum levels. Preventing a few mastitis cases will more than repay you for your time and effort.



Pulsators should be cleaned and checked periodically for proper operation.



Locate the vacuum gauge where the milking machine operator can easily see it.

at standard atmospheric pressure and temperature. The New Zealand method measures air at 15 inches of vacuum which is twice the volume when compared to the American method.

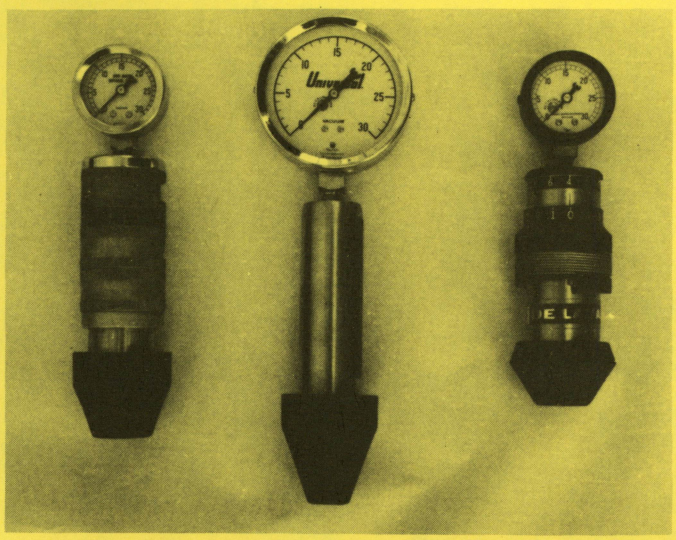
Some of those machines using the Standard method are Chore Boy, DeLaval, Sta-Rite, Universal, and Zero. Among those using the New Zealand Standard are Babson Bros, or Surge, and Bou-Matic.

In selecting a vacuum pump you should make sure it has enough cfm's to handle your system. Whether you milk 10 cows or 1,000 cows, you must have a vacuum pump that delivers enough vacuum at the teat cup. The following signs may be related to low vacuum:

1. Obvious discomfort of the cow, often manifested by stepping about during milking.
2. Red, swollen, or inflamed teat ends.
3. Inversion or erosion of the teat ends.
4. A ring at the base of the teat, indicating teat cup crawl.
5. An excessive number of leukocytes in tank or upon routine examination of all cows.
6. High rates of udder infection, particularly in young animals.

Your dairy equipment dealers will recommend a pump adequate to handle the job, so demanding a smaller pump is a poor way to save money. It may cost you production and cause udder damage. Install your pump in an easily accessible place that is free from hay or grain dust. You should occasionally check the pump for belt slippage and make sure that it is running at the recommended speed.

Use the oil the manufacturer recommends, changing it every 3 months. The capacity of the vacuum pump in a pipeline installation should be large enough to operate all units and accessories and have about 50% reserve. A pipeline installation with six units, using the American Standard, needs a pump that will produce about 40 to 45 cfm. The same system using a New Zealand standard would need a pump that would produce 80 to 90 cfm. The vacuum reserve tank should be placed near the vacuum pump. Allow about 5 gallons for each pipeline milking unit.



Several types of airflow meters can be used to check vacuum pumps.

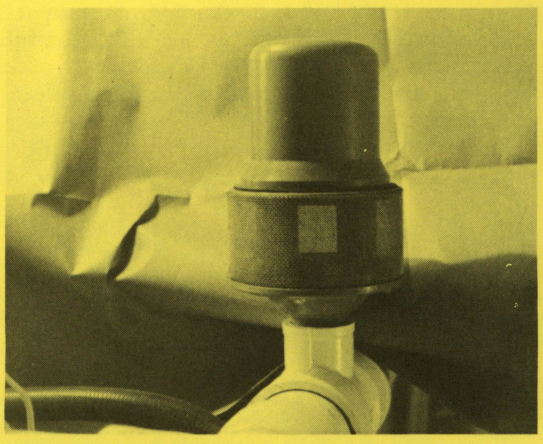
The size of the vacuum pump needed for a particular dairy operation depends upon: (1) the number of units to be used, (2) the size and the length of the pulsated line, (3) the type of the system – whether it is a bucket or a pipeline, (4) the type of pulsator, and (5) other vacuum accessories.

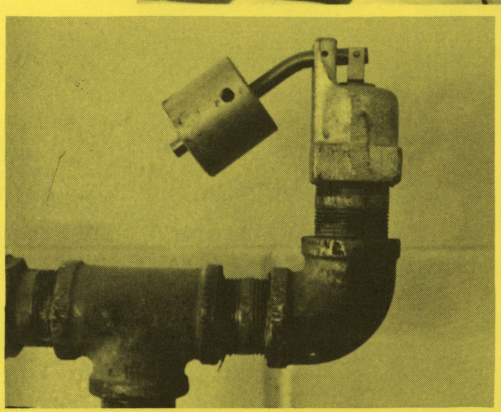
The vacuum level should not drop more than 2 inches of mercury during a normal operation. When a drop occurs, the operative vacuum should be restored to the required level within 10 seconds.

The exhaust from the pump should be piped to the outside of the building. The exhaust pipe diameter should not be smaller than the pump's discharge port. Your dealer or serviceman will sell you an adequate pump but it is up to the operator to manage it properly for maximum performance.

Vacuum Regulators

The vacuum regulator should be located between the reserve tank and the first place of vacuum use. A properly operating vacuum regulator will maintain a constant level of vacuum at all times. With a properly operating pump, you should hear a constant steady hiss of air entering the milking system during the milking operation. Install the regulator in a place that is free from dust and dirt. The regulator should also be placed so that its operation can be checked at every milking. Dust covered vacuum regulators are a common problem. Excessive vacuum causes udder irritation and mastitis. Vacuum controllers should be checked and cleaned on a regular basis.





Vacuum controllers should be located in a dust-free area.

Milking Machine Operators

Your production will depend on the man and your milking machine. The man is by far the most important. A *good operator* with a poorly functioning milking machine will do a much better job of milking than a poor operator using a properly functioning milking machine.

You should secure the best milker available. Poor help costs money. An experienced milker who takes pride in his work is an asset. He will make you money every day he is on the job. Unfortunately, the value of these men is only realized after they have left and you try to replace them.

Inform your help of what you expect from them. Outline all their duties and responsibilities to prevent misunderstandings. Periodically visit with your help during milking hours and observe their milking techniques. Don't force your help into poor milking habits by long hours and many cows. Have them start young cows and late lactation cows that milk fast while they are fresh and rested. Save heavy producers and slow milkers until last to slow the pace at the end of milking.

There is no set number of units per man. Milk with the number of units that can be operated properly with time for priming and moving cows in and out of the barn. Speed of total milking means little if the cows are improperly milked. Stress quality milking, not number of cows per hour.

Conclusion

Properly harvesting your milk crop depends on many things. Most of these have been discussed in this publication. All of these must go together in a total milking program. A well designed and maintained system and sound milking practices are vital in this total program. If you are not proud of the way your cows are being milked, perhaps you need to change equipment, milking practices, or both.

Successful Milking Check List

- Prepare all cows properly for milk letdown.
- Follow a regular milking routine stressing tender loving care and milking habits.
- Apply the milking unit 30 to 60 seconds after letdown and remove when milk flow stops.
- Service vacuum pump every 3 months.
- Clean and service pulsators and vacuum regulators each month.
- Check reading on vacuum gauge before each milking.
- Replace rubber parts on a regular schedule regardless of their appearance.
- Check the air bleeder hole in the claw before each milking.
- Don't take short cuts in buying equipment or hiring help in hopes of saving money.

For convenience and clarity, certain trade names of equipment are mentioned in this publication. No endorsement of the named materials is intended, nor is criticism implied of any similar products not mentioned.

Published and Distributed in Furtherance of the Acts of May 8 and June 30, 1914, by the University of Idaho Cooperative Extension Service, James L. Graves, Director; and the U.S. Department of Agriculture, Cooperating.

TN 8.5M 12-72