

**BULK MILK  
COLLECTOR  
INTRODUCTION  
HANDBOOK**

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# **Farm Bulk Milk Collection and Sampling Procedures**

## **Introduction**

The farm bulk milk hauler/sampler plays a very unique and important role in the dairy industry as a representative of both the buyer and the seller of raw milk. The hauler/sampler's judgment and decisions with regards to quantity, sampling, and quality of the milk at the farm has a direct effect on the final milk price paid to the producer and also the quality of the milk products being offered for sale

A hauler/sampler must possess many skills in addition to being able to negotiate a large truck over a variety of terrains under all types of weather conditions. The driver is first a food handler. All steps taken by the hauler/sampler must protect the milk from contamination. Personal appearance, milk sampling and pickup practices and the appearance of the truck reflects upon this role. The hauler/sampler is responsible for his or her vehicle and all of its equipment regardless of who cleans and sanitizes that equipment including the tanker, the hoses, valve lid, gasket, vent, and sample dipper and sample dipper container.

A hauler/sampler must be able to determine and record milk weights accurately and collect and handle milk samples properly. It is important for the hauler/sampler to appreciate the need and take responsibility for cleanliness and sanitation in the handling and protection of samples entrusted to his or her care. Sufficient time must be taken to perform all duties in the proper manner.

The hauler/sampler is a most important link in the chain of events that moves milk from the farm to the table. A chain is only as strong as its weakest link. By being the middle link, the hauler/sampler is in a position to ensure that the good quality milk collected from dairy farms is handled properly so that the quality is maintained between the farm and the milk processing plant.

## **Licensing**

Each hauler/sampler, whether full-time, part-time, a relief driver, or an emergency driver, must be licensed by each state in which they pick up milk even if they only pick up milk infrequently in that state. Applicants for a hauler/sampler license must be qualified, trained and evaluated. For all new applicants, this includes both a written exam and a field evaluation administered by the state regulatory agency. A state regulatory agency may accept the examination results and field evaluation conducted by another state if the hauler/sampler is applying to be licensed in more than one state. It is mandatory for everyone who holds a Certificate of Competence to Weigh and Sample Milk to have attended at least one training seminar during the three year period their license was in effect to have their license renewed. If someone fails to attend at least one training

seminar during the three year period their license was in effect they will have to retake and pass the examination to renew their license.

Field evaluations of licensed hauler/samplers are conducted at least once every 24 months (two years) by the state regulatory agency.

Licenses may be revoked, after a hearing, for dishonesty, incompetence, inaccuracy or violation of the licensing state's laws and regulations.

## **Equipment**

It is essential that the hauler/sampler have on hand the necessary equipment to pick up milk. All equipment and utensils used must be made of a safe, cleanable material and must be in good condition free of dents, cracks or checks. This equipment includes:

- 1) Sample case and rack: The sample case should be constructed of rigid metal, plastic or other approved material for safe transportation of samples to the laboratory. The case must have ample space to hold a rack or flotation retainer as required to keep samples in an upright position with the neck of the sample containers above the surface of the cooling medium.
- 2) Refrigerant: A refrigerant is required to maintain samples at 32° - 40° F. The level of refrigerant should be kept at the level of the milk in the sample containers. The preferred refrigerant is ice and water.
- 3) Sampling instrument: This can be a seamless stainless steel dipper, sterile straw, Bob-J device or any other sampling device of sanitary design approved by the regulatory agency. The sampling device must be kept clean and in good repair.
- 4) Sanitizer and sampling instrument container: Most sampling instruments must be stored and carried into the milk house in a tightly closed sanitizing solution container. The sanitizing solution must be of proper strength and must be discarded and replaced with fresh solution after each tanker load of milk is picked up or sooner if it appears to be diluted in strength due to added solids such as milk or dirt, or due to added water. Two commonly used sanitizers and the strengths in which they should be used are: iodine: 25 parts per million, and chlorine: 200 parts per million.
- 5) Sanitizer test kit: Used to check strength of sanitizer. The strength of the sanitizer must be tested every time the sampling instrument container is filled. You need to have a test kit for the sanitizer you are using.
- 6) Sample containers: Sample containers can be sterile vials, bags, tubes, or bottles. They must be large enough to hold at least 30 ml and must have space on them for sample identification. Before use, sample containers should be carried in the cab of

the truck. They must be kept clean and dry and properly protected in a covered container or plastic bag. Sample containers must not be carried loose or in the refrigerated sample case prior to use. Spare sample containers should be carried in case any turn out to be unclean or defective.

7) Thermometer: A calibrated pocket thermometer must be used. This thermometer can be bi-metal type or digital. The use of mercury or alcohol-in-glass thermometers is discouraged due to the potential for glass breakage which could cause contamination of the milk. Thermometers must have gradations and be accurate to 2° F. (1° C.). Thermometers must be checked against a standard thermometer at least once every 6 months. A label must be affixed to the thermometer's case with the date checked and the checkers initials. A field check of the thermometer should be conducted periodically. This is done by placing the thermometer in a mixture of three parts ice to one part water. When the thermometer comes to rest it should read 32° f. If necessary, the pointer on a dial thermometer should be adjusted by turning the external adjustment nut while firmly grasping the dial.

8) Watch: A watch to time the duration of agitation of the milk in the bulk tank prior to sampling and from which to note and record time of arrival at milk house.

9) Waterproof indelible marker: Waterproof, felt tipped pen to use when it is necessary to identify or mark a sample container for any reason and to identify the temperature control as required.

10) Pen: A ball point pen with indelible ink for filling out all necessary paperwork. In addition, a supply of weight receipts should be carried.

### **General Information**

1) Hauler/samplers shall practice good hygiene, shall maintain a neat and clean appearance and shall not use tobacco in the milk house. Outer clothing must be free of any loose particles which may come off into the milk supply or the sample being taken.

2) Be watchful for any condition or article in the milk house which could be dislodged or spilled into the milk supply or the sample. This could be flaking or dripping ceiling surfaces, and drugs or drug handling equipment on the bulk tank or around the hand-washing facility or single service towel supply.

3) Do not walk out into the barn or animal housing areas. This is to avoid spreading bacteria and diseases between farms by carrying manure on your shoes from one farm to the next. Follow any requirements a farm may have for sanitizing your footwear before entering the milk house.

4) Do not pick up any milk which is not held in the producer's bulk tank. This includes milk stored in milk cans, pails, milking machines, etc. This milk is not

refrigerated and may contain very high numbers of bacteria or may contain animal drug residues which can contaminate the entire tanker compartment. In addition, the milk stored outside the bulk tank can not be adequately agitated so as to get a representative sample of the entire batch.

5) Do not measure, sample or begin to pump the milk if the producer has not finished milking.

6) Pick up all of the milk from every farm at least every other day. Milk that is more than two days old is lower in quality.

7) Always pick up all of the milk in the producer's bulk tank. Partial pick ups are only allowed if: 1) the farm bulk tank is equipped with a 7 day recording chart and the milk tank is emptied, washed and sanitized at least once every 72 hours, or 2) the milk remaining in the tank after the partial pick up is picked up and the tank is washed and sanitized prior to the next milking.

8) If there is more than one bulk milk tank on a farm, each tank must be sampled, measured, and checked for odor and appearance separately.

9) If the milk in a producer's bulk tank is not at a level that can be reached by the agitator, so as to be properly agitated, do not pick up the milk. Notify the plant, the field representative and contact the producer directly, or leave a written note in a conspicuous place, as to why the milk was not picked up. Milk that is not agitated cannot be properly cooled or sampled. The field representative should be notified if the milk level is so low that it is obvious the milk did not touch the agitator after the first milking.

10) Wash tags are placed near the milk tank truck outlet by the individual who cleaned and sanitized the tanker. These tags are to be removed only at the next location where the milk tank truck is cleaned and sanitized. The information on the wash tags must include the identification of the milk tank truck, the day, time, location and initials of the person who cleaned and sanitized the milk tank truck. The bulk milk hauler/sampler is responsible for maintaining all of the information on the wash tag.

11) A bright, shiny truck leaves a lasting impression on the public and the dairy farmers. Generally the driver is not required to physically clean the inside of the tanker but it is the responsibility of the driver to determine that the tank is clean and sanitized prior to picking up milk. The milk pump, hose, valve and pump compartment must be cleaned and sanitized after each delivery, or once each day if the truck is immediately going out on another route.

### **Pick-up Procedures**

1) **Evaluating milk quality.** Upon entering the milk house at each farm, the first task is to grade the milk to determine if it is acceptable. The decision to accept or reject the milk is one of the most difficult decisions a hauler/sampler will make. However, it is important because defective milk from a single producer can spoil the quality and flavor of an entire tanker load of milk. If the quality of a producer's milk is suspect or considered unacceptable for any reason, the hauler/sampler should collect a milk sample in the usual way but leave the milk in the bulk tank and immediately notify the milk plant, the field representative and contact the producer directly or leave a written note for him or her in a conspicuous place. This milk sample should be marked with an "X".

a) Odor. Smell the milk through the porthole or manhole of the tank to check for sour, malty, feed, unclean, chemical or any other off odors. If you think you may detect an off odor but are unsure, warm a sample of the milk to approximately 100° F. At this temperature the odor will intensify making it easier to detect.

b) Appearance. Visually inspect the milk in good light for any apparent physical abnormalities. Signs of churning, freezing, excessive foaming, excessive sediment or floating matter should all be considered warning signs.

Normal milk is almost odorless, mildly sweet in taste and ranges in color from bluish-white to golden yellow. A change in this normal odor and color of milk may result from bacterial growth caused by improper cooling, feeding, milking, handling practices or unhealthy animals. The following are some visual abnormalities of milk:

1. Bloody milk. Milk from fresh or mastitic cows may contain blood. A very small amount of bloody milk can give a large quantity of normal milk a reddish tinge.

2. Flaky milk. Flakes or curd particles may occur in milk as a result of mastitis, souring, or destabilized protein. Milk from mastitic cows may show light flakiness or pronounced stringy curd particles. Flakiness due to souring of the milk is usually accompanied by a disagreeable sour milk odor.

3. Extraneous matter. Floating extraneous matter such as insects, hair, bedding, chaff and straw is cause for rejection of milk, The presence of extraneous matter may result from careless handling of the milk, open doors, torn screens, dusty conditions, failed filtration systems and/or improper cleaning of the animals teats prior to milking.

4. Churned milk. Visible fat globules, (butterballs), sticking to the side of the tank or floating in the milk are due to excessive agitation at warm temperatures either within the farm bulk tank or the milk transfer system.

5. Frozen milk. Presence of ice in the milk is an indication that the farm bulk tank is malfunctioning and is cooling the milk below freezing. The particles will be noted floating on top of the milk or seen frozen to the cooling coils when the milk is removed from the tank.

6. Excessive foaming. A stable foam is caused by the agitator running at the wrong speed, air leaks in a pipeline milking system or when the drop pipe leading into the farm bulk tank is insufficient in length.

c) Temperature of milk. Determine the temperature of the milk using your thermometer. Place the sanitized thermometer stem in the milk for 20 to 30 seconds until the pointer comes to a rest. The milk temperature in the farm bulk tank should not exceed 45° F. when the milk is picked up. If the milk is over 45° F. it should be rejected. Incorrect holding temperatures can have a significant effect on the quality of the milk.

The thermometer must be placed in a sanitizing solution for at least one minute before being used in the milk. Some haulers store the thermometer in a puncture hole in the top of the sample instrument container so that it is always in contact with the sanitizer. Always rinse the thermometer with clean water before returning it to its case or into the sanitizing solution.

If the tank thermometer is used to determine temperature it must be checked against your pocket thermometer at least once each month. Record this monthly check on the farm weight receipt. If the bulk milk tank has a 7 day recording chart this also needs to be checked for accuracy against your pocket thermometer at least once each month. Record this check on the chart.

**Rejecting the milk.** If for any reason you feel that the quality of the milk in a producer's farm bulk tank is such that it may, if commingled, adversely affect and cause the bulk tank truckload of milk to be rejected, sample the milk, contact the plant and the field representative, contact the producer directly or leave a written notice for the producer in a conspicuous place, but **do not** pick up the milk. This milk sample should be marked with an "X".

**Accepting odd pick up or unusual milk.** If the tank contains an odd number of milkings or partial milkings or there is some sign of freezing, foaming or churning, mark the sample container with an "X" taking care that the "X" does not prevent the producer number from being read. This will alert the laboratory personnel that the sample should not be used for butterfat testing. If you do "X" a sample attach a note to the sample rack explaining why the sample was "X'd."

## 2) Measuring the milk.

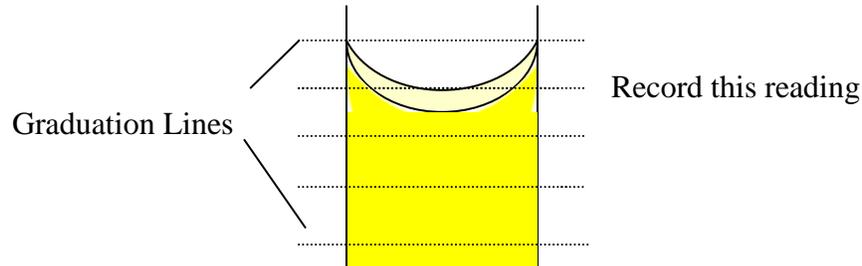
**Measuring Devices.** There are two types of measuring devices used for measuring the volume of milk in farm bulk tanks. One is a stick type gauge which measures the

milk in either inches and fractions of an inch or centimeters and millimeters. The other is an external gauge which has a glass or plastic sight tube and a scale plate. This may also use either conventional or metric measurements. Both measuring devices are compared to a calibration chart developed specifically for the tank to determine the actual weight of the milk in the tank.

**Measurement.** The milk in the bulk tank must be absolutely still when it is measured. If the agitator is running when you arrive at the farm you may want to sample the milk before you measure it. If the agitator is not running and the milk is at a complete rest, do the following:

- a) Turn off the agitator to prevent it from coming on while you are measuring the milk.
- b) If the milk is measured using a gauge stick, remove the stick from the milk. Either wipe the stick dry with a clean, single-service paper towel or wash it in warm water to remove milk residue and then wipe dry with a clean, single service paper towel. If the milk residue is not removed it may cause the milk in the tank to climb up the stick and give an inaccurate reading. If the stick is the type that hangs outside the bulk tank it must be washed and sanitized before being used.
- c) Taking care not to contaminate the stick as you handle it, carefully lower it straight down into the milk until it is one quarter inch from its base. Hold the stick in this position briefly then lower it slowly until it is seated firmly in its base.
- d) Remove the stick and read it in good light at eye level. This reading is the depth measurement. If the milk level is between two graduations, read it as if it were on the nearest graduation. If the milk level is exactly between two graduations read the measurement to the nearest even graduation.
- e) Always repeat the process until you have two consecutive readings that are the same. For subsequent readings wipe the stick downward with a clean paper towel to remove milk residue.
- f) Immediately record the measurement on the weight receipt so it is not forgotten.
- g) If the tank is equipped with an external gauge make sure that the sight tube is clean and dry. If there is milk or water in the tube drain it out and fill the tube only with cold milk from the tank. Also make sure that the sight tube is vented to the atmosphere at the top. Restrictions in the venting may cause false low readings of the milk level.
- h) To operate the external gauge, open the valve at the bottom of the tank and slowly allow the milk to run up into the tube until it reaches the static level of the

milk in the tank. Filling the tube slowly prevents the milk from foaming and from rising to a level higher than the milk in the tank. The milk in the tube will appear to be higher at the edges and curve down to a low point in the middle. This is called the meniscus.



i) The external gauge is equipped with a vernier. Slide the vernier along the scale plate and sight tube until one edge is on the highest point at the center of the meniscus. This edge on the vernier will correspond with a reading on the scale plate. As with the stick reading, if the measuring point is between two graduations read it to the nearest graduation. If the measurement is exactly between two graduations read it to the nearest even graduation. Record the measurement on the weight receipt.

j) Use the calibration chart to convert the stick or scale plate reading to pounds. The calibration chart is specific to each bulk tank and should have written on it the serial number that is on the measuring stick or scale plate. You can not give the producer a higher measurement than the highest reading on the conversion chart.

**Recording Results.** Promptly record all results. Do not rely on memory. The following information shall be included on the weight receipt:

- a) Time and date of arrival
- b) Producer's identification (name or number)
- c) Route number
- d) Hauler/sampler's signature
- e) Milk temperature
- f) Stick or scale plate reading.
- g) Converted milk weight.
- h) Name of buyer
- i) Once a month note the day the tank thermometer is checked if that is used for milk temperature.

**3) Sampling the Milk.** It is the responsibility of the hauler/sampler to collect a representative sample of milk from each farm bulk tank, regardless of whether the milk is accepted or rejected by the hauler/sampler. The sampling method used is called the universal sampling method. This ensures that each bulk tank of milk is

sampled in such a manner that every sample can be used for a variety of quality checks including butterfat, bacteria, herd health, added water, and residues of antibiotics or other inhibitors, and as a check on milk sampling techniques. The laboratory will determine at random which tests to conduct on a sample. These tests are only reliable if the hauler sampler has agitated and sampled the milk and handled the sample properly. The sample will provide evidence if the hauler/sampler rejects a bulk tank of milk and allow the source of the problem to be traced if the tanker is rejected by a milk plant.

**Agitation.** All milk must be properly agitated before sampling. The milk in all farm tanks must be agitated a minimum of 5 minutes. Tanks larger than 1,500 gallons must be agitated for a minimum of 10 minutes. For large tanks follow the manufacturer's recommendation. These are generally located on an information plate on the back of the tank. Use a watch or other timing device to ensure that proper agitation time is achieved.

Proper agitation time can not be over emphasized. Insufficient agitation time may be the largest single contributing factor to butterfat test variations. Improper agitation may also affect bacteria and somatic cell counts as the bacteria, and somatic cells tend to rise with the cream.

**Please note:** Even if the bulk tank agitator is running when you arrive in the milk room you must continue to agitate the milk for at least 5 minutes or the minimum requirement for the tank.

While the bulk tank is agitating you may complete the following steps:

- a) Connect the milk transfer hose to the bulk tank outlet. Make sure you always use the hose port. Handle the cap from the transfer hose in a sanitary manner and store it to prevent contamination. It is recommended that you lay it on the outlet valve cap or hang it on the outlet valve handle. When you remove the outlet valve cap, if you notice that milk has leaked past the valve, rinse and sanitize the outlet before connecting the transfer hose. If no milk has leaked past you can assume that the outlet is a sanitized surface and connect the transfer hose.
- b) Wash and dry your hands after connecting the transfer hose using the producer's hand wash facilities.
- c) Measure the temperature of the milk.
- d) Clearly identify the sample container using a waterproof marker or a pre-made label.

**Sampling.** Collect the sample after the minimum required agitation time and before the outlet valve is opened. The agitator must still be running when the milk sample is taken.

- a) Remove the sample dipper from the sanitizing solution in which it is stored. If a Bob-J sampling device is used, the sample vial, with cap open, is placed in the holding clip and the vial and holder are immersed in sanitizer for a minimum of one minute.
- b) Rinse and completely empty the dipper in the agitating milk at least twice to assure that none of the sanitizer gets into the milk sample.
- c) Immerse the dipper in at least 6 inches of milk to obtain the sample.
- d) Without touching the inside of the sample container or the milk, transfer the sample into the sterile sample container being careful not to fill the container directly over the bulk tank opening. Fill the sample container 2/3 to 3/4 full. Make sure the sample container is closed tightly.
- e) Rinse the dipper with warm water and return to the sanitizing solution. The dipper and the container holding the dipper and sanitizing solution need to be brushed clean using an approved detergent and rinsed and sanitized when the truck is washed.
- f) Close the bulk tank lid or cover after weighing and sampling the milk.
- g) Immediately place the sample in the refrigerated sample storage case making sure it is upright and properly placed in the refrigerant.
- h) At the first pick up of each route every day a second sample must be taken as a temperature control. This sample must be identified as the temperature control with a "T" or "TC" and must have the date and time the sample was taken, temperature, and producer and sampler identification on it. This sample is placed in the sample storage case with the others.

**4) Milk Pump Out.** The following procedures should be followed.

- a) When the milk has been measured, sampled and evaluated open the outlet valve and start the milk pump. **Under no circumstances should the milk be measured or sampled after the valve has been opened and the pump started.**
- b) The agitator should be running, until the milk reaches the agitator blade(s), and the bulk tank lid closed, but ajar if not vented, while the milk is being pumped out.
- c) When the milk level in the tank reaches the agitator blades stop the agitator and turn off the refrigeration if the tank is a direct expansion type.

- d) When the bulk tank is empty turn off the milk pump, disconnect and cap the transfer hose and return it to the truck. Make sure the hose port is closed.
- e) Observe the inner walls and floor of the bulk tank for signs of freezing, churning, sediment or other foreign matter. If any abnormalities are observed notify the producer, the plant and the field representative.
- f) Rinse the bulk tank with warm water (100° F.) and close the bulk tank lid(s).
- g) Hose down the floor to clean off any spilled milk and return the hose and any other displaced items to their proper places in the milk room.
- h) Be sure to turn off the lights when you leave.

The scheduling of your route involves many people. The hauler wants to run his route in the most efficient manner possible, the receiving plant schedules times of arrival for all incoming milk and the producer needs to finish milking or washing his bulk tank prior to milking. Somehow you must schedule your route to accommodate all these people. Milk collectors, handlers and producers should cooperate to coordinate time of milking and collecting so as to permit cooling of milk and cleaning and sanitizing of equipment.

In conclusion, the work of the bulk milk hauler/sampler is very important in today's milk marketing system. By following the procedures in this guideline you will assure: that the milk producers are paid the proper amount for the milk they produce, that the samples of their milk represent the true quality of the milk, that the milk company receives only good quality milk and that milk remains a high quality and wholesome food for the consumer.