Producing Hygienic Raw Milk: Standards, Testing, and Farmer Education
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Dedicated Fresh Raw Milk can be produced with significantly lower bacteria, coliform and pathogen counts than what is required for pasteurized milk.

Most raw milk studies have been carried out on conventional pre-pasteurized bulk tanks milk, yet DEDICATED FRESH RAW MILK is produced to significantly higher standards. Producing milk for pasteurization does not provide an incentive for minimizing pathogens and bacterial counts. Farmers producing DEDICATED FRESH RAW MILK need to implement extra hygienic controls to ensure a safe product.

Grass-to-Glass Farmer Education
The California-based non-profit Raw Milk Institute (RAWMI) has developed an on-farm food safety training and certification system for DEDICATED RAW MILK farmers.

RAWMI training includes the development of a Risk Analysis and Management Program (RAMP) tailored to the individual farm. This comprehensive plan identifies potential risks that are present at the farm. With assistance from RAWMI, management practices are set up to reduce, manage, or mitigate those potential risks.

RAWMI-listed farmers maintain Common Standards:
- Milk must have no detectable Salmonella.
- Coliform count on clara-mycogenes is not greater than 100.
- Bacterial count from results of stool sample; milk is not used if greater than 5000/3 ml.
- Milks must be documented as free from Tuberculosis and Brucellosis.
- Milk must not be mixed with that of other dairies, to ensure traceability.

Test & Hold for Additional Safety
With rapid molecular methods for detection of pathogens and coliforms, as opposed to traditional culture-based detection, it is now possible for farmers to test every batch of raw milk prior to it being released for sale. While this may be cost-effective for small farms, larger dairies can reduce risk of DEDICATED RAW MILK outbreaks to near zero. The BAX system, for example, uses real-time PCR assays for detection of major milk contaminants and provides results within hours.

Outbreaks Decreasing as Raw Milk Production Increasing in the USA

Since 2005, the number of states providing legal access to raw milk, through heralds, farmgate sales or retail sales, has increased from 34 to 42. Outbreaks of foodborne illnesses attributed to raw milk and reported to the Centers for Disease Control and Prevention peaked in 2010 and have since decreased significantly (1). The lack of correlation between legal access and number of outbreaks, illnesses and hospitalizations has been independently verified using Poisson regression (2). The CDC outbreak database does not distinguish between pre-pasteurized and dedicated raw milk.

In California, retail milk is produced on five licensed farms, for which annual production volumes were obtained; this increased from 100,000 gallons in 2000 to 1.3 million gallons in 2016. Changes in California outbreaks, illness and hospitalization rates are shown for 2005 to 2018. Although the number of illnesses fluctuates widely, both outbreak and hospitalization rates have remained unchanged, despite the large increase in production over this time. The 8 outbreaks, 15 illnesses and 14 hospitalizations were not necessarily attributed to these licensed farms; the contaminated milk may have come from pre-pasteurized bulk tanks, unrecorded herdshares, family farms or unreported buying clubs (2).

Drivers of Dairy Outbreaks in the USA, 2005-2017

In the United States, more outbreaks are caused by raw milk than other dairy products, but DEDICATED RAW MILK is not distinguished from conventional pre-pasteurized milk in the CDC database. Outbreaks from pasteurized milk can be very large, such as one in 2006 which caused 1644 illnesses in the California prison system. Queso fresco is a significant contributor to hospitalizations and deaths, and pasteurized and non-pasteurized dairy foods cause more deaths than any other dairy commodity. Raw milk caused fewer deaths than any other dairy foods. Shown here are outbreaks reported to the CDC for 2005-2017.

The hospitalization rate is highest for ques fresco outbreaks at 399 per 1000 illnesses, as compared to 31 per 1000 for pasteurized milk. Death rate is highest for processed pasteurized dairy at 364 per 1000 illnesses, and lowest for raw milk, at 1.2 per 1000. For processed dairy, pasteurized products caused 5.5% more deaths per 1000 illnesses than unpasteurized, while for fluid milk, pasteurized caused 1.8% more deaths per 1000 illnesses than unpasteurized.

Risk Profiles of Different Dairy Foods

Dairy Food Outbreaks and Outcomes in the USA, 2005-2017

The relative frequency of raw milk outbreaks may be decreasing because dedicated farmers are undertaking on-farm food safety training. Systematic implementation of training, certification and monitoring could further reduce raw milk outbreaks. Risk management would be a better strategy than prohibition for raw milk regulation.

Farmer Training Reduces Bacterial Counts and Prevents Outbreaks

The British Columbia Fresh Milk Project monitors milk from cow and goat herdshares and offers RAWMI training to farmers. Bacterial counts of 158 consecutive milk samples are shown. Those from fully-trained farmers have consistently lower standard plate counts than the 20,000 cfu/ml required for pasteurized milk (10,61 samples below this limit). Farmers still in training generally also have very low counts but occasionally show unacceptable levels of bacteria (5/107 samples above limit). Coliform counts from fully-trained farmers fall mostly below the 10 cfu/ml for pasteurized milk (98/107 samples below limit), while farmers still in training are more likely to have coliform contamination (6/107 samples above limit). For any samples with coliform counts above 10 cfu/ml, the point of contamination was discovered and remediated. Not one of the 158 milk samples tested so far showed any detectable Campylobacter. E. coli STEC, Listeria or Salmonella.

Pennsylvania is one of seven states allowing retail raw milk sales. Outbreaks were relatively frequent up to 2014, but a training session by RAWMI in 2014, he had been responsible for multiple outbreaks, including 57% of raw milk-related illnesses nationwide in 2010. For 2014 to 2017 there was only a single small raw milk outbreak in the state, which was not from a RAWMI-listed farm.