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Maintaining a Safe Milk Supply

Michigan State University Extension Service

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# Maintaining A Safe Milk Supply

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Milk, one of the most important human nutrients for children and adults, must be readily available and safe for human consumption.

The safety of milk is assured by strict state and federal laws and regulations. Michigan has especially high quality standards for milk. It was the first state in the nation to adopt Grade A fluid milk laws, and has stricter standards than the federal government for regulating certain chemicals in milk. Producers and processors, whose livelihood depends in part on the quality of milk and milk products, share in the effort to insure a safe milk supply.

The quality of milk is better today than ever before due to the unwavering commitment of the dairy industry and state and federal governments. This bulletin describes how fluid milk and milk products can be kept safe from chemical contamination.

## COMPOSITION OF MILK

Milk is a complex mixture of many different substances originating from feedstuffs, water and air being processed through the cow. Chemicals possessing no nutritional value may find their way into the cow as a result of intentional addition (such as antibiotic treatment) or inadvertent contamination (such as chemical pollutants in water or feed).

Certain toxic chemicals, especially those known as halogenated hydrocarbons such as organochlorine pesticides (like DDT) possess properties that cause them to be of special concern. Chemicals of this type are usually persistent (not biodegradable) environmental pollutants. Because of their extremely high solubility in fat and low solubility in water, they are not excreted in urine, and will most likely accumulate in the body fat of a cow. Unfortunately, in synthesizing milk, the cow's body does not distinguish between hazardous and nonhazardous substances, therefore toxic chemicals may be secreted into milk fat. This is one reason that many of these pesticides are now banned from commercial sale.

These and other industrial chemicals, even though monitored very closely, are in the environment and have the potential to pollute air or water. Fortunately, most chemicals never come in contact with cattle at concentrations high enough to be secreted into milk. When a rare contamination incident has occurred, it was usually found to be the result of:

- 1) the user not adhering to directions for proper dosage or usage of medication or pesticides;
- 2) accidental administration of the wrong chemical;
- 3) allowing cattle access to areas where pesticides were freshly applied or stored.

Contaminated milk cannot be sold to consumers and must be destroyed. There is no process by which chemicals can be removed from milk. Pasteurization destroys only microorganisms, such as bacteria; it does nothing to change harmful chemical residues. Therefore, preventing toxic chemicals in milk is one of the keys to maintaining a safe milk supply.

## GOVERNMENT CONTROL

Any chemicals that may possibly contaminate milk are monitored very closely by state and federal agencies. Federal and state governments have passed laws to protect consumers from obtaining milk containing toxic chemicals, and strictly enforce these laws through random sampling and testing. The U.S. Food and Drug Administration (FDA) regulates contaminants in food under Section 406 of the Food, Drug, and Cosmetic Act. Tolerances and Action Levels: AN ACTION LEVEL OR TOLERANCE IS THE GUIDELINE FOR THE MAXIMUM AMOUNT OF THAT CHEMICAL ALLOWED IN FOOD. Examples are given in Table 1. The allowable level of a chemical has been determined to be acceptable and safe for human intake based on: 1) existing animal toxicity data, 2) existing human toxicity data, and 3) exposure data based on the level of the contaminant in food and the average consumption of that food.

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**Table 1. FDA Tolerance and Guideline Levels for Some Chemicals in Milk.**

CHEMICAL	FDA TOLERANCE OR ACTION LEVEL* (maximum level allowed in milk fat) (parts per million)
DDT	
DDD	
DDE	1.5
Methoxychlor	
Dieldrin	
Aldrin	0.3
Endrin	
Lindane	
Hexachlorobenzene	0.3
Heptachlor	
Heptachlor epoxide	
PBBs	action level = 0.3 Michigan tolerance = 0.1**
PCBs	action level = 1.5

\*Levels equal to or below tolerance or action levels are considered safe for human consumption.

Action levels are used when scientific data are incomplete. FDA may lower or raise action levels or establish tolerances as new data become available.

\*\*In this case Michigan standards are more stringent than Federal standards.

### Screening for toxic chemicals in raw milk

The Food and Drug Administration (FDA) periodically takes samples of bulk milk for routine chemical screening analyses. Each milk sample taken from a bulk tank truck represents approximately 20 producers. The FDA takes samples randomly at various locations throughout the year and keeps records of the farms that contributed to each bulk tank. Therefore, if a contaminant is detected in a market product or in a bulk tank, the source of contamination may be traced.

The FDA uses two different procedures to detect unusual or undesirable chemicals in milk samples:

#### 1. Screening Analysis

This analysis detects classes of compounds, such as organochlorines or organophosphates, which include many of the common pesticide compounds, and other toxic chemicals such as PBBs and PCBs. For most of these compounds, if any chemical is detected, additional testing is done to substantiate the original analysis, and specifically identify the chemical. For some of these compounds, there is an established FDA tolerance which, if exceeded, results in regulatory action.

#### 2. Early eluter program

This analysis detects chemicals that cannot be found in the Screening Analysis. Smaller molecular weight compounds such as solvents are hidden in the first screen and must be tested for separately.

### Responsibilities of regulatory agencies

When a contaminant in food is detected, State and/or Federal authorities may take any or all of the following types of action:

- 1) prevent the food from reaching the market;
- 2) remove the food from the market;
- 3) dispose of the contaminated food;
- 4) if a contaminant that has no action level or tolerance is detected such a limit may be set.

Michigan's dairy laws authorize state inspectors to regulate contaminated milk and other food products.

The SEIZURE LAW authorizes a state inspector to place any food or food products under seizure on suspicion of contamination with a hazardous substance. This means that the product cannot be sold for human consumption until testing reveals that the product meets State standards. The inspector, in turn, is obligated to take a sample of the food or food product for testing.

The Grade A Milk Law and Manufacturing Milk Law are also involved. These laws provide a mechanism for state inspectors to prevent contaminated milk from entering the market place. To insure a safe milk supply, milk and milk products are tested routinely every 6 months for the presence of chemical contaminants (See Figure 1). If a low-level contaminant is found, bulk truck samples are taken to locate the load containing the low level contaminant. When the load is found, milk samples from all farms in the load are tested, and appropriate actions are taken on those farms found in violation.

The Michigan program is designed to eliminate all possible contaminant problems long before the finished product reaches an FDA action level. This program has proven to be very effective for many years.

### PRODUCER RESPONSIBILITIES

Producers are the first, and most important, members of the "safe milk supply team." A producer should do his utmost to prevent contamination of milk. The following are some suggestions:

- Use and store all pesticides, fertilizers, feed additives, medications, cleaners and other chemicals away from feed and livestock.



X = points at which enforcement action may be taken

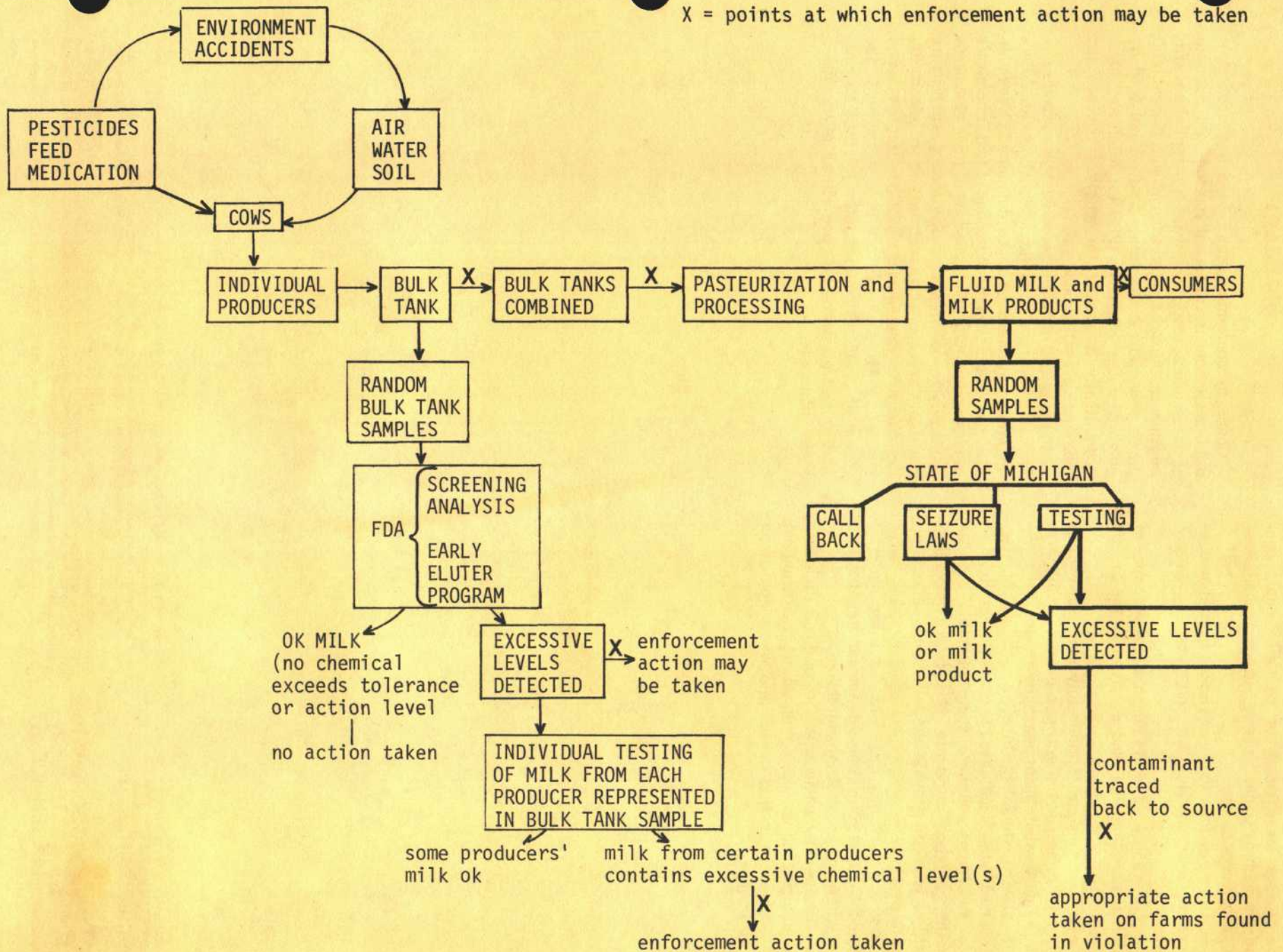


Figure 1. State and Federal schemes for monitoring chemicals in milk.

- Do not leave empty or partially empty containers such as paper bags or cans in areas accessible by livestock.

- Adhere strictly to the advice and recommendations of your veterinarian and county extension agent.

- Adhere strictly to the formula and sequence of adding ingredients to feed as given in the mixing directions.

- Report to your supplier any materials which seem abnormal; do not accept a product with ingredients of questionable appearance or odor.

- Always examine the label on each bag of material to make sure it matches the contents exactly.

- Know your suppliers, their reliability, and the quality of their products. Buy from recognized dealers who can provide unadulterated, uncontaminated products.

- If you have any questions, have the material tested. Contact your County Extension Agent to find out where to have the material tested.

- Evaluate the environment around you, including neighboring industries or other enterprises. Find out if these are affecting the air and water quality on your farm.

## SUMMARY

Chemical contamination of food has become a nationwide concern in recent years. Slight amounts of chemicals in food are always a potential hazard, because chemical use is so widespread. Recent incidents, especially contamination of animal feed by polybrominated biphenyls (PBBs) in Michigan, have dramatically increased the public's concern for maintaining a safe food supply.

As the public demands reassurances of food safety, more sensitive analytical techniques to detect contaminants continue to be developed. Nevertheless, the FDA claims the incidence of toxic chemicals in milk is declining. The presence of toxic chemicals is usually traced to a rare occurrence, such as an accident, gross mismanagement, or carelessness. Conscientious management by both producers and regulatory agencies will continue to minimize the threat of chemical contamination of food animals and animal products, and provide all of us with a safe food supply.

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