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Michigan Department of Agriculture and Rural Development

Bulk Milk Haulers Training Manual

Food and Dairy Division
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CONTENTS

Introduction **3**
Dairy Laws And Regulations **3**
Bulk Milk Hauler/Sampler Operational Requirements **5**
Examination And Score **9**
Grading By Smell, Sight And Temperature 12
Sampling The Milk **14**
Measuring The Milk **16**
Transferring Milk **18**
Unloading Milk Tank Truck 18
Summary **20**
Appendix A **21**
Milk Tests **21**
Milkfat/Butterfat **21**
Protein **21**
Appendix B (Chart A) **24**
Appendix B (Chart B) **25**
Appendix C **26**
Appendix D/E **28**
Appendix F **36**
Appendix G **36**
Appendix H (Forms) **38**

PURPOSE

This manual is provided as a study guide for those preparing to take the examination to become a licensed bulk milk hauler/sampler. Included is a basic review of the applicable Michigan dairy laws, regulations, and codes, with a discussion of the principles, procedures and techniques used on the job. This document may also be used for reference or review when questions arise.

INTRODUCTION

The licensed bulk milk hauler/sampler has responsibilities in addition to properly loading, transporting, and unloading bulk milk. The quality and quantity of milk delivered to the dairy plant depends on how knowledgeable the hauler is in grading and weighting the milk before pumping into his/her bulk tank truck. In order to do the job properly the hauler must:

1. Have a basic understanding of the laws and supplemental documents that cover the bulk milk hauler/sampler.
2. Provide properly constructed, cleaned and sanitized milk sampling, transfer, and transport equipment.
3. Have the ability to grade milk and reject milk not acceptable for pickup.
4. Have the ability to properly sample milk and transport milk samples for all required testing.
5. Have the ability to accurately measure milk and complete records, posting copies of the record, as required.
6. In cooperation with the dairy producer when applicable, properly label and maintain accurate bulk tank temperature recorder charts, changing them at the proper frequency.

DAIRY LAWS AND REGULATIONS

This manual is based on the following Michigan laws and supplemental documents. Copies of these laws and documents may be obtained from the Michigan Department of Agriculture and Rural Development (MDARD).

- The Manufacturing Milk Law of 2001
- The Grade A Milk Law of 2001
- Pasteurized Milk Ordinance (PMO)
- Standard Methods for the Examination of Dairy Products, 16th Edition, published by the American Public Health Association (Standard Methods).

Both the Manufacturing Milk and Grade A Milk laws require that a bulk milk hauler/sampler be properly licensed to sample and pickup farm bulk milk.

The Grade A Law of 2001 provides the licensing requirements and procedures as follows:

1. At the time of application, the person shall pay a license fee of $40 and complete an application form provided by MDARD. The person shall renew the license every two years by applying for renewal, and by paying a fee of $40 on or prior to July 1 (for renewal applications see **APPENDIX H**). When a bulk hauler/sampler is initially licensed, the license fees can be prorated in six month increments if the application is for a partial year. For example, if a hauler is licensed in January and the biennial renewal date is July of that same year, the initial license would be valid for only six months and a $10 fee is all that would be required.

2. MDARD will examine each applicant's qualifications to:
    a. Evaluate or grade milk in each farm bulk tank.
    b. Obtain a representative sample from each farm bulk tank.
    c. Properly handle and transport samples.
    d. Accurately measure milk in each farm bulk tank.
    e. Accurately record milk weight and temperature.
    f. Protect milk when transferring and transporting.

Legal Requirements:

The following are excerpts from the Grade A Milk Law of 2001 detailing the licensing and operational requirements pertaining to bulk milk pickup hauler/samplers:

LICENSING REQUIREMENTS FOR TANK TRUCK CLEANING FACILITIES, MILK TRANSPORTATION COMPANIES, BULK MILK TANK TRUCKS AND HAULER/SAMPLERS:

Sec. 33.

1. NOT APPLICABLE
2. Each milk tank truck cleaning facility that cleans milk contact surfaces of milk tank trucks used to haul milk or milk products regulated under this act must be licensed or permitted under this act either as part of a milk plant, receiving station, or transfer station or a stand-alone milk tank truck cleaning facility. A licensing or permitting fee shall not be charged under this act for a milk tank truck cleaning facility that is a part of a dairy plant, receiving station, or transfer station licensed or permitted under the manufacturing milk law of 2001.

   Each stand-alone facility will be licensed or permitted at a rate of $50 per year. License renewal shall take place on June 30 every year.
3. Each milk transportation company must be licensed or permitted under this act at a rate of $20 per year. License renewal shall take place on June 30 every year.
4. Each milk tank truck must be licensed or permitted under this act at a rate of $10 per year. License renewal shall take place on June 30 every year.
5. NOT APPLICABLE
6. NOT APPLICABLE
7. A person shall not pick up grade A milk in a farm pickup milk tank from a farm bulk milk tank without a hauler/sampler license issued by the department under this section. Each applicant for a license shall be examined by the director under the provisions of this act to determine his or her qualifications to evaluate milk in a farm bulk milk tank, to accurately measure milk in a farm bulk milk tank, to obtain representative samples of milk from a farm bulk milk tank, to properly handle and deliver the samples, and to pick up milk. The license fee is $40 for two years. An initial license fee may be prorated in six-month increments at $10 per increment. A hauler/sampler licensed or permitted in another state shall apply for a license from the department without examination after submitting satisfactory proof of training and current licensing in another state to the department with the license fee and application, unless this requirement is waived by the director based on reciprocal agreements with individual states.

The director may deny license renewal to any bulk milk hauler/sampler if the bulk milk hauler/sampler has not had a satisfactory evaluation of their hauler/sampler methods in the previous two years. License renewal shall take place on June 30 every two years.

BULK MILK HAULER/SAMPLER OPERATIONAL REQUIREMENTS

Sec. 61.

1. A bulk milk hauler/sampler shall not take milk from a farm tank without first determining that the farmer has a valid permit if a permit is required. Milk shall be picked up from only an approved farm tank, constructed to sanitary standards with agitation and cooling except as approved in writing by the director on a case-by-case basis.
2. A bulk milk hauler/sampler shall pick up only milk that appears to be normal and does not contain off odors or visible foreign material and that has been stored on the farm for no more than 72 hours. Goat milk may be stored up to seven days in a farm tank if properly cooled. Sheep milk may be frozen for storage.
3. A bulk milk hauler/sampler shall not record or report inaccurately a milk measurement taken in the farm tank. A measurement shall be made with a measuring gauge that is clean and wiped dry with a sanitary towel or by any other measuring method meeting the requirements of section 65(3).
4. After measuring the milk in the farm tank, the bulk milk hauler/sampler shall promptly, accurately, and legibly record the following information on the pickup record:
   a The gauge or stick reading.
   b The converted gauge or stick reading in pounds.
   c The date and time of pickup.
   d The milk producer's name and permit number.
   e The temperature of the milk from an accurate thermometer.
   f The bulk milk hauler/sampler's identification, including the bulk milk hauler/sampler's name or initials and department issued hauler/sampler identification number.
   g The assigned "bulk tank unit" (BTU) number.
5. A bulk milk hauler/sampler shall provide the original copy of the pickup record to the milk buyer and a duplicate copy, or other record acceptable to the director, to the producer.
6. A milk tank truck driver engaged in direct farm pickup has direct responsibility for accompanying official samples.

Sec. 62.

1. During a pickup, a bulk milk hauler/sampler shall take a sanitarily collected representative sample from each farm tank after the tank is agitated for not less than five minutes and for not less than 10 minutes for tanks over 1,500 gallons or for such additional time as may be recommended by the tank manufacturer or the director, so as to obtain a representative sample.
2. A sample dipper shall be rinsed by the bulk milk hauler/sampler at least twice in the milk prior to transferring the sample to the approved sample container.

3. Sample transfer instruments shall be used by bulk milk hauler/samplers that are of sanitary construction, clean, and sterile, or which are sanitized with approved sanitizers and protected from contamination prior to each use.
4. A bulk milk hauler/sampler shall take a temperature control sample of the milk at the bulk milk hauler/sampler's first sampling point and shall place it in the refrigerated, insulated transport case with the first official sample.
5. The bulk milk hauler/sampler shall identify the temperature control sample with the hauler/sampler identification, time, temperature, date, producer permit number, and letters "T.C."
6. A bulk milk hauler/sampler shall not sample milk in the farm tank during emptying.
7. A bulk milk hauler/sampler shall not sample milk in the farm tank with a sample container or any other unapproved transfer instrument or sampling device.
8. A bulk milk hauler/sampler shall place producer milk samples into approved sample containers only. The sample containers shall be properly protected and handled to prevent contamination.
9. A bulk milk hauler/sampler shall place milk only in sample containers that are legibly marked with the following:
    a The milk producer's permit number.
    b The date of pickup.
    c The route number.
    d Temperature.
10. The bulk milk hauler/sampler shall store the milk samples in an approved manner to protect the samples from contamination inside a refrigerated, insulated transport case that is kept tightly covered until the samples are delivered to the transfer point, laboratory, or other destination.
11. The hauler shall maintain milk samples in a temperature range of 32 degrees Fahrenheit (0 degree Celsius) to 40 degrees Fahrenheit (4.4 degrees Celsius).

Sec. 63.

1. A bulk milk hauler/sampler shall not adulterate milk in the farm tank or the milk tank truck.
2. There shall be no partial removal of milk from the farm tank by the bulk milk hauler/sampler except that partial pickups may be permitted when the farm tank is equipped with a seven day recording device complying with the specifications of pasteurized milk ordinance appendix H, or another recording device acceptable to the department, provided that the farm milk tank shall be cleaned and sanitized when empty and shall be emptied at least every 72 hours. In the absence of a temperature recording device, partial pickups may be permitted as long as the farm tank is completely empty, clean, and sanitized before the next milking. In the event of emergency situations, seasonal weight restrictions, or the overflow of the milk tank truck, partial pickups will be allowed.
3. A bulk milk hauler/sampler shall carry an accurate, approved dial-type or electronic thermometer with him or her on the route and shall not pickup milk from a farm tank which exceeds the maximum temperature allowed by law.
4. A bulk milk hauler/sampler shall keep his or her sample transfer instrument and sample transport case clean and in good repair.
5. A bulk milk hauler/sampler shall use the hose port provided for him or her in the milkhouse for accommodation of the pickup milk hose.

6. A bulk milk hauler/sampler shall comply with the requirements of appendix B of the pasteurized milk ordinance, incorporated herein by reference.

Sec. 64.

1. The milk transportation company shall be responsible for maintaining the tank and milk contact surfaces of a milk tank truck clean and in good repair. Milk or milk products shall not be placed in such tanks unless the tanks have been properly cleaned and sanitized at a milk plant, receiving station, transfer station, or other licensed milk tank truck cleaning facility.
2. Suitable facilities for cleaning and milk contact surfaces of the milk tank trucks shall be provided and the washing and sanitizing of the tanks shall be carried out by the receiving milk plant, transfer station, receiving station, or other licensed milk tank truck cleaning facility. The milk transportation company representative or the bulk milk hauler/sampler shall be responsible for cleaning the hose, pump, and valves. After the cleaning and sanitizing operation is completed, a representative of the milk tank truck cleaning facility shall provide a suitable record identifying who washed the milk tank truck, the license or permit identification number of the milk tank truck, the date, and the location of the facility. The milk transportation company representative or the bulk milk hauler/sampler, after inspection of the tank, shall indicate on the record that the tank has been cleaned to that person's satisfaction. A copy of this record shall be kept with the vehicle until it is washed and sanitized again.
3. A bulk milk hauler/sampler operating a bulk milk pickup tanker may make more than one trip daily without cleaning and sanitizing the bulk milk pickup tanker. The bulk milk pickup tanker shall be cleaned and sanitized after the final trip of the day, each day of use.
4. A milk transport tank shall be cleaned and sanitized each time the tank is emptied.
5. Milk may be picked up in the milk tank truck on the return trip to the bulk milk hauler/sampler's home if the milk tank truck is cool enough to maintain the milk placed in it at or below the legal storage temperature and if the pickup hose and pump are washed and sanitized at a licensed wash facility or at a cleaning facility approved in writing by the director on a case-by-case basis.
6. A milk tank truck may be used to haul potable water, or other wholesome liquid food products, if the milk contact surfaces are properly cleaned and sanitized prior to picking up raw milk. Certain pasteurized products, as specified in the pasteurized milk ordinance, must be transported in milk tank trucks dedicated to hauling pasteurized products.
7. A milk transfer station or receiving station shall keep daily records identifying which farm loads of milk have been commingled in each milk transport tank. These records shall be kept at the transfer station or receiving station for not less than 30 days.
8. Producer samples shall accompany the milk transport tank holding the largest amount of the farm bulk milk pickup tanker's milk unless the samples are transferred or held for testing at other locations.

Sec. 65.

1. A farm tank on a dairy farm shall be installed so as to remain level at all times.
2. A farm tank shall have an accurate indicating thermometer stored in the milkhouse which may be either an integral thermometer in the farm tank or an approved thermometer acceptable to the director.
3. A farm tank shall have a calibrated means of measurement and an accurate and legible volume to weight conversion chart unless the farm tank is mounted on an accurate scale. All measuring devices must be in compliance with the weights and measures act of 1964, 1964 PA 283, MCL 290.601 to 290.634.

4. A conversion chart shall bear the same serial number as that found on the farm tank and measuring rod.

5. The producer is responsible for recalibrating a farm tank that does not have an accurate conversion chart. A recalibration must be in compliance with the weights and measures act of 1964, 1964 PA 283, MCL 290.601 to 290.634. A person shall not adjust, alter, or change a conversion chart unless the change, alteration, or adjustment is made strictly according to the requirements of the weights and measures act of 1964, 1964 PA 283, MCL 290.601 to 290.634.

6. A farm tank shall not be filled to a capacity that exceeds the calibrated limits as indicated by the conversion chart. If the producer wishes to fill the tank nearer to the top, the tank shall be calibrated to an additional height that still permits proper agitation without spillage.

7. Milk to be offered for sale shall be cooled and stored in the farm tank equipped with cooling and agitation. Other cooling and storage vessels may be used when approved in writing by the director on a case-by-case basis.

8. Milk production shall be of sufficient quantity so that it can be properly agitated not later than at the completion of the first milking into the farm tank.

9. Facilities for effectively sanitizing farm tanks shall be provided by the producer.

10. Non-electric farms shall provide battery powered lighting for farm tanks that will adequately illuminate each farm tank opening. Fuels used for milkhouse operations shall not cause odors that may impart off-flavors.

Sec. 66.

The care and handling of milk samples by all persons in the chain of possession shall be in substantial compliance with standard methods.

Sec. 67.

1. Methods of analysis, including butterfat analysis, shall comply with the requirements of sections six and seven of the pasteurized milk ordinance. Analysis required on producer, raw, and finished product samples shall comply with the pasteurized milk ordinance.

2. The milk buyer of Grade A raw milk shall be responsible for making the quality tests on the raw milk, at the producer level, that are required by law unless the director specifies otherwise. It shall be the responsibility of the bulk milk hauler/sampler to collect the samples for analysis. In situations where the producer is not represented by a milk buyer or handler that provides an approved sample analysis and reporting service, it shall be the responsibility of the producer to insure that the proper number of samples are submitted to an approved laboratory for analysis and that the results are reported to the department. In all situations, it is ultimately the producer's responsibility to insure that a minimum of four official sample results for the previous six months' production are reported to the department. The test results shall be reported to the department as requested.

3. Methods for determining the sediment content of milk shall be those described in standard methods. Sediment content shall be based on comparison with official United States department of agriculture sediment standards, incorporated by reference.

4. If the sediment disc is classified as numbers 1, 2, or 3, the producer's milk may be accepted. If the milk contains more sediment than a number 3, it is considered rejectable.

For a discussion of reinspection items and license revocation items, see APPENDIX G.

EXAMINATION AND SCORE

A passing score of 85 percent must be obtained on the examination to obtain a Bulk Milk Hauler/Sampler's License. The examination consists of 40 written test questions and an on-farm evaluation of sampling and pickup procedures worth 60 points (for farm evaluation, see **APPENDIX C**).

1. At the time of application, the person shall pay a license fee of $40 and complete an application form provided by the department. The person shall renew the license every two years by applying for renewal, and by paying a fee of $40 prior to June 30 of the expiration year (for renewal applications see DY-304, **APPENDIX H**). When a bulk hauler/sampler is initially licensed, the license fees can be prorated in six month increments if the application is for a partial year. For example, if a hauler is licensed in January and the biennial renewal date is July of that same year, the initial license would be valid for only six months and a $10 fee is all that would be required.
2. The department will examine each applicant's qualifications to:
    a. Evaluate or grade milk in each farm bulk tank.
    b. Obtain a representative sample from each farm bulk tank.
    c. Properly handle and transport samples.
    d. Accurately measure milk in each farm bulk tank.
    e. Accurately record milk weight and temperature.
    f. Protect milk when transferring and transporting.

Note: A licensed bulk milk hauler/sampler who fails to properly perform the tasks as indicated above or picks up milk that exceeds 45°F will be in violation of the Grade A Law of 2001 and is subject to license suspension or revocation.

THE MILK PICKUP PROCESS

Personal Requirements:

1. The hauler/sampler must be free of any communicable disease.
2. Every milk hauler/sampler shall hold a valid hauler/sampler license.
3. Hauler/samplers shall be neat appearing, wear clean outer garments, and have clean hands.
4. All hauler/samplers shall be inspected by the regulatory agency at least once every two years.

The Equipment and Documentation Required:

The bulk milk hauler/sampler must have the proper equipment and supplies in order to properly sample, measure, transfer, and transport bulk milk. It is, therefore, necessary to start with the following equipment:

1. All milk transport vehicles shall be legibly identified with the name and address of the milk plant or hauler/sampler in possession of the contents. All bulk milk tank trucks shall display a Michigan Department of Agriculture and Rural Development (MDARD) assigned permit identification numbers in two separate locations on the tank (see **APPENDIX F** for instructions, **APPENDIX H** for DY-305 for application).
2. The milk contact surfaces of the milk tank truck and its component parts must be constructed of approved materials and kept in good repair. Inspection of the milk tank truck and its components will be made annually by MDARD or another state's regulatory agency. The milk tank truck truck, transfer hose and pump must be properly washed and sanitized. The responsibility for a clean and sanitized tank and pump lies ultimately with the bulk milk hauler/sampler and the milk transportation company that owns or leases the tank.
3. The milk tank truck must be washed and sanitized daily (every 24 hours). When in continuous use, two or more trips may be made daily without re-washing or sanitizing if the milk tank truck remains closed and cold. A clean, empty milk tank truck must be re-sanitized when setting longer than 96 hours after washing and sanitizing. The wash tag should be endorsed to note the date and time of re-sanitizing. Tank trucks setting longer than 96 hours after washing and sanitizing must be re-washed and sanitized, and have a new wash tag issued.
4. The record of the tank truck washing and sanitizing must be maintained for a minimum of 15 days at the milk receiving facility.
    a. If the tank always delivers milk and is washed and sanitized at the same location, the record of washing and sanitizing may be posted at that wash location or a wash tag may be attached to the tank.
    b. Milk tank trucks delivering to more than one location must have a wash tag attached, stating the permit number of the tank, the date, time and place washed and sanitized, and the signature of the person verifying the tank is clean and sanitized.
    c. Trucks unloading at two or more receiving points in one day must provide a wash tag for each receiving point. The first receiving point will remove the original tag and provide a duplicate or copy for the next receiving point. A wash tag is valid for only 96 hours, as allowed in item three above.
5. The practice of a hauler/sampler picking up milk when returning from a dairy plant at the end of the work day, after washing and sanitizing the equipment, is allowed only if the milk can easily be kept cold as legally required. If more milk is picked up the following work day before delivery to the dairy plant, the pump and hose must first be washed and sanitized in a licensed tank truck wash facility or at a location specifically approved by the MDARD for that purpose. When washing and sanitizing the hose and pump between milk pickups, the hauler/sampler must endorse the wash tag to note that the pump and hose were re-washed and re-sanitized.
6. The wash tag must be attached to the milk tank truck, normally to the dome lid or the outlet valve.

3. Proper sample collection equipment:
    a. A sample dipper of sanitary construction, protected in a carrying case or tube, and in sanitizing solution.
    b. An accurately prepared sanitizing solution for the sample dipper of 200-ppm chlorine (or equivalent). Hauler/samplers are required to have an appropriate test kit to check the concentration of the sanitizing solution.
    c. An adequate supply of sample containers stored in a clean, dry location such as the truck cab, inside a dust free container such as a plastic bag in a cardboard box or a covered plastic storage container.

1. An insulated sample carrying case with a sample rack or floating sample support and adequate ice or refrigerant to maintain samples at 32°F to 40°F (0-4.4°C).
2. A spray bottle or similar device containing sanitizing solution of 200-ppm chlorine or equivalent to sanitize bulk tank outlet valves.
3. An adjustable dial or electronic thermometer calibrated and accurate to + or - 2° F with scale divisions no greater than 2°F. It is recommended that the thermometer used have a scale range of 25° to 125°F (see **APPENDIX D** for calibrating thermometer).
4. A waterproof indelible or permanent marker to identify samples.
5. A watch or other timing device to measure bulk tank agitation time.
6. Adequate supply of milk weight slips and a pen to record the required information.
7. Single service paper towels.

Dairy Farm Requirements:

1. Each dairy farm milkhouse is required to have a covered hose port, in good repair and a minimum 4' X 4' impervious and clean surface under the hose port. The purpose of the impervious surface under the hose port is to provide the hauler/sampler with a place to uncoil the milk transfer hose and keep the hose clean even in adverse weather conditions.
2. Each milkhouse must have an MDARD issued Grade A Milk or Manufacturing Grade Milk permit displayed. If a permit is not displayed, the milk must not be picked up. Manufacturing Grade Milk cannot be commingled with Grade A Milk on the same load unless the entire load is being delivered to a Manufacturing Grade receiving location.
3. Each milkhouse must have a properly constructed bulk milk storage tank with cooling and agitation, unless it is a direct load facility (see **APPENDIX E**) or is specifically approved by the Michigan Department of Agriculture.
4. Each milkhouse must have adequate lighting to grade, sample and weigh (measure) the milk. Non-electric farms must provide at least one battery operated light for each opening in the bulk milk tank.
5. Each dairy farm must have a handwash sink with warm or hot and cold running water, hand-soap and paper towels located in the milkhouse or in a room adjacent to the milkhouse.

GRADING BY SMELL, SIGHT AND TEMPERATURE

Grading the milk in the farm bulk tank is a most important step to assure only clean, uncontaminated, properly cooled milk is transferred and commingled with milk in the bulk tank truck. It is the bulk hauler/sampler's responsibility when grading the milk to screen out and reject milk with serious defects.

The grading of milk is done by smell, sight and temperature only. It is important that the hauler/sampler not taste the milk due to the potential health problems caused by consuming raw milk.

Grading for Off-Odors by Smell:

Odors gather just below the cover of the bulk tank. To properly check for off odors, remove the small lid port opening of the bulk tank (the manhole opening on some tanks) put your nose down to the opening and smell the milk. Keeping the opening as small as possible will prevent odors from escaping. External odors can be a distraction to the hauler/sampler and should be minimized where possible. Examples of external odors are as follows:

1. Milkhouse odors.
2. Gasoline or fuel oil fumes adhering to clothing.
3. Smoking immediately prior to checking for odors or smoking in the milkhouse.
4. Eating or chewing aromatic candy, tobacco, medicine, beverages, foods, etc.
5. Highly scented shaving lotion, soap or toiletries used by the hauler/sampler.

Normal milk has virtually no odor! The hauler/sampler should have a firm impression of the smell of normal milk so he can judge the milk he collects with confidence. Milk with serious off-odors must be rejected. The producer and assigned fieldperson should be contacted to determine the cause and make corrections. In the case a hauler/sampler is uncertain if the milk is acceptable, the plant or fieldperson may be contacted for guidance.

Milk with slight off-odors should be brought to the attention of the producer, plant and fieldperson with an appropriate comment on the weight ticket. This may serve as an early warning, avoiding serious trouble.

The following is a list of the more common off-odors. Some of the more common off-odors and their possible causes are:

1. Feed: The feed the cow eats may impart certain odors to milk. Some stronger feeds will carry through more noticeably than others. Odors resembling green grass, silage, onions, and alfalfa hay are outstanding examples. Feed odors can be minimized or eliminated by taking the cows off offending feeds at least four hours before milking.
2. Barney, Cowy Unclean: This odor is from cows breathing foul air, poor barn ventilation, dirty utensils and equipment, insufficient bedding, or poorly fermented silage. Good sanitation and ventilation, clean utensils, proper milking habits, and better feeding practices will correct this.
3. Medicinal, Musty: many times this problem is caused by feeding moldy hay before milking, a poorly ventilated barn, or a residual chemical odor from udder treatments or sanitizers. Correcting the cause will usually correct the problem.
4. Rancid: Very often this odor is caused by excessive agitation of warm raw milk, excessive foaming, or alternate warming and cooling. Rancid condition of milk will cause an odor like soap, perspiration, or syrupy butter.

5. Sour: Sour milk will have a malty odor and will be found when poor cooling has resulted in excessive bacterial growth. It can also result from an excessive amount of bacteria gaining entrance to the milk through incinerate milking practices and/or incinerate milk equipment.

Grading milk by checking the appearance:

Checking the appearance of the milk requires lifting the lid of the tank and observing the complete undisturbed milk surface. Normal milk color ranges from bluish white to golden yellow and is free of foreign or clotted matter. The following are some milk quality problems which may be evident when checking the milk appearance. Any of these defects could be sufficient reason to reject the tank of milk. Any of these defects would be sufficient reason to reject the tank of milk:

1. Bloody milk is the milk from cows with mastitis or from fresh cows that may contain blood. A small amount of bloody milk can give a large quantity of normal milk a reddish or pinkish tinge.
2. Flaky milk is often from cows having mastitis and may show as light flakiness or pronounced stringy curd particles.
3. Extraneous matter includes such things as insects, hair, chaff, and straw. The presence of extraneous matter may result from careless handling of milk, open doors, torn screens, dusty feeding conditions, and improper cleaning of the udder before milking.
4. Other problems that may become evident while checking the appearance of the milk include frozen milk and partially churned milkfat. These problems, depending on their severity, may or may not be reasons for rejecting the milk. Slight churning or freezing may not call for rejection of the tank of milk but these conditions may affect the reliability of the milk sample and should be indicated on the sample container.

Taking milk temperature:

Part of the grading process is taking and recording the milk temperature. A temperature reading must be taken for each bulk tank pickup. This temperature must be taken after the tank has been thoroughly agitated. Proper agitation will be discussed later.

All bulk tanks are required to cool and maintain milk at 45^{o}F or less within two hours after milking. A blend temperature of 50^{o}F is permitted up to four hours after the commencement of milking or up to two hours after the completion of milking. The law requires that the milk temperature for pickup be at 45^{o}F or less. Note that many dairy plants require milk temperature at 40^{o}F or less.

The milk temperature may be read from an accurate bulk tank thermometer if the bulk tank thermometer is checked monthly against the bulk hauler/sampler's thermometer. The result of this monthly test must be recorded on a chart or calendar and posted in the milkhouse.

The hauler/sampler may use his/her thermometer to check milk temperature. A metal stem dial or electronic thermometer with external adjustment for calibration is recommended. The bulk hauler/sampler's thermometer must be checked for accuracy initially and semiannually thereafter against a certified thermometer (see **APPENDIX D**). This thermometer must be accurate in a range of 32^{o}F to 45^{o}F and must be properly sanitized for 60 seconds in a sanitizing solution of 200-ppm chlorine or equivalent before placing it into milk.

All farm bulk milk tanks or milk silos constructed after January 1, 2000 must be equipped with an approved temperature recording device. In addition, many older bulk milk tanks have been equipped with a temperature recording device. Such a device is an excellent management tool to monitor proper cooling and cleaning, but recording charts must be changed at the required frequency. The most common charts are "seven day charts" and normally changed every seven days, but may be changed more frequently for appropriate reasons. The bulk milk hauler can provide a service to the producer by assisting in maintaining the charts by noting date and time installed and by changing them as needed before the chart pen overlaps the starting point. Notation should be made on the chart to identify the person removing the chart from the recorder device.

Age of the milk:

A new requirement from the Grade A Law of 2001 is that cow's milk on the farm must not be more than three days old to be picked up. The requirement for goat milk is a maximum of seven days if it is stored at a relatively cold temperature. Sheep milk may be frozen for storage and transportation.

SAMPLING THE MILK

Michigan law requires that every bulk tank of milk picked up for sale must be sampled by a licensed bulk milk hauler/sampler. Required tests are performed on these samples for bacteria, somatic cells, antibiotics, butterfat, chemical and pesticide residues. The dairy industry is also using these samples in quality incentive programs and component pricing programs. Accurate laboratory tests are mandatory to insure the purity and quality of the bulk milk and to insure economic fairness to producers and processors. Additional information on laboratory tests can be found in **APPENDIX A**.

Sample Collection:

Sampling is the first step in the laboratory testing process. Accurate laboratory results cannot be achieved from samples which have been improperly taken, contaminated in any way, or abused in storage or transport. To be satisfactory, the sample must represent all milk in the bulk tank and must be properly collected and transported. The following procedure must be strictly followed:

1. Milk in the bulk tank must be properly agitated before taking the sample. Bulk tanks up to 1,500 gallons in size require a minimum of five minutes continuous agitation. Tanks 1,500 gallons in size and larger require a minimum of 10 minutes continuous agitation unless specified otherwise by the tank manufacturer. Some individual bulk tanks may require more than minimum agitation time. The proper agitation time can be determined from the tank identification tag fastened to the tank, or by taking a series of samples to be tested for butterfat. The hauler or fieldperson can take a timed series of milk samples at varying intervals of agitation time to determine how long it takes to completely mix the milk. The minimum agitation time is considered the point in time that the butterfat results in the series of samples stabilizes.
2. When a slight amount of freezing or churning is noted the sample must not contain particles of ice or butterfat as it may adversely effect the sample results. This condition must be noted on the sample container and the milk producer must be notified for immediate correction.
3. A sample must be taken before any milk is removed from the bulk tank.

4. The hauler/sampler must take the sample with clean, dry hands.
5. The sample container must be identified with:
    a. The MDARD issued producer permit number.
    b. The date of pickup.
    c. The route number.
    d. Temperature of milk in the tank.
6. A duplicate sample, the temperature control sample or TC, must be taken at the first pickup stop. This sample must be marked with:
    a. The letters TC indicate this sample is a temperature controlled sample.
    b. MDARD issued producer permit number.
    c. The hauler/sampler name, initials or MDA RD issued hauler/sampler identification number.
    d. The date of pickup.
    e. The time of sampling.
    f. The temperature of the milk in the tank.
7. The sample dipper must remain in the dipper container containing a sanitizing solution of 200-ppm chlorine sanitizer, or other approved sanitizer of equivalent strength, except when being used to collect the sample. The dipper must be carried into the milkhouse in the dipper container to provide protection from contamination.
8. Sampling is done in the following manner:
    a. Remove the dipper or sampling device from the holder pouring any sanitizer back into the holder. Inspect dipper or device to assure it is clean and empty.
    b. Rinse all sanitizer from the dipper by inserting the dipper into the milk at least twice to a depth of six to eight inches and then pouring the milk back into the tank. Be careful not to put hands into the milk.
    c. A sample is now taken by inserting the dipper six to eight inches into the milk, removing the dipper from the milk and pouring the milk into the sample container – away from the bulk tank opening. The sample container must not be more than 3/4 full to allow for proper agitation at the laboratory. Sample containers must always be protected. Containers are not carried in clothing pockets and are not dipped into the milk. Care must always be taken when opening sample containers to prevent contamination of the interior and/or cap of the container by touching with hands or any contaminated object.
    d. The sample container must be securely closed to prevent leaking and avoid contamination. When using whirl-pak bags, care must be taken to prevent sharp corners of the metal closer tab from puncturing the sample bag when folding to seal. Samples are filled no more than 3/4 full with an air space above milk to accommodate proper agitation at the laboratory.

e. Samples are immediately placed in a refrigerated sample case, which must cool and maintain samples at 32°F to 40°F. Samples must be supported in a rack or a floating sample support, which will keep the sample upright with the seal or cap above the refrigerant water. Refrigerant water level must be maintained near the upper milk level in the sample containers.

f. The sample dipper is first rinsed in clear tap water before returning to the sanitizing solution in the dipper container.

g. If a producer has more than one bulk tank with milk to be picked up, each tank must be individually sampled.

MEASURING THE MILK

Measuring the milk in the bulk tank is done by reading the level of milk in the tank indicated on a calibrated measuring stick. This measuring stick is graduated in 1/32 of an inch or in millimeters. Each graduation on the measuring stick is equivalent to a determined number of pounds of milk posted on a conversion chart specifically calibrated for each bulk tank. The bulk tank, measuring stick and conversion chart must have the same serial number.

The bulk milk tank calibration is the responsibility of the dairy producer under the supervision of the milk buyer (plant or co-op) and the state regulatory agency. All tanks must be calibrated to assure the accuracy of the measuring stick readings and chart conversions.

There are conditions that the hauler/sampler must be aware of that could contribute to inaccurate weight problems such as:

1. The tank is incorrectly calibrated.
2. There are errors in the weight chart or the chart may be worn and unreadable.
3. The bulk tank may be out of level. Heaving, cracking or settling of milkhouse floor causing the bulk tank to shift.
4. The bulk tank interior may have warped.
5. The measuring stick bracket may have worn or become deformed.

If discrepancies are noticed, they should be brought to the attention of the dairy producer and the dairy plant or fieldperson.

Procedures for measuring milk:

1. The milk must be completely motionless when a measurement is made. If /when entering the milkhouse and the bulk tank agitator **is** running, it may be advantageous to sample the milk, after the proper agitation time, before measuring.

   If /when entering the milkhouse and the agitator **is not** running, it may be advantageous to turn the agitator off and measure the milk first. The bulk tank agitator must be switched off to assure it does not start whenever measuring the milk. After any agitation, the bulk hauler/sampler must wait for the milk to become completely motionless before making the measurement. It must also be noted that after the completion of milking, it may take several minutes for incorporated air to escape to get an accurate measurement.

2. The measuring stick must be properly prepared to get an accurate measurement. The following steps are essential to assure accurate measurement of milk in the bulk tank:

    a. Hands must be washed and dry before measuring milk.

    b. Remove the measuring stick from its bracket where it is stored between readings and remove from a bulk tank.

    c. A measuring stick that is stored externally of the farm tank must be washed and sanitized prior to inserting it into the milk for measurement.

    d. Vigorously wipe the stick with a clean, dry, single service paper towel. The measuring stick must be clean, dry and free of fat to get an accurate reading. Heating the stick with hot water (hot stick method) is no longer acceptable because the stick would require re-sanitizing.

    e. The clean, dry stick is now ready to be placed back into its bracket. If there is any foam on the surface of the milk in the bracket area, gently move it away with the end of the stick. Lower the stick slowly until it is approximately 1/4 inch from the bracket seat. Wait a moment and then slowly lower the stick until it is flush in the bracket seat.

    f. Remove the stick from the bracket and read at once. The markings must be read at eye level in a well-lighted area.

    g. Repeat steps c, d, and e to obtain a second measurement to insure accuracy.

1. When the milk line is between measuring stick lines, read it to the closest measuring stick line unless the milk line falls exactly between two measuring stick lines, then read the milk line to the nearest **even** measuring stick line. It is important to always read the stick in this manner to get accurate results.
2. Record the reading of the measuring stick on the weight receipt immediately.
3. If the tank has an external sight tube (soft plastic hose tubes are not acceptable), connect the sight tube jumper hose to the outlet valve and open the valve slowly, allowing the milk to rise in the sight tube. After giving time to settle any fluctuations of the milk in the tube, slide the milk level indicator to the line separating the milk and any foam. Read the milk level off the adjoining measuring scale. Do not use milk for measurement that may have been left in the tube by the producer, since it would be warm and give an inaccurate reading. Discard all milk that has entered the sight tube, following its measurement.

Completing the weight receipt:

The weight receipt must be completed immediately after reading the measuring stick or sight tube, and using the weight chart, converting the measurement reading to weight in pounds. The following items must be included on the bulk milk weight receipt:

1. Date of pickup.
2. Name of producer.
3. Producer's state issued permit number.
4. Measuring stick reading.
5. Converted weight (taken from weight chart).

6. Time of pickup.
7. Temperature of milk.
8. Hauler/sampler's identification (signature, initials or MDARD issued hauler/sampler ID number) for each milk weight receipt copy that is left on the farm.
9. Load BTU number.

A legible copy of the weight receipt or recorded information that is duplicate to the information on the weight receipt must be left on the farm after each milk pickup.

If a producer has more than one farm bulk tank that are weighed and sampled at the same time, the weight receipt information can be combined on one weight receipt.

TRANSFERRING MILK

Only after grading, sampling and measuring the milk in the farm bulk tank and completing the weight receipt is the hauler/sampler ready to start transferring milk (see **APPENDIX B** for an outline of procedures). The milk transfer hose is brought into the milkhouse through the hose port. Note the following requirements:

1. The transfer hose cap is protected from contamination (Keep it off the floor).
2. The bulk milk tank outlet is washed (only if is leaking milk), and sanitized before attaching transfer hose.
3. The bulk milk tank cover(s) are lowered when pumping, while still allowing for air to enter as the milk is removed.
4. The agitator is operated when pumping the tank to minimize fat build up on sides of the tank. Shut off the agitator when tank is half-empty to minimize splashing.
5. Shut off the pump and disconnect and cap hose as soon as tank is empty. Avoid drawing excessive air into the transport truck tank.
6. Shut off the milk refrigeration system to the bulk tank when tank is empty.
7. Rinse the interior of the bulk tank with warm water (about 100^{o}F).

   Make sure that the transfer hose is disconnected before rinsing.
8. Visually check the bottom of the tank for sediment before, during and after rinsing. Check the interior top and sides for staining or soil build up. Note also any foul or unusual odors. When a problem is observed, notify the milk producer and fieldperson.
9. Complete the procedures for starting the bulk tank wash cycle and start the wash cycle if that is part of the pickup routine expected by the producer.
10. Rinse the milkhouse floor free of milk. Acids developing from milk will erode concrete floors.

UNLOADING MILK TANK TRUCK

The Grade A Law of 2001 requires that milk must be unloaded in an approved dairy/milk plant, receiving or transfer station, and the milk must be screened for beta lactam drug residues before unloading.

Drug residue screening:

When a load of milk arrives at a transfer station, receiving station, or plant receiving room, a representative sample is taken by a trained sampler and the sample is screened for drug residues by a trained industry analyst using an approved screening test. Only loads testing negative on an approved screening test can be unloaded. If a load is found positive on a screening test it is considered presumptive positive and may not be unloaded. This presumptive positive load requires further confirmation testing. This must be done at a Certified Laboratory or Certified Industry Supervisor site using an approved confirmation test. If the load confirms positive, it must be disposed of properly. A negative confirmation test result will allow the load to be unloaded and used.

Unloading procedures:

Unloading of the milk tank truck must be done in a manner that will protect the milk from contamination, by using the following procedures after the drug residue results allow for unloading:

1. Open manhole dust cover and inspect the tank vent. The vent must be clear to allow air to enter the tank as milk is removed, preventing the collapse of tank. Receiving rooms which are closed to the outdoors throughout the time the tank is unloading and are free of all smoke and fumes, do not require tank vent filters if the lid is propped open only by the locking lugs. All other receiving situations require tank vent filters.
2. Connect the receiving hose to the tank outlet in a manner that will not contaminate milk contact surfaces. Tighten all fittings before opening the milk tank truck outlet valve and starting milk transfer pump. Milk pump must self prime and start pumping with fittings tight.

Washing and Sanitizing milk tank truck:

The law requires the bulk milk tank trucks to be washed after each day's use (see Equipment and Documentation Required section for a discussion of wash frequency, wash records and wash tags).

It is the responsibility of the bulk milk hauler/sampler to pick up milk with equipment that is properly cleaned and sanitized.

Tanks may be washed and sanitized mechanically or by hand. Visual inspection of all milk contact surfaces must be made on mechanically washed tanks to verify an effective wash. The following items must be dismantled and thoroughly hand washed and sanitized:

1. Manhole cover, gasket and vent assembly.
2. Tank outlet valve assembly.
3. Milk pump assembly, short connector hose and fittings.
4. Milk transfer hose (must be circulated with cleaning solution to wash and sanitizing solution to sanitize), fittings must be removed to hand wash slip joint.
5. Sample dipper, dipper container, sample storage case, and sample rack.

SUMMARY

It is the purpose of this manual to acquaint the bulk hauler/sampler with the proper methods of grading, sampling, measuring, loading and unloading bulk milk. This manual will prepare a bulk hauler/sampler to be proficient in his/her job. In any situation where conditions require a deviation from accepted practice, it is required that the local state inspector be informed to evaluate the situation.

Remember ,today's bulk milk hauler/sampler is more than a "truck driver." He/she is a professional with the job of performing the important first step in a chain bringing "nature's most perfect food" to the consuming public. It is hoped that every hauler/sampler will, after taking their exam, keep striving to improve their knowledge and proficiency. Constant review and improvement of the procedures and practices the hauler/sampler employs in their daily routine will leave them in good standing with their patrons, the buyer, and the regulatory agency.

APPENDIX A

MILK TESTS

Often farmers will ask the hauler/sampler about the quality tests performed by the laboratory. The following summary will help him explain the reasons for the tests and his/her responsibilities as the official sampler.

MILKFAT/BUTTERFAT

The results obtained from the butterfat tests are one of the four components (the others being protein, milk volume, and somatic cell adjustment) used to determine the payment made to the producer for their milk. It is important that the bulk hauler/sampler has thorough knowledge of the proper sampling and sample handling procedures to insure that this test is both accurate and representative of all the milk in the farm bulk tank. The law requires that the milk must contain at least three percent milkfat. The normal range is three to four percent. The sample must be kept below 40^{o}F to prevent churning and flaking, which could distort sample results. Some other reasons not under the hauler/sampler's control for variations in milkfat tests are:

1. Breed of cow
2. Age of cow
3. Genetic potential of individual cow
4. Stage of lactation
5. Seasonal changes
6. Udder infection
7. Type and quality of feed
8. Milking procedures
9. Health of cow
10. Heat periods
11. Excitement

PROTEIN

This test is used as part of the component pricing system for determining the pay price for a producer's milk. High levels of protein in the milk are important for increased food value in fluid milk and increased yield for manufactured dairy products such as cheese and not-fat dry milk. Factors affecting protein production are much the same as those listed above for butterfat. The normal range is similar to butterfat, three to four percent.

BACTERIA COUNTS

Bacteria are small one-celled organisms, which are found on and in all living animals, in the soil, water, ponds, and even wells. Manure, flies, insects, rodents, utensils and equipment are sources of many types of harmful bacteria. The dust from soil or feeds may be carried in air currents and are thus a good source of bacteria. Because of the widespread presence of bacteria, contamination of equipment that comes in contact with milk must be avoided. This could happen when taking a measurement, collecting a sample, and/or transferring the milk from the tank to the milk tank truck truck.

Bacteria multiply by dividing into two separate organisms, and this process is dependent upon the proper, favorable conditions. These are the presence of food, moisture, and a favorable temperature.

All milk contains some bacteria. Food and moisture are present in milk. Thus, any bacteria in the milk will multiply rapidly at warm temperatures but will not multiply as fast if the milk is kept cold.

The standard plate count (SPC) or plate loop count (PLC) are measurements of these bacteria. More recently the use of preliminary incubation counts (PI) has come into use. Whereas the SPC or PLC counts measure the number of bacteria present in the milk sample being examined, the PI count is a measurement of the potential growth of bacteria during the cold storage of raw milk and even during cold storage of pasteurized milk since approximately one percent of these bacteria survive pasteurization. The bacteria that show up on a PI count are good indicators of unsanitary farm conditions that are masked by good cooling and storage on the farm. They are also good indicators of the potential shelf life of the pasteurized milk with low counts meaning long shelf life.

The importance of proper sampling and quick placement of the sample container in sample storage maintained at 32°F to 40°F cannot be overemphasized since bacteria counts taken from a very small sample container can have large economic consequences for the producer. It should be noted that a sample container such as a plastic bag will raise in temperature approximately 1°F per minute when left laying on the bulk tank, and that the bacteria in the sample will double in number approximately every twenty minutes at 50°F.

INHIBITOR/DRUG RESIDUE TESTS

The presence of antibiotic residues can cause violent allergic reactions in some individuals. These residues cannot be removed from the milk by any method once introduced into it. These residues are most often of medicines and drugs used to treat the cow for udder or other infections. Excessive use of sanitizers used on milk equipment (or sampling devices) may also show up on these tests. Routine tests are run on every load of milk to check for the presence of some of these inhibitors.

Inhibitors can also interfere with the manufacture of many dairy products by killing or interfering with the natural bacteria processes which give us cheeses, yogurts, sour cream, buttermilk, and other products.

SEDIMENT TESTS

This test consists of filtering a measured amount of milk through a white cotton disk and checking the kind and amount of a residue found. It is a rapid method to determine whether the milk is being properly protected from contamination due to dust, and/or improperly cleaned udders. The presence of sediment indicates insanitary methods of milking and milk handling. A clean sediment disk, however, does not prove that sanitary practices exist.

ADDED WATER

Accurate analytical tests are conducted to determine the presence of added water. The temperature at which milk freezes is a fairly constant factor and can be easily determined by laboratory tests. If water is added, the freezing point will be closer to that of pure water. Some poor milk handling practices permit excess amounts of water to enter the milk resulting in an illegal product and an inflated amount of the product.

The hauler/sampler must exercise care in sampling as a few drops of water in the dipper causes an improper freezing point indicating the presence of added water. He/she must also be careful to disconnect the transfer hose from the bulk tank before rinsing the tank in order to prevent the adulteration of the milk with water.

SOMATIC CELL COUNT

The somatic cell count (SCC) is a basis for determining payment in the component pricing system. This test, formerly called the mastitis test or the WMT, is used to measure the presence and level of white blood cells and worn out body cells in the milk. Elevated levels of somatic cells in the milk will decrease the yield of manufactured milk products, such as cheese, from each hundredweight of milk. A somatic cell count of less than 301,000 will cause the producer's payment to be adjusted upward, and a count of more than 400,000 will cause a downward adjustment in the pay price. Counts above the 400,000 level indicate that mastitis may be a herd problem and individual cows should be tested to identify problem cows. Tests exceeding 750,000 are illegal and tell us that the milk is not acceptable for bottling and other Grade A uses.

Cows showing abnormal milk must be milked last or in completely separate equipment. Some of the causes of abnormal milk may be poor milking practices, improper cattle housing, improperly operating milking machines, or poor feeding.

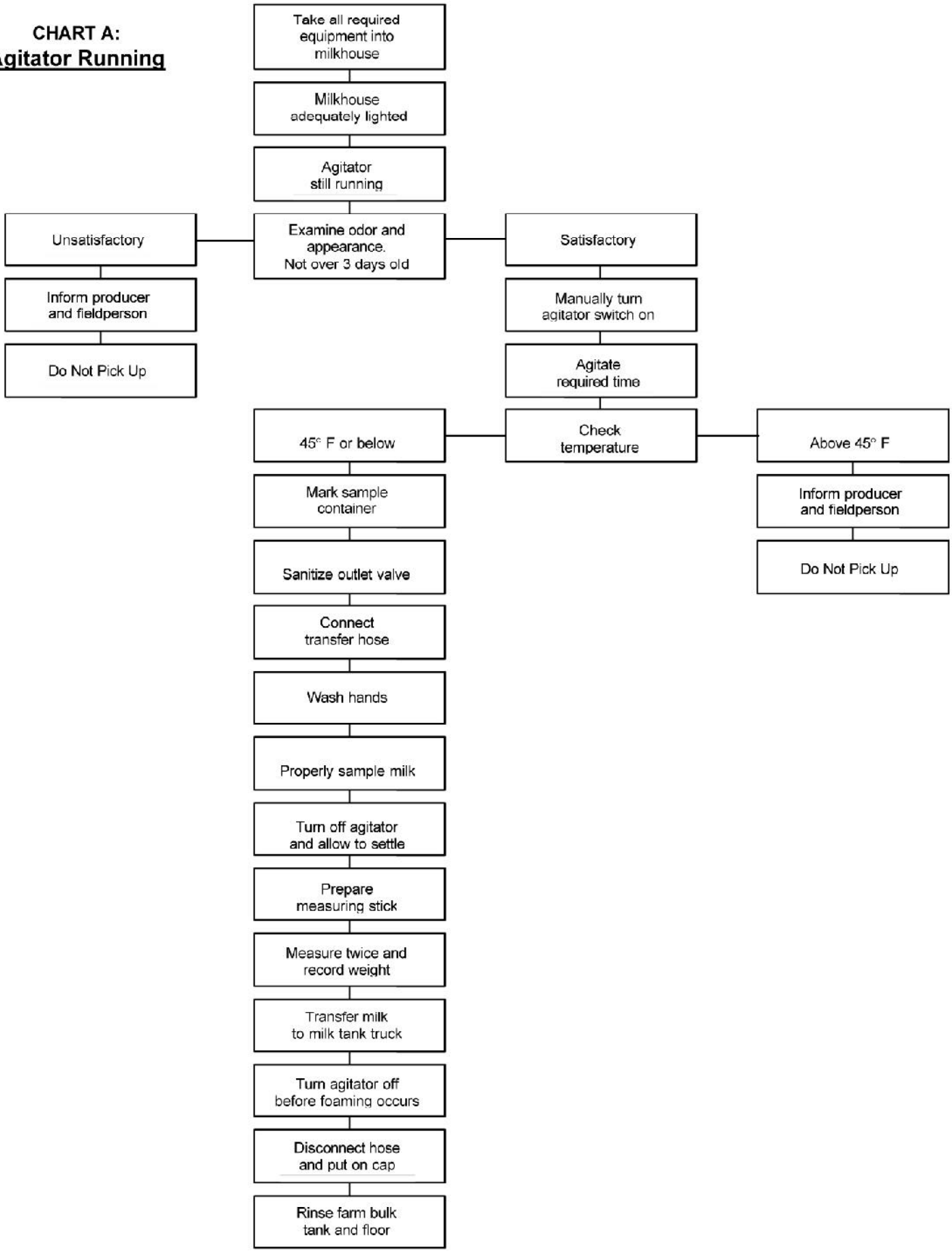
PESTICIDE RESIDUE TESTS

The improper use of approved pesticides, or the use of unapproved pesticides on or near milk cows can result in residues of these materials in the milk. Improperly protecting the milk handling equipment from these pesticides during their use can also result in residues in milk.

Only approved materials should be used and then only FOLLOWING THE LABEL DIRECTIONS EXACTLY. Lists of approved materials are available from the county extension agents.

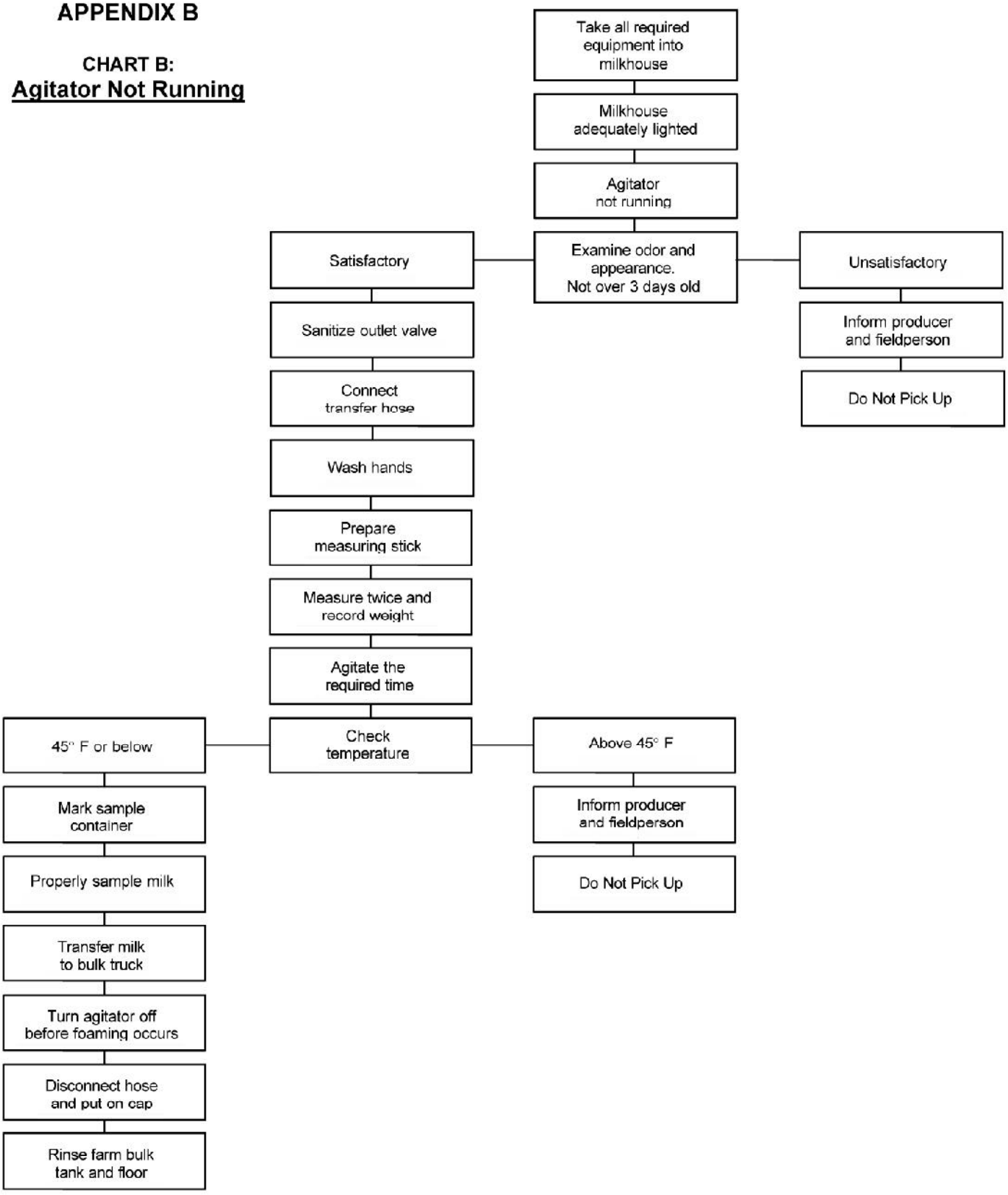
APPENDIX B

CHART A:
Agitator Running



APPENDIX B

CHART B:
Agitator Not Running



APPENDIX C

Bulk milk sampling and pickup procedures (to be evaluated by the MDARD inspector) Mark with an S = Satisfactory, N/S = Not Satisfactory. Each item one point, except as noted.

_____ (3pt) 41. Pickup practices conducted to preclude contamination of milk contact surfaces.

_____ 42. Hands clean and dry; no infections.

_____ 43. Clean outer clothing; no use of tobacco.

_____ 44. Hose port used; tank lids closed during completion of pickup.

_____ 45. Hose port capped between milk pickup operations; hose cap protected during milk pickup.

_____ (2pt) 46. Hose disconnected before the tank rinsed.

_____ 47. Observation made for sediment/abnormalities.

_____ (2pt) 48. A sample collected at each pickup.

_____ 49. Thermometer is approved type.

_____ 50. Thermometer accuracy checked against a certified thermometer every six months with accuracy + or – 2°F.

_____ (3pt) 41. Pickup practices conducted to preclude contamination of milk contact surfaces.

_____ 51. The date the thermometer was checked and checker's initials attached to case.

_____ (2pt) 52. Sample transfer instrument clean, sanitized or sterilized and of proper construction and repair.

_____ 53. Sampling instrument container of proper design, construction and repair for storing a sample dipper in sanitizer.

_____ 54. Applicable test kit for checking strength of sanitizer (200-ppm chlorine or equivalent).

_____ 55. Sample containers clean, properly sanitized or sterilized.

_____ (2pt) 56. Sample containers of adequate supply, properly stored and handled.

_____ 57. Sample storage case of rigid construction, suitable design to maintain samples at 32°F to 40°F, protected from contamination and maintained clean.

_____ 58. Sample storage case with ample space for refrigerant; racks provided where necessary.

_____ (2pt) 59. Sample instrument and container(s) properly carried into and aseptically handled in milkhouse.

_____ 60. Bulk milk tank outlet valve sanitized before connecting transfer hose.

_____ 61. Smell milk through tank port hole or partially open lid.

_____ 62. Observe milk in a quiescent state with the lid wide open and lights on when necessary.

_____ 63. Test thermometer sanitized (60 seconds contact time).

_____ (3pt) 64. Non-acceptable milk rejected.

_____ 65. Dry measuring stick with a single-service paper towel.

_____ 66. Measure milk only when quiescent.

_____ (3pt) 67. Do not contaminate milk during the measuring process.

_____ 68. Agitate milk before sampling at least five minutes or longer as required by tank specifications.

_____ (2pt) 69. Do not open bulk tank valve until milk is measured and sampled.

_____ (2pt) 70. Temperature of milk, time, date of pickup and hauler/samplers identification recorded on each farm weight ticket.

_____ 71. Tank thermometer accuracy checked monthly and recorded when used as a test thermometer.

_____ (3pt) 72. A temperature control sample provided at first sampling location for each rack of samples.

_____ (2pt) 73. A temperature control sample properly labeled with time, date temperature and with producer and hauler/sampler identification.

_____ 74. Sample containers legibly identified at collection points.

_____ 75. Sample dipper rinsed at least two times in the milk before transferring sample.

_____ 76. The dipper should extend six to eight inches into the milk to obtain a representative sample.

_____ 77. Do not hold a sample container over the milk when transferring the sample into the container.

_____ 78. Sample container not filled over 3/4 full.

_____ 79. Sample dipper rinsed in tap water, replaced in its container, tank valve opened, and milk pump switch turned on.

_____ (2pt) 80. Immediately take milk sample to the sample case.

_____ (3pt) 81. Sample storage refrigerant maintained no higher than milk level in sample containers; sample temperature maintained 32°F – 40°F; tops of containers not buried in ice, protected from contamination.

APPENDIX D

CHECKING THERMOMETERS

An approved laboratory with a certified thermometer can be used to check hand -held thermometers for accuracy. This is required every six months, and a tag must be attached to the case with the date, correction factor, if any, and checker's initials. A lab technician, inspector or a hauler/ sampler can also check and tag thermometers by comparing it to a certified thermometer found at drug residue screening sites. The thermometer should be checked at or near 40°F. It may be necessary to use the following information to convert °C to °F:

0°C = 32°F 1°C = 33.8°F 2°C = 35.6°F 3°C = 37.4°F 4°C = 39.2°F

5°C = 41.0°F 6°C = 42.8°F 7°C = 44.6°F 8°C = 46.4°F

APPENDIX E

DIRECT LOADING WITHOUT AN IN-LINE SAMPLER

On farms that plan on not utilizing a farm bulk milk tank or milk silo to cool and store the milk, special consideration must be given to some added PMO requirements.

- The cooling capacity must be adequate to cool the milk to 45^{0}F or less prior to storage on a milk tank truck.
- A separate structure meeting milkhouse construction requirements is required for the storage of the milk tank truck during filling.

The shelter for the milk tank truck shall be adjacent to the milkhouse, but not part of the milkhouse. A wall and door would be adequate separation from the milkhouse. The milk tank truck room shall be constructed and finished like a milkhouse with light colored walls and ceiling that have washable surfaces, impervious floor sloped to drain, adequate lighting, insect and rodent control, and maintained clean.

If the milk tank truck manhole cover is open during filling, a filter must protect the opening. If the manhole is propped up by the locking lugs and the milk tank truck room door(s) are closed, a filter is not needed.

If the milk tank truck is cleaned and sanitized at the dairy farm, adequate, licensed facilities for washing must be present. A wash tag must also be filled out with the appropriate information.

Proper milk sampling procedures must be met, which include milk agitation. If the truck only contains one producer's milk, it is allowable for the producer's sample to be collected at the dairy plant, receiving station or transfer station after proper agitation.

DIRECT LOADING WITH AN IN-LINE SAMPLER

When an in-line sampler is installed at a dairy farm facility, a separate structure to house the bulk milk tank trucks is not required. FDA describes the application and standard operating procedures (SOP) for the installation and use of approved in-line samplers for the collection of dairy farm raw milk samples from direct load tankers as required in Section 6 of the Grade A Pasteurized Milk Ordinance.

In-line milk sampling is used when the dairy facility is set up to direct load bulk milk tankers bypassing the use of conventional bulk milk tanks for cooling and storage. The milk flows from the receiver through a chiller or plate cooler that cools the milk to +/- 45^{0}F. In the case of the Anderson Instruments sampler, the milk then goes through a flow meter to the in-line sampler where a small amount of milk drips into a sample container positioned inside a refrigerator. No flow meter is used in the QMI and ISOLOK samplers. After the sampler, the milk flow continues to the bulk milk tanker. Some direct load farms also install bulk tanks for use as a back up or in emergency situations. It is important to meet with the producer, installer and field person during the planning and construction phases of the project.

- An application to install and a written construction plan must be submitted to MDARD for review by the inspector.
- The dairy producer must submit a signed MDARD in-line sampler protocol prior to use of the system.

General Construction Requirements for In-line Samplers:

1. The bulk milk tankers must be parked on an impervious surface that is sloped to drain and maintained clean in all weather conditions.
2. The tanker load out connections must be made through tight fitting doors in the milkhouse wall that have padded bumpers on the outside ensuring the tanker fits tight against the milkhouse wall.
3. If an air blow is installed on the system, it must be installed to be accessible for daily manual cleaning and daily replacement of the single-service filters used on the air blow line.
4. A check valve must be installed downstream from the in-line sampler.
5. A check valve must be installed in close proximity to the connection point of each tanker.
6. A clean, well-lit, impervious work surface of adequate size must be provided in the milkhouse for the sub-sampling of milk samples.
7. Sweetwater, well water and/or Glycol systems are used to cool the milk going through the chiller. Propylene glycol, USP or food grade, is the approved type of glycol to be used. Industrial propylene glycol is not approved. The producer must have a letter from the manufacturer of the glycol, posted in the milkhouse, stating it is the approved type meeting the requirements of 21 CFR 184.1666. Sweetwater and glycol storage tanks must be of proper construction and have tight fitting, overlapping lids.
8. Below are some areas to pay particular attention to concerning water systems:
    a. Plate cooler water/fresh water add lines to plate cooler water storage tanks/fresh water feed lines downstream from storage tanks.
    b. CIP chemical addition/water connections to the wash vat.
    c. Calf milk pasteurizers/water connections for CIP and to cool the coils.
    d. Boiler systems - some are closed systems and some have fresh water add lines.
    e. Grey water recaptured for parlor wash down.
9. The interior lid and exterior dome lid of the bulk milk tanker must remain closed and sealed during the loading process. Proper vents on the tanker lid are to be installed to assure the needed airflow.
10. Milk transfer lines must be hard-piped to the tanker access doors using short jumper hoses to attach to the bulk milk tanker.

General Construction Recommendations for In-Line Samplers

Experience has shown the following items to be very helpful in making the direct load facility easier to maintain and meet the requirements of the dairy laws. MDARD recommends the following:

1. Provide a heated surface and overhead protection for tanker parking to prevent build up of ice or snow.
2. Provide a channel drain at the rear of the tankers along the milkhouse wall. This will facilitate cleaning between the milkhouse and the tanker where the loading connections are made.
3. Install a CIP position switch on the milk pipeline system to prevent contamination of the milk with CIP solution.
4. Maintain an alternative sampler system in case problems develop with the primary sampler.
5. Keep replacement silicone diaphragms on hand (Anderson Instruments in-line sampler).
6. Construct the milkhouse and the trailer parking area on the same grade level to facilitate ease of making the tanker connections.
7. Install the recording and indicating thermometers together in one thermometer well at an elbow for better milk contact and cleaning.

In-Line Sampler Device Requirement:

1. An approved in-line sampling device must be installed inside a refrigerator that can maintain 32-40^{0}F (0.0-4.4C) in an appropriate and easily accessible location in the milk line to ensure accurate sampling and proper cleaning. The in-line sampler must be installed in the milkhouse.
2. The in-line sampler attachment must allow a single-service sample collection bottle to be attached directly on the sampler. The sample goes directly from the sampler into the attached sample collection bottle on the Anderson Instruments and the ISOLOK samplers. The QMI sampler collects the sample in a single-service transfer hose that is connected to a single-service sample collection bag.
3. The in-line sampler must be cleaned and sanitized via the pipeline CIP system and/or manually cleaned if needed.
4. Size of the milk sample needs to be determined with the cooperation of the installer and MDARD to ensure the sample collection container size is of an adequate volume to prevent overflow. In general, for the Anderson Instruments sample, bulk milk tankers with a capacity of <50,000 lbs. will require a 500-ml single-service sample collection bottle and tankers with a capacity of >50,000 lbs. will require a one-liter sample bottle. The sample collection rate must be manually adjusted on the ISOLOK sampler. The QMI sampler rate is changed by changing the sample collection needle size. In all cases, the sample container must not exceed ¾ full.

Thermometer Requirements:

1. A Recording Thermometer (seven-day chart) is required with the temperature probe to be installed in the milk line downstream from the cooling device prior to the in-line sampler device. This recording temperature probe should be installed in a thermometer well as close as practical to the required indicating thermometer, which is also in a thermometer well in the milk line (see Indicating Thermometer below).

a. The owner or hauler/sampler shall document on the recording chart the date, farm permit number, regulatory agency tanker identification number and initials of the person who changed the chart.

b. The owner or hauler/sampler shall document on the recording chart the identification number of each additional bulk milk tanker being loaded.

c. The owner or hauler/sampler shall make a weekly temperature check of the recording thermometer against the indicating thermometer at chart change. Document the temperature check on the recording chart and adjust the recording thermometer to match the indicating thermometer, if needed.

d. During an inspection by MDARD, the inspector will compare the temperature readings of the recording and indicating thermometers. The comparison will be documented on the recording chart and the inspection sheet.

e. Temperature recording charts are retained for six months and stored in a clean, dry place.

2. **An Indicating Thermometer** (digital display or dial) is required to be installed in the milk line in a thermometer well downstream from the cooling device prior to the in-line sampler device.

   a. This thermometer shall be installed in a thermometer well as close as practical to the required recording thermometer.

   b. Indicating thermometer must have a minimum scale of 2^0F (1^0C).

   c. During an inspection by MDARD, the inspector will conduct an annual accuracy check at ice point of the indicating thermometer and document on the farm inspection sheet.

3. **Refrigerator Thermometers** (digital or liquid filled in glass type stored in glycol)

   a. A thermometer is required in both the in-line sampler refrigerator and the sample storage refrigerator.

   b. Refrigerator temperature must be recorded AM and PM from the thermometers and documented on the monthly temperature-recording log. If a recording thermometer is installed with each refrigerator, no log is necessary and the temperature checks are documented on the recording chart.

   c. The refrigerator temperature logs and/or temperature recording charts shall be stored in a clean, dry area available for review and retained for six months.

   d. During an inspection, the MDARD inspector will conduct an annual accuracy check at ice point of the refrigerator thermometers and will tag the thermometer. This accuracy check will be documented on the farm inspection sheet.

   e. Test thermometers have a minimum scale of 2^0F (1^0C).

   f. Check temperature just prior to collection of the sample to assure the temperature is in regulatory compliance between 32-40^0F (0.0-4.4^0C).

Refrigerator Requirements:

Two refrigerators are required, one for the in-line sampler and one for the storage of samples.

1. The refrigerator must be of an appropriate size to hold the sample container and the in-line sampler.
2. Refrigerator must be able to maintain the sample between 32-40^{0}F (0.0-4.4^{0}C).
3. Refrigerators are only used to collect and store samples. No food, beverage or any other items not related to the samples or sampling procedures are to be stored in the unit.
4. Refrigerator must be maintained in good working condition, repaired and clean inside and out at all times.
5. The sample storage refrigerator must be in the same room as the sub-sampling area.

Milk Sample Collection Requirements:

1. Person(s) performing the sample handling must possess a valid bulk milk hauler/sampler license with an in-line sampler endorsement.
2. Person(s) performing the sample handling must wash their hands before handling the equipment used to collect the milk sample.
3. Verify refrigerator temperature is between 32-40^{0}F (0.0-4.4^{0}C). Corrective action(s) must be taken if there is a temperature problem. Document corrective action(s) on the log or recording chart and retain records for six months.
4. Record the regulatory agency tanker identification number for each load on the recording chart.
5. At the end of milking, remove the sample container from the in-line sampler or the sampling tube from the sample port and immediately cap the container using the approved cap that had been stored in a sanitary manner. Record the milk temperature on the sample container. Place the sample in the approved refrigerator.
6. Prepare the in-line sampler for the CIP wash cycle or disassemble and manually clean and sanitize the sampler.
7. The exterior of the in-line sampler shall be hand-cleaned and sanitized before the start of the next milking. Sanitizer must be 200-ppm or equivalent with a test kit to check the solution. A spray bottle with sanitizer is required to sanitize the bottle attachment area on the in-line sampler.
8. At the start of the next milking, make sure the sample collection container is properly identified with the date, time, regulatory agency tanker identification number, permit number and initials of the person installing the container on the sampler. Position it properly to collect the milk sample.
9. Attach the milk line to the milk tanker. Sanitize the tanker valve and milk line fittings prior to attaching the line to the tanker.
10. Repeat steps two -10 until the bulk milk tanker is full.
11. Documented milk weights must be provided on the farm. Some farms use scale weight and, in the case of the Anderson Instruments sampler, a printout strip is available to document the milk weight.

Sub-Sampling and Representative Sample and Sample Handling Requirements:

1. Person(s) performing the sample handling and sub-sampling must possess a valid bulk milk hauler/sampler license with an in-line sampler endorsement.
2. Person(s) performing the sample handling and sub-sampling must wash their hands before carrying out the following steps three through six.
3. Remove the sample container from the refrigerator. Check and record the temperature of the sample storage refrigerator. Corrective actions must be taken if the temperature was out of the 32-40^{0}F (0.0-4.4^{0}C) range.
4. Observe the sample for off odors, visual defects, extraneous material and ice. Frozen samples cannot be used for official testing.
5. Agitate the sample container sufficiently to obtain a representative sample by rapidly inverting the sample container completely 25 times.
6. Transfer (sub-sample) a portion of the original sample into properly identified sample vials (3/4 full), including a temperature control (TC) sample, within three minutes of agitation.
7. Sub-sample vial shall be labeled with the following:
    a. Date of sampling
    b. Time of sampling (time of sample split)
    c. Producer Permit Number
    d. Regulatory agency tanker identification number
    e. Sample Temperature (Using the temperature of the refrigerator thermometer in the sample storage or sample collection refrigerator depending where the sample container was removed from.)
    f. Initials of the person performing the sub-sampling.
8. A temperature control (TC) sample is required for each bulk milk tanker and it shall be identified with the following:
    a. TC
    b. Date of sampling
    c. Time of sampling (time of sample split)
    d. Producer Permit Number
    e. Regulatory agency tanker identification number
    f. Sample Temperature (Using the temperature of the refrigerator thermometer in the sample storage or sample collection refrigerator depending where the sample container was removed from.)
    g. Hauler/sampler identification (initials, ID number or name)
9. Store the samples in the sample storage refrigerator until the bulk milk tanker is taken to the dairy plant. The samples must accompany the load to the dairy plant.
10. Sub-sampling provides the additional samples needed for the temperature control, the producer's milk company or the regulatory agency.

MDARD PROCEDURES FOR IN-LINE SAMPLERS SUB-SAMPLING

1. Wash your hands.
2. Obtain sterile, smaller sample vials to be used for sub-sampling.
3. Each sub-sample vial shall be identified with:
    a. Date
    b. Time (time of sample split)
    c. Producer Permit Number
    d. Regulatory agency tanker identification number
    e. Sample temperature
    f. Hauler/sampler identification (initials, ID number or name)

4. A temperature control (TC) sample is required and it shall be identified with:
    a. TC
    b. Date
    c. Time (time of sample split)
    d. Producer Permit Number
    e. Regulatory agency tanker identification number
    f. Sample temperature
    g. Hauler/sampler identification (initials, ID number or name)
5. Remove the sample container from the sampler or sample storage refrigerator.
6. Observe sample for off odors, visual defects, extraneous material and ice. Cap the sample container if taken from the in-line sampler.
7. Shake or rapidly invert the sample container 25 times. If undesirable foam is created, the sample may sit for up to three minutes to allow the foam to disperse.
8. Transfer a portion of the sample into smaller, sterile vials filling each only ¾ full.
9. Immediately transfer all sample vials into a rack which fits into a cooler with ice/water mix up to the milk level in the vials or samples can be kept in the sample refrigerator until transported.
10. Manually clean and sanitize the sampler/sample bottle connection after each CIP cycle and prior to installing a sample bottle. Disassemble and manually clean and sanitize the sampler body if needed.

Approved In-Line Milk Sampler Contacts

Accurate Metering/Anderson Instruments
156 Aurisville Rd.
(800) 833-0081/ext 208
www.andinst.com

Isolok/Sentry Equipment
P.O. Box 127
Oconomowoc, WI 53066
sales@sentry-equip.com
www.sentry-equip.com

QMI/Quality Management, Inc.
426 Hayward Ave., North
Oakdale, MN 55128
Qmi2@aol.com
www.qmisystems.com

Laboratory Supply Companies

Nelson Jameson, Inc.
(800) 328-8302
www.nelsonjameson.com

Weber Scientific
(800) 328-8378
www.weberscientific.com

IMPORTANT NOTES

1. Keep all sample containers protected from contamination.
2. Protect in-line sample container caps from contamination while being stored during sampling. Caps can be stored in 200-ppm chlorine or equivalent.
3. Perform sub-sampling on a clean, well-lit, impervious work surface of adequate size.
4. Clean the in-line sampler per manufacturer's instructions.
5. Provide a brush to manually clean and sanitize the exterior of the sampler/bottle connection.
6. Sample containers must be disconnected during Clean in Place (CIP) pipeline wash.
7. Partially filled sample containers may be reconnected after CIP.
8. Provide and maintain a sanitizer spray bottle for sanitizing tanker connections and in-line sampler connections.
9. Provide and use sanitizer test kits or strips (200-ppm chlorine or equivalent).
10. Maintain in-line sampler refrigeration and sample storage refrigerator between 32-40^{0}F (0.0-4.4^{0}C).
11. Provide thermometers in glycol for each refrigerator and record an AM and PM check of the thermometer on the temperature recording log. If a recording thermometer is used with each refrigerator, the temperature check can be documented on the recording chart. Corrections are made by adjusting the temperature-recording chart to match the refrigerator thermometer.
12. Provide an indicating and recording thermometer with the temperature probes to be installed as close as possible in the milk line downstream from the cooling device prior to the in-line sampler device. A weekly check of the indicating thermometer against the temperature-recording thermometer must be made and recorded on the temperature-recording chart. Corrections are made by adjusting the temperature-recording chart to match the indicating thermometer.
13. Maintain refrigerator temperature log sheets for a minimum of six months.

APPENDIX F

BULK MILK TANK TRUCK PERMIT IDENTIFICATION DECALS

The PMO, Section 5, requires each milk tank truck and its appurtenances be inspected at least once every 12 months. To identify which milk tank truck is being inspected (since more than one milk tank truck may be used on a specific route) annual permit decals are issued by MDARD for each milk tank truck giving it an individual identification number (see **APPENDIX H** for the application form, DY-305.

These permit identification decals are issued to all new or existing milk tank trucks and expire June 30 each year and are re-issued following the receipt of an annual $10 fee. The assigned permit number will remain the same from year to year.

Milk tank trucks with enclosed compartments are to have the permit with identification number placed in the compartment near the outlet valve where it will be visible when the compartment is open. The pump motor compartment is also an acceptable location. On milk tank trucks without compartments the permit is to be placed near the rear outlet valve on the tank. In addition, the assigned number is to be displayed on the underside of the manhole dust cover, on top of the milk tank truck in 2 inch high letters that contrast with the background to be highly visible. The numbers for tank "0123", for instance, will be displayed as "MI-0123." This will allow receiving personnel to positively identify the milk tank truck they are sampling, unloading and washing.

When inspected, the milk tank truck will be issued an "inspected and approved" seal by the MDARD inspector as well as an inspection sheet. This will be applied by the annual permit decal.

APPENDIX G

REINSPECTION:

There are certain items evaluated during the course of an inspection that are considered critical to the proper sampling, measuring and transporting of milk and the milk samples. If violations are found for these critical items, it is imperative they are corrected and documentation of the correction is provided by conducting a reinspection.

When a reinspection is required, the inspector will list the items that need to be corrected and allow a minimum of 72 hours to correct the items before a reinspection is made. Items not corrected on the reinspection may lead to administrative or legal action as described in the SUSPENSION OR REVOCATION OF LICENSE, ISSUANCE OF FINES section following this section. Items normally requiring a reinspection are:

When inspected at a dairy plants:

- Dirty milk contact surfaces
- Deeply pitted stainless steel pump housing
- Cracked or broken milk contact equipment, including impellers
- Improper sample storage temperature

- Samples do not correspond to those listed on weight slips
- Thermometer not accurate, not available
- Damaged or taped milk pickup hose
- Failure to store samples properly
- Failure to record information accurately on weight slips

When inspected at a farm:

- Thermometer not correctable for accuracy or not available
- Fails to agitate the milk properly
- Improper sample storage temperature
- Samples do not correspond to those listed on weight slips
- Picked up milk which exceeded 45°F
- Failure to accurately report the weight or temperature of the milk picked up from the farm milk tank
- Failure to take the sample for analysis in accordance with the procedures established by the department
- Damaged or taped milk pickup hose
- Failure to record information accurately on weight slips

SUSPENSION OR REVOCATION OF LICENSE, ISSUANCE OF FINES:

Certain items are specifically listed in the law as items for which the director or his/her representative may summarily suspend a license or permit on the spot because the items pose an imminent threat to the public health, safety or welfare. In addition, any violation of items listed in the Legal Requirements section in the front of this booklet that are not corrected can lead to administrative hearings or court proceedings that allow for license revocation and/or a penalty fine (up to $1,000, plus costs for an administrative hearing; from $250 to $2,500 for a court proceeding) and/or jail time (up to 90 days through court action).

Summary suspension items for a milk hauler/sampler:

- Offered for sale or sold milk or milk products from production, transportation, packaging, or storage facilities that have such an accumulation of trash, rubbish, dirt, insects, vermin, human or animal wastes, or spoiled milk or milk products that precludes the reasonable protection of the milk or milk products from contamination.
- Offered for sale or sold milk or milk products produced in equipment with a significant portion of the milk contact surfaces covered with an accumulation of residues that were left after having gone through a cleaning regimen and that are thick enough that they may be easily scraped to form a body of solids.
- Offered for sale or sold milk or milk products stored in a container of unapproved construction.
- Received or picked up milk or milk products stored in a container of unapproved construction.
- Interfered with inspection of milk or milk products
- Any other condition that creates an imminent threat to the public health, safety, or welfare.

APPENDIX H

FORMS

To download the fom DY-304 click here

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www.michigan.gov/mdard