

# **MILK HAULERS PROGRAM / TEST MANUAL** **FOR THE STATE OF KANSAS**

## **INTRODUCTION**

Milk haulers are the most important link between the milk producer and the milk plant. They are more than truck drivers. They are the judge of acceptable milk before it leaves the farm; they determine the amount of milk to be purchased by measuring the amount in the tank. The milk hauler's sampling techniques are very important because that milk sample is the key that determines the quality and composition of the milk in the bulk tank. Test results obtained have a major influence on the price paid to the producer.

These procedures, when done properly, ensure a fair and accurate transaction between the producer and buyer.

The quality of milk delivered to the plant depends on how well the hauler identifies and eliminates all unsatisfactory milk before pumping the product into the tank truck.

One of the major duties of the dairy program of the Kansas Department of Agriculture is to promote the production and sale of good quality dairy products in the state of Kansas. One of the methods of achieving this goal is by using proper milk sampling, collection, and transportation procedures. These procedures are similar in most of the states and many of the steps presented must be followed to satisfy regulations.

The regulatory agency is responsible for ensuring that haulers know what to do, how to do it, and take the time to do it at each pickup location. If procedures are not strictly followed the milk may be improperly accepted. This may cause an economic loss for either the producer or the plant.

In the following material, it is our intent to outline the procedures for measuring, sampling and collecting milk and to provide general information on milk composition, quality and testing.

## **REQUIREMENTS OF THE MILK HAULER**

Before a hauler is issued a license, the applicant must be capable of performing the work properly. Initial training of a prospective hauler should consist of aid and training by a licensed hauler. A prospective hauler shall not haul milk until he or she obtains a license.

A. **OBTAINING A LICENSE**

The measuring, sampling, collection and transportation of milk in Kansas is to be done by a person who holds a license to do so. An application for a milk hauler's license, as well as a program/test manual, will be available from the dairy inspector and/or the regulatory agency (Dairy Program, Kansas Department of Agriculture). The applicant must view a training video and upon satisfactory completion of the bulk hauler test and application, accompanied by a \$35.00 fee a temporary license will be issued. The new hauler must then be evaluated by an inspector within 30 days, before the regular license may be issued. This license is renewable annually on July 1 and shall be carried by the hauler at all times while on the job and be available for inspection on request of an authorized official.

B. **LICENSE RENEWAL**

A hauler license is renewable without examination upon completion of an application and payment of the \$35 fee unless the previous license was cancelled/suspended or was not renewed for the previous year. An evaluation of the haulers sanitation and sampling procedures during the license year is necessary to keep a valid license.

In addition to the above, each three (3) years all milk haulers must also:

1. Review the "Kansas Milk Hauler's Handbook"
2. Complete and return the written test with a passing score.

Failure to obtain a license before picking up milk could result in the truck being detained until a licensed hauler can take over the operation of the truck.

3. **HAULER QUALIFICATIONS**

1. Must be able to read and write.
2. Appearance must be neat and clean.
3. A desire to learn and the ability to follow instructions.
4. Ability to work with others.
5. Some knowledge of the dairy industry.
6. Must have some knowledge of the operation and maintenance of trucks.
7. Valid driver's license.

**EVALUATION OF HAULER  
SANITATION AND SAMPLING PROCEDURE**

At least once a year, a dairy inspector will evaluate each hauler's sanitation and sampling procedures. New haulers will be evaluated within 30 days of the date the temporary license is issued. These evaluations are done while the hauler is picking up milk at the farm; however, special arrangements may be made if necessary. During an evaluation, observations are made and violations are noted on the evaluation form and discussed with the hauler at that time.

## **EVALUATION OF TRUCKS, TANK AND APPURTENANCES**

At least once a year an evaluation of the truck, tank and appurtenances will be made at the plant, receiving or transfer station. The following items are checked for cleanliness and construction: the truck tank; the dome lid gasket and air relief valve; the sample case; the sample transfer instrument; sample containers.

Other items checked:

1. The truck for proper identification (name and address of the milk plant or hauler in possession of the contents).
2. Tank identification number. These tank I.D. numbers will be assigned by the Department of Agriculture Dairy Program and it shall be affixed on the tank rear left corner. It is the truck owner's responsibility to keep the assigned number in place on the tank.
3. Outside of truck cleanliness; wash tag.

Yearly, upon a satisfactory evaluation of the truck and tank appurtenances a Kansas Department of Agriculture inspection decal will be affixed to the truck.

## **TRAINING**

All haulers must attend a training session and/or complete a review of the hauler study material, including a written test, in order to keep a valid license. These hauler training reviews are for the purpose of maintaining uniform methods and sampling procedures and to keep the hauler notified of changes affecting his/her duties. The training consists of reviewing the Kansas Milk Hauler Handbook and completing the written test. In addition, training sessions may also be held by the dairy inspector at various locations throughout the state. Sessions also are available at the Topeka Office. New haulers are required to attend a training session before the license is issued. It is the hauler's responsibility to complete the training.

## **ENFORCEMENT**

During a hauler evaluation, if improper procedures are noted, they will be discussed at the time. If violations are found, the hauler is notified, in writing, requesting corrections before a follow up evaluation is done. If violations have not corrected, the license will be suspended. Before initiating legal action, the dairy program manager will provide the hauler the opportunity for a hearing. Facts presented at the hearing shall determine the action taken.

If a person is found hauling without a license, the truck will be detained until a licensed hauler can take over the operation of the truck. The plant, receiving or transfer station will be notified.

## **OUT OF STATE HAULER**

Haulers licensed by another state, but operating in Kansas, can be evaluated by the Kansas Department of Agriculture and their methods reviewed to meet Pasteurized Milk Ordinance sampling and hauling procedures. Copies of the evaluations will be sent to the licensing state.

## **PROCEDURES OF THE MILK HAULER APPEARANCE**

The milk hauler, as a handler of human food, must have a clean, neat appearance and good sanitary habits.

The clean, outward appearance of the truck and tank also establishes confidence in the hauler's ability to handle a food product. The bulk tank truck must be of sanitary design and construction. The tank shall meet the construction requirements of the 3-A Sanitary Standards for farm pickup service.

## **CHECKLIST PRIOR TO STARTING ON THE ROUTE**

The hauler must have certain supplies and equipment in order to satisfactorily perform the requirements of measuring, sampling, collecting, and transporting the milk. Before starting, check for the following:

- A. The truck tank and the transfer equipment have been properly washed and sanitized
- B. The last wash tag is available in the truck. This tag shall contain the following information:
  - 1. The date and time tank was cleaned and sanitized
  - 2. The location where the tank was cleaned and sanitized
  - 3. The signature, or initials, of the person who washed and sanitized the tank.
- C. The following supplies and equipment are to be present on the truck:
  - 1. Adequate supply of sample containers, properly stored and protected from contamination.
  - 2. Sample transfer instrument with prepared sanitizing solution (200ppm chlorine or 12ppm iodine or equivalent or a ph less than 4.0 when using an acid sanitizer), in a suitable covered container
  - 3. Applicable test kit for checking strength of sanitizer.
  - 4. Insulated sample case with adequate ice or other refrigerant to maintain sample temperature between 32<sup>0</sup>F to 40<sup>0</sup>F
  - 5. A metal stemmed, dial thermometer with unbreakable plastic window. This thermometer needs to be calibrated at least once every six (6) months against a certified thermometer of known accuracy. Both thermometers must be accurate within  $\pm 1^0$  F. Usually the calibration can be done at any industry or plant laboratory where milk is delivered. The date checked, correction factor and

checker's initials must be attached to the thermometer case before returning to the hauler. Care must be taken that this information is readable. We recommend that this information be covered with clear tape.

6. A pen with waterproof ink to identify samples
7. A watch or other timing device
8. Adequate supply of milk weigh tickets and pen to record the required information
9. Adequate supply of single service paper towels.

## **ORGANOLEPTIC TEST OF MILK**

### A. ODOR

The most important factor in consumer acceptance of dairy products is flavor. Milk flavor control must begin at the farm.

It is recommended that the hauler does not taste the milk for off-flavors because of potential health problems caused by the consumption of raw milk. Nevertheless, the hauler should realize that off-flavors in raw milk invariably show up with off-odors; therefore, if off-odors are noticed, off-flavors are usually present.

Normal milk has virtually no odor. Haulers should have a good impression of what constitutes normal milk so they can judge the milk which is collected with confidence. If the milk has a serious off-odor or appearance, the milk is to be rejected. The producer and/or fieldman shall be contacted immediately so the cause may be determined and corrected. In case a hauler is uncertain as to whether a tank should be accepted, the hauler should contact the plant or association for guidance, and obtain a sample upon which a final decision may be made.

Some of the more common off-odors and their possible causes are:

1. **Feed.** The feed a cow eats may impart certain odors to milk. Some stronger feeds will carry through more noticeably than others. Odors resembling green grass, silage, turnips, and alfalfa hay are outstanding examples. Feed odor can be minimized or eliminated by taking the cows off offending feeds at least four hours before milking. Certain feeds can be detected in milk if fed to the cow even 15 or 30 minutes before milking.
2. **Barny.** This odor is caused by cows breathing foul air due to poor barn sanitation and/or ventilation. Good sanitation and proper milking procedures will correct this problem.
3. **Foreign.** Any seriously objectionable odor foreign to milk, such as sanitizer, fly spray, paint, oil, kerosene, creosote, or a medicinal substance will render the milk unacceptable or unfit for use. Such an odor may be caused by direct contamination of the milk or may be absorbed from the air. Sanitizers are included in this category because the residue of sanitizer, such as hypochlorite and iodophor, if left on dairy equipment, may be absorbed by milk and impart a foreign odor. Phenolic compounds used in udder ointments may combine with iodophor or hypochlorite

sanitizers to form a highly objectionable foreign odor which is detectable in a very low concentration.

4. **Garlic/Onion.** This obnoxious weed flavor, imparted to milk when the cow eats garlic, onions, or leeks, is not classified as one of the usual feed flavors described above. The garlic/onion flavor is recognized by the distinctive odor suggestive of its name. It may be actually so objectionable as to render the milk undesirable for use.
5. **Musty.** This odor is suggestive of musty or moldy hay. It may be absorbed directly by the milk, but is more likely to come from feed or stagnant water consumed by the cow.
6. **Rancid.**
  1. **Oxidative Rancidity:** Oxidized milk gives off odors usually described as cardboard, metallic, or tallowy. It is usually more noticeable during the winter months when cows are on dry feed. The most frequent cause of oxidative rancidity is by the contamination of milk with small amounts of copper or iron from milk contact surfaces.
  2. **Hydrolytic Rancidity:** Hydrolytic rancidity found in milk will give off an odor resembling spoiled nut meats. It is more noticeable during winter, when cows are on dry feed, or during late lactation. Agitation of warm raw milk in the presence of air, causing foaming, will result in a rancid type odor within a few hours.
  3. **Sour:** Sour milk will have a malty odor and will be found when poorly cooled milk results in excessive bacterial growth. It also may result from bacterial growth due to unsanitary milking practices and/or unsanitary equipment. Good, sound sanitary practices and prompt cooling in the bulk tank will prevent this problem.
  4. **Weedy:** The weedy odor is not included among the usual feed odors. It may include obnoxious odors resembling such plants as ragweed, bitterweed, or peppergrass, and may become a very troublesome flavor defect. It can be eliminated or minimized by keeping cows away from weed-infested pastures or by not offering feeds containing such weeds until after the cow is milked.

Any change in quality should be brought to the attention of the producer and the milk plant. Appropriate comments are to be made on the producer's milk weigh ticket. This warning may often be the earliest indication of trouble.

Odors gather just below the cover of the bulk tank. To properly check for off-odor, remove a small port opening, put your nose down to the opening and smell the milk. Never open the entire lid; this will let the odors escape into the air. The detection of off-odors can be affected by a number of external factors such as:

1. Milk house odors,
2. Gasoline or diesel fumes adhering to clothing
3. Smoking immediately prior to checking for odors, or smoking in the milk house
4. Eating or chewing aromatic candy, tobacco, medicine, beverages, food, etc.
5. Highly scented shaving lotion, soap, and other toiletries.

## B. APPEARANCE

Normal milk color ranges from bluish white to golden yellow and is free from foreign or clotted matter. When you are checking the appearance of a tank of milk, make sure the tank light is on and/or the area is well lighted. Lift the lid and observe the complete, undisturbed milk surface. Any evidence of partially churned butterfat, frozen milk, or other condition which may alter the reliability of the sample is to be indicated. These problems, depending on their severity, may or may not be reason for rejecting the milk. Bring this to the attention of the producer and the fieldman to have this problem corrected.

Following are some milk quality problems which may become evident while checking the appearance of that milk. Any of these defects would be sufficient reason to reject the milk.

1. Bloody milk. The milk from mastitic cows may contain blood. A small amount of bloody milk can give a large quantity of normal milk a reddish tinge.
2. Flaky milk. Milk from cows having mastitis may show light flakiness or pronounced stringy curd particles.
3. Foreign matter. Floating foreign matter includes insects, hair, chaff and straw. The presence of foreign matter may result from careless handling of milk, open doors, torn screens, dusty feeding conditions, and improper cleaning of the udder before milking.

## **MEASURING THE MILK**

In order for the producer to receive payment for his or her milk, it is necessary to determine the amount of milk in the bulk tank. This is most generally done by measuring the milk in the tank using a graduated dipstick provided with each bulk tank. The measurement indicated on the dipstick is then converted to pounds by the use of a calibration chart which is provided with each tank. The calibration of the tank is usually done by the tank manufacturer and is checked upon installation of the tank in the producer's milk room. When measuring milk in farm bulk tanks, the hauler must do it competently, honestly, and impartially to ensure that both producer and buyer receive a fair value for the milk.

### A. Procedures for measuring milk in bulk tank:

If the agitator is running upon arrival, turn the switch to "off" to make sure it does not start during the measuring process. The milk must be completely motionless when measurements are made. It is permissible to take the sample before measuring the milk and after agitation time is completed.

1. Wash and dry hands (do not use the equipment wash vats).
2. Lift the measuring stick and wipe vigorously with a clean paper towel, an area above and below the approximate milk line. This not only wipes away the milk line, but also warms the measuring stick slightly to produce a more definite reading.

3. Position the stick in the milk. If there is any foam, gently move the foam away from the measurement area with the end of the measuring stick.
4. Gently remove the stick and read measurement at eye level in a well lighted area. Repeat this procedure to check your first reading. Both readings must be identical. If they are not, repeat the entire procedure. When the milk line is close to, but not exactly on a specific mark, it is read as if it was exactly on that mark. When the milk line falls exactly between two marks, always read to the nearest even number. It is important to always read the stick in this manner to ensure accuracy and consistency.
5. Record the reading on the weigh ticket immediately. Use the conversion chart to change the reading to pounds of milk. Also, record the date and time of the pickup, temperature of the milk, the producer's number and your identification. A copy of the weigh ticket must be left in the milkroom.

The measuring stick should be stored in the bulk tank in its proper position between pickups. If an outside measuring tube is used, it shall be readable and must be cleaned and sanitized when the rest of the bulk tank is cleaned.

If any of the following conditions are present, the milk hauler shall notify the producer and fieldman or plant and record it in the remarks column of the weigh ticket.

1. The tank is incorrectly calibrated
2. Errors in the weigh conversion chart
3. Bulk tank is out of level
4. Moving, cracking, or settling of milk house floor causing the bulk tank to shift
5. Improper footings under the tank legs
6. A wearing or distortion of the measuring stick bracket or seat.

## **AGITATION**

In order to obtain a sample that is truly representative of the milk in tank, proper agitation of the milk before sampling must be accomplished.

Follow the tank manufacturer's recommendation for proper agitation time. If no recommendation is available, a general rule is at least five (5) minutes of constant agitation for tanks less than 1,500 gallons; for tanks of 1,500 gallons or more at least 10 minutes of constant agitation is required.

If it is determined that the milk is not properly agitated by following the above state procedures the milk hauler, dairyman and/or fieldman will contact the Dairy Program Manager or his representative. The problem will be reviewed and a proper agitation time determined.

It is the hauler's responsibility to have a watch or other timing device to check the agitation time of the milk. If the agitator is running upon arrival, timing begins when it has been noted that the agitator is running. After the milk has been agitated for the proper amount of time, it is ready to be sampled.

## **TEMPERATURE**

The hauler must take and record the temperature of the milk at each pickup. The proper time to check the temperature of the milk is while the milk is being agitated. This temperature is an important quality control measure for both the producer and the plant.

First, sanitize the metal stemmed pocket thermometer stem for at least one minute (use the prepared sanitizing solution in your sample transfer instrument). Then, insert the thermometer stem an inch or two into the milk supply and read.

The following should be considered when checking the temperature:

1. Milk at the farm must be cooled to 45<sup>0</sup> F or less within two hours after milking. The blend temperature of the milk after the first and each successive milking shall not rise above 50<sup>0</sup> F. It is recommended that milk be cooled and maintained between 32<sup>0</sup> F and to 40<sup>0</sup>F for the production of a quality product.
2. The reading and recording of the temperature monthly on the barn card will provide a history of the bulk tank efficiency. If the temperature readings of the milk in the tank gradually increase, it will show that there is something wrong with the tank and it is not cooling properly. The milk hauler should notify the producer and the plant to resolve the problem. The hauler should also make a note of this in the remarks column of the weight ticket.
3. A temperature above 45<sup>0</sup>F can cause an off-flavor or high bacteria count in the milk.

## **MONTHLY BULK TANK TEMPERATURE CHECK**

At least once a month the accuracy of the bulk tank thermometer shall be checked against the hauler's thermometer. A card is provided at the farm to record bulk tank and haulers thermometer readings. If the tank thermometer is not working properly or if it is inaccurate, a note of this should be made on the producer's weight ticket and the plant should be notified.

## SAMPLING

The sampling of milk from a farm bulk tank is an important part of the milk hauler's responsibilities. Extreme care must be taken to obtain a representative sample.

In the state of Kansas, the UNIVERSAL SAMPLE SYSTEM is being used. This universal sample system provides for one sample that can be used for all laboratory analysis, but not all analysis may be done on the same sample. This system permits the regulatory agency, at its discretion, at any given time and without notification to hauler or industry, to collect and to analyze these samples. The producer or milk hauler is not as likely to anticipate when quality tests will be run because the same sample is taken at every pickup.

All samples must be handled as if they were to be used for quality testing. If there is more than one bulk tank at the farm, each tank is to be separately measured and sampled.

This sampling procedure must be strictly followed:

1. Wash and dry hands
2. Identify each sample container with the producer's state and patron number, the date of pickup, the time of pickup, the temperature, and the haulers initials. Sample containers with a bar code sticker should also have this information available.
3. Make sure the milk has been properly agitated.
4. If a dipper is used, make sure it is clean and sanitized. The dipper should remain in the sanitizing solution until it is removed to sample the milk.
5. Open the sample container, being careful not to contaminate the interior of the container or its cap. Contamination of the sample container will alter the laboratory results. (Do not dip the sample container in the milk).
6. Rinse the dipper at least twice in the milk before taking the sample, being careful not to put your hands in the milk. Extend dipper 6-8 inches into the milk and collect the sample. Make sure the sample container is not held over the milk supply while pouring the sample. The sample container should not be filled more than three-fourths of the way full; this will enable the laboratory to properly mix the sample before testing.
7. Close the sample container, making sure it is sealed correctly so it does not leak or cannot puncture other sample containers. When using a Whirlpak bag, make sure enough air is trapped inside the bag to be able to properly mix the sample.
8. Immediately place the sample in the refrigerated sample case and keep it between 32<sup>0</sup>F to 40<sup>0</sup> F until delivery. Make sure that the level of refrigerant is no higher than the milk level in the sample containers. The use of racks and/or drainage holes ensures that sample containers do not get buried in ice or do not get contaminated due to melting of the ice.
9. After you have sampled the milk, rinse the sample dipper with potable water and return it to the container with sanitizing solution for storage.

## **TEMPERATURE CONTROL SAMPLE**

Always take a second sample of milk at the first stop of each load as a temperature control sample. This sample will only be used to check the temperature at which samples are maintained during transportation and delivery. This sample must be marked with the following:

1. The words “temperature control”, or “TC”, or “Pilot”
2. The date
3. Time of pickup
4. Temperature of the milk
5. Producer’s state and patron number and
6. Milk hauler’s identification

## **CONNECTION OF HOSE**

The transfer hose is to be brought into the milkroom through the hose port. Remove the cap from the bulk tank outlet. If the milk tank valve has been leaking, or there is evidence of milk present, the outlet shall be rinsed and sanitized. Remove the cap from the transfer hose, placing the cap off the floor to prevent contamination; then, connect the hose to the bulk tank outlet. If a reducer is used on the bulk tank valve, it must be cleaned and sanitized prior to use. The only time the transfer hose is not capped is during the loading of milk and truck tank cleaning process.

## **PUMPING THE MILK**

To aid in the removal of butterfat which may have clung to the side of the tank and to help protect the plant against a fat loss due to this factor, it is a good practice to leave the agitator running until the tank is at least half empty. Make sure the agitator is shut off before foaming and splashing begins, to prevent product loss due to foam.

It is also important to shut off the pump as soon as possible after the tank is empty to avoid sucking air and milk house odors into the truck tank. When the tank is empty, shut off the refrigeration compressor on a direct expansion tank, or the water circulation pump on an ice bank tank.

If the farm tank was not completely emptied when your truck tank is full, return to the farm and empty the tank before the producer adds any additional milk. If the bulk tank is not emptied, it cannot be washed and sanitized before the next milking, nor would the samples and weight accurately represent the milk delivered.

Do not start rinsing the tank while the hose is attached.

## **DISCONNECT THE HOSE AND RINSE THE FARM BULK TANK**

After the milk is pumped from the tank, and the pump shut off, remove the transfer hose from the bulk tank and cap it off immediately. Visually check the bottom of the bulk tank for sediment. If it is excessive, make a note of it on the weigh ticket in the remarks column and notify the producer and plant fieldman.

As a help to the producer, remove tank valve assembly and place it in the wash vat (the hand washing facilities should not be used to wash the tank valve and cap assembly); rinse the interior of the bulk tank with warm water (about 100<sup>0</sup>F). Close the tank cover after rinsing to prevent the tank from drying out and to keep out any foreign material. If the producer wants you to do so, install and start the automatic tank washer.

Rinse the floor down to keep it clean and free of milk. Any milk remaining on the floor may sour and develop acid which may eventually damage the concrete. Do not place the end of the water hose in the wash vat. Be sure to check that the hose port is properly close.

## **TRANSPORTATION AND UNLOADING OF MILK**

During loading and transportation of milk, the manhole cover of the pick up tanker should not be opened. All samples must be kept between 32<sup>0</sup>F to 40<sup>0</sup>F during transportation and delivery to laboratory.

When unloading, the use of a dome filter on the tank manhole cover is required to protect against the entry of dust and insects.

## **CLEANING AND SANITATION OF TANK AND APPURTENANCES**

Tank and transfer equipment are to be cleaned and sanitized after each use. It is permissible for the tank and transfer equipment to be cleaned and sanitized after one or more uninterrupted loads but always after each days use. The job of cleaning and sanitizing the tank and/or equipment may be with a plant employee; however, it is the hauler's responsibility to ensure its sanitary conditions before starting on the route.

A wash tag is to be filled out every time a tank is cleaned and sanitized. The last wash tag must remain in the truck for inspection.

## **MILK COMPOSITION, QUALITY AND TESTING**

The haulers have more contact with the dairy farmer than any other group. They are asked a variety of question which they may or may not be able to answer. The following material presents information of the composition of milk, quality and testing which will be useful to haulers on their daily contact with producers.

### **A. COMPOSITION OF MILK**

The main constituents of milk are water, butterfat, protein, lactose (milk sugar), and ash.

The average composition of milk is:

Water	87.0%
Butterfat	4.0%
Lactose	5.0%
Protein	3.3%
Ash	0.7%

### **B. CAUSES OF BUTTERFAT VARIATIONS**

The variation in the percent of butterfat has the greatest effect on the producer's returns. The bulk milk hauler must provide an adequately mixed, reliable sample for butterfat analysis. This is done by following the proper sampling procedure. There are, however, some reasons for butterfat variations which the hauler cannot control. These variations are commonly due to:

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

### **C. MILK QUALITY**

**WHAT HAPPENS TO THAT SAMPLE OF MILK AFTER IT IS COLLECTED?**  
Milk samples collected by the hauler are delivered to a plant, transfer or receiving station for further collection by industry for laboratory analysis.

FARM  
MILK SAMPLE  
PLANT STATION

STATE LAB

INDUSTRY LAB

ANTIBIOTIC RESIDUE

BUTTERFAT

SOMATIC CELL

SEDIMENT

BACTERIA

ADDED WATER

PESTICIDE RESIDUE

REGULATORY ACTION

PAYMENT

At least once a month, these samples are collected by the dairy inspector to be delivered to the state laboratory for analysis. Tests such as antibiotic residue, somatic cell count, bacteria count, pesticide residue, added water, etc, are performed on each milk sample at a determined frequency. Testing shall begin within 48 hours from the time the sample is collected at the farm.

Additional tests such as butterfat, sediment, etc., are performed by the industry. Tests for milkfat content are used as the basis for payment to the producer for his or her milk.

Test results are used to verify compliance with standards for the production of quality milk. If violations are found, regulatory action is taken on that producer's milk supply. Regulatory action may cause the producer to lose the ability to sell milk, resulting in loss of income.

#### D. MILK TESTING

The following is a summary of the quality tests performed by the laboratory and the reasons for the tests and haulers responsibility as the official sampler.

1. Butterfat Tests for butterfat content are mainly performed by the marketing association, and used as the basis for payment to the producer for his or her milk. It is important that the hauler has knowledge of the proper sampling procedure to ensure that test results are representative of all the milk in the farm bulk tank. Incorrect agitation of bulk milk at the farm can greatly affect the determination of milk content.

2. **Bacteria Count**—Bacteria are microscopic one-celled organisms which are found in all living animals, in the soil, water, ponds, and even well. Manure, flies, insects, rodents, utensils, and equipment are sources of many types of harmful bacteria. Because of the widespread presence of bacteria, contamination of equipment which comes in contact with milk must be avoided.

The amount and kind of bacteria found in a sample of milk is an indication of the sanitary conditions and practices occurring on the farm and the extent of milk cooling. Contamination can occur when measuring, sampling, and transferring milk. Therefore, extreme care must be taken to prevent further contamination of the sample by the hauler. If samples are improperly cooled during transportation, bacteria count results may not be representative of the producer's milk.

The standard plate count is one of the tests used to enumerate organisms. Results are not obtained until 48 hours after testing. Bacteria counts exceeding 100,000 per milliliter are in violation of state and federal standards and corrective action must be taken immediately.

3. **Antibiotic residues**—the dairy industry is focusing their attention on drug residues found in milk. Dairy farmers, haulers, processors and marketing associations are being affected by the changes brought about as a result of this attention. A closer look is being taken at proper usage, labeling and storage of antibiotics at the farm; severe penalties are taken whenever unapproved, mislabeled or illegal drugs are found at the farm.

The amount of drug residue testing continues to increase because processors and marketing associations want to insure that milk is residue free before it enters the market.

The presence of antibiotics in milk is illegal. These residues can cause violent allergic reactions in some individuals; furthermore, their presence in milk can interfere with the manufacture of certain dairy products such as cheese or cultured products. These antibiotic residues are of medicine and drugs used to treat the animals as a result of an infection.

Drug screenings are performed on all loads of raw milk and finished products. Screening tests have been developed which are rapid, easy to run and sensitive to families of antibiotics. These screening tests are performed on each load of milk received at a plant or transfer/receiving station before the milk is unloaded.

When a milk sample is found to contain antibiotics, the producer's milk supply is stopped from entering the market until a sample is collected and

found to be clear of antibiotics. Bulk milk tanker samples that show presence of antibiotics are traced back to the responsible producer(s) and regulatory action is taken.

4. **Sediment Tests**—The presence of sediment indicates unsanitary methods of milking and milk handling practices. This test determines whether the milk is being properly protected from contamination due to dust, and/or improperly cleaned udders. The test consists of filtering a sample of milk through a white cotton disc and checking the amount and kind of residue left. A clean sediment disc pad, however, does not prove that sanitary practices exist.
5. **Added Water**—Adding water to milk is illegal and when found is considered an adulteration of product. The added water test is based on the principle that the temperature at which milk freeze is a fairly constant factor. If water is added either deliberately or by accident, the freezing point of milk will become closer to that of pure water. A cryoscope is used to measure the freezing point of milk.

The hauler must exercise care and make sure the transfer hose is disconnected before the bulk tank is rinsed in order to prevent adulteration of milk with water. Also care should be taken to ensure that sample containers sealed properly and that they are not completely submerged in the ice water during transportation to the plant or lab.

6. **Somatic Cell Count**—Mastitis is a very costly disease that reduces milk yield and milk quality, and increases cost of production. Somatic cells are primarily white blood cells which are fighting an infection in the cow's system. Many factors influence the number of somatic cells in milk. The cow's age, production capacity, and stage of lactation influence the normal level of somatic cells in the milk. Irritation and infection of a cow's udder caused by poor milking practices, improper cattle housing, improperly operating milking machines, or poor pasture conditions will show up as increased somatic cell counts. High somatic cell counts signify that some cows in the herd are experiencing illness or injury. Some of the tests used are called direct microscopic count (DMSCC) or electronic count (ESCC, OSCC) and WMT (screening test). The test measures the level of somatic cells in the milk. A level of 500,000 or less indicates normal milk and a mastitic condition would not be expected. Somatic cell counts exceeding 500,000 per milliliter indicate that mastitis may be a herd or cow problem and individual cow samples should be tested to identify problem cow. Somatic cell counts exceeding 750,000 per milliliter are in violation of state and federal standards and corrective action must be taken immediately.

7. Pesticide ResiduesBMilk contaminated with pesticide residues is of serious concern. Some pesticides are fat soluble and are metabolized by the cow and could appear in the milk, body fat and excreta after ingestion. The state laboratory performs routine pesticide screening or residues in milk samples. The methods used to determine the presence or absence of pesticides requires sophisticated equipment and materials. These tests usually require the extraction of the fat layer before quantitative determination can be made. If pesticides are detected in milk, the source of the problem needs to be found and corrected before the product can be used in the market.
  
8. AflatoxinBMilk contaminated with Aflatoxin M<sub>1</sub> is of concern due to its toxicity and carcinogenicity. When feed contaminated with aflatoxin is consumed by dairy cattle, the milk produced by the cow may contain Aflatoxin M<sub>1</sub>. Aflatoxin levels in milk may not exceed the FDA established safe level of 0.5 parts per billion.

To determine if aflatoxin is present, milk samples are tested at the state lab or shipped to an FDA lab. Some plants are screening tanker milk samples for aflatoxin. If sample results exceed acceptable levels, the milk source is stopped until levels are found to be acceptable. Most of the aflatoxin testing is done by the association or cooperative marketing the milk.