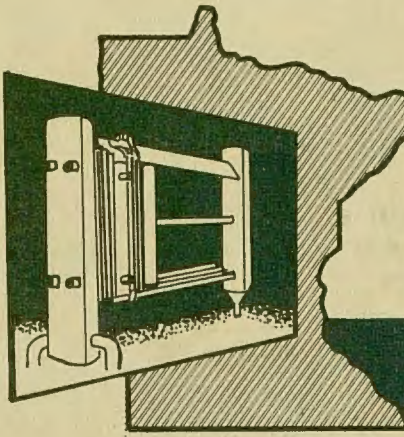
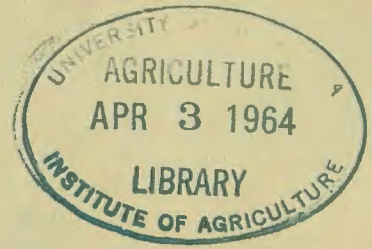


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# Minnesota

## Dairy Products Processor

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### KEEP BULK TANKS CALIBRATED

When installing bulk tanks on farms precautions must be taken to calibrate measuring devices accurately. Even when this is done, tanks frequently settle out of tolerance and recalibration is necessary. Here are some considerations to help do this job accurately:

### MEASURING DEVICES

Dipsticks are the most common measuring device for bulk milk. Some tanks have been set on scales. Others use a surface gauge for making liquid measurements inside the tank. The latter is a plastic tube about 36 inches long. Sealed inside is a scale graduated in thirty-seconds of an inch. This equipment also utilizes an electronic device for sensing the liquid surface.

### BASIC CONSIDERATIONS

Water, milk's major ingredient, is most dense at 39° F. It is at its maximum weight per quart or gallon or other unit volume at that temperature. As temperature decreases from 39° F. to 32° F. water expands. On a 100-gallon tank this amounts to a 0.1 pint difference at 32° compared to 39° F.

The same conditions exist as temperature increases above 39° F. At 50° F. a 100-gallon tank reads about 1/4 pint higher than at 39° F. These are small errors in comparison to other sources of error. Careless reading, dirty dipsticks, and residual milk losses can and do cause more significant variations in weight control.

### DIPSTICK MEASUREMENT

Dipsticks are usually graduated in 1/16- or 1/32-inch subdivisions. Acceptable accuracy can be obtained if certain precautions are observed. Remember that stable positioning during installation is the basis of success.

Bulk tanks are designed in different ways to assist leveling operations. These include:

1. Punch or scribe marks inside the tank. Sometimes these are placed in each of the four corners.
2. Leveling areas on the outer top of tanks.
3. Built-in vertical and horizontal spirit or bubble levels. Circular levels can be set and then fixed with lead and wire seals threaded in setscrews. But these can be damaged.

When punch or scribe marks are used inside tanks, legs are adjusted until a prescribed amount of water touches all marks. Some difficulty may be experienced in making accurate visual observations of water against the stainless steel surface. This is especially true if marks are located deep inside the tank.

Leveling positions outside the tank are effective. Usually two scribe marks or pegs enclose the leveling surface; proper positioning can be determined by placing a level between them. These marks are handy also for making routine checks at later dates.

Occasionally four punch marks will be placed at "capacity" level when initial calibration is made. Milk will flow out one or more of these holes if the tank settles out of tolerance. Subtle changes will not be detected.

#### CALIBRATION OF TANKS

A specially designed 5-gallon measuring can must be used. These can be obtained from petroleum equipment dealers at nominal cost. They are positive displacement cans which permit use of water at any temperature and can be read to 1 cubic inch. Inaccuracies arise only if water temperature varies significantly between dumping and reading. It is best to use water at a temperature close to that inside the tank.

Before dumping water a few requirements must be met:

1. Dipstick must be in a vertical fixed position.
2. Graduation marks and numerals must face away from tank wall.
3. Dipstick must not touch bottom of tank.
4. Maximum swing at bottom of dipstick 30 inches or less in length must not exceed  $\frac{3}{4}$  inch; for 30 to 60 inch rods swing must not exceed  $1\frac{1}{4}$  inch.
5. Dipstick must be absolutely clean. Greasy or oily rods allow products to creep higher. A film of moisture has the same effect. When the dipstick is clean, water droplets will not gather or spread anywhere on its surface.
6. Dipstick must be dry. Rods can be dried satisfactorily with paper towels. Rub briskly. Dust the stick with powdered Bon Ami from a cloth sac. Blow off excess to avoid high readings. Measurements made with water will then equal milk measurement at identical fill.

Pour precisely 5 gallons of water into tank using farm water supply. A funnel and pipe arrangement is usually used. Make a reading after water comes to rest. All previous effort will be wasted if reading is not accurate. Have good lighting. Record reading. Do not record any indistinct or sloping or irregular measurements.

If any one reading is indistinct and you want to make a second attempt at the same fill, wash, dry, and redust stick before doing so. Never read from a previously wetted surface.

Measurements should be recorded to the nearest graduation.

It is necessary to add 5-gallon increments until the tank is filled to capacity, recording after each dump. No section of the tank can be assumed to measure the same as another.

From this data a conversion chart can be prepared. Use 8.6 pounds per gallon as the weight of milk. Fill in weights for points between the measured 5-gallon recordings.

Once a tank has been positioned, leveled, and filled it should be fixed to the floor. This will prevent accidental movement and discourage tampering. Rough a small area around legs and enclose each in a small amount of fast drying cement.

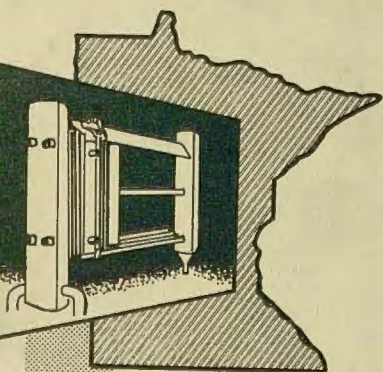
### FACTORY PREPARED CALIBRATION CHARTS

Many companies supply conversion charts with their bulk tanks. Nevertheless, each tank should be given an initial calibration study as previously described to assure accuracy. This means filling the tanks to capacity. Adding water to a single level and checking against the chart is not sufficient. If readings are consistently high or low, legs can be adjusted until volumes agree with chart figures.

Tanks do go out of tolerance. When check weighings do not agree with farm receipts, tanks must be recalibrated. Until such time as an accurate metering device may become available, this necessitates use of the rather tedious 5-gallon unit procedure. Can you afford not to be precise?

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