

Risk from Bioaerosols during Raw Milk Movement

Overview:

This paper and related SMS raw milk movement risk assessments focus on the risk that moving raw milk might create and spread infectious bioaerosols from unknown Foot and Mouth Disease (FMD) infected farms. Specifically, the proactive risk assessments evaluated the likelihood that handling and moving raw milk would create bioaerosols that could potentially infect susceptible species. In looking at this risk, considerations that allow bioaerosols to form and remain in the air related to raw milk handling and movement from a dairy premises were evaluated, including: temperature, humidity, particle size and available space.

These risk assessments concluded that as long as common industry practices, the pasteurized milk ordinance (PMO) and State regulations are followed, any bioaerosols created through raw milk movement were considered a *very low risk* to spread FMD. Putting in place the Biosecurity Performance Standards, the risk that any bioaerosols created through raw milk movement would spread FMD virus is **negligible to low**.

Considerations:

Bioaerosol background:

Bioaerosols are small particles or droplets that are able to carry and spread live virus. They are created when a liquid is aerosolized through partial evaporation due to heat, high pressure or another process. Common processes that may form bioaerosols within agricultural activities include pressurized spray washes, irrigation, animals breathing or other high energy processes.

Bioaerosol sources:

The FMD virus is found in several bodily fluids from infected animals including saliva and milk. Relating to FMD, common concerns for airborne disease spread include animal respiration creating bioaerosols and the potential for bioaerosols to form from moving raw milk or cleaning activities.

Research:

Most current research studies evaluating liquid aerosolization risks, including diseases and job hazards, focus on the risk to human workers during cleaning activities, especially in municipal waste treatment processes and concentrated animal feeding operations. No known studies have evaluated the risk that transporting unknown infectious raw milk may spread the virus to an uninfected farm. Due to the lack of research around milk aerosolization, dairy and FMD experts were consulted to evaluate this risk.

Secure Milk Supply Plan focus:

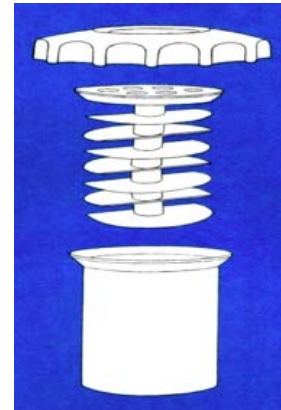
Given that the SMS focuses on raw milk movement, these risk assessments specifically evaluated the risk that bioaerosols may form from raw milk during pumping and transport activities, creating a potential source for FMD spread to other farms. The risk that animal respiration could spread disease was not evaluated within these assessments. Similarly, milk

tanker and other vehicle cleaning activities were assumed to take place away from farm animals, minimizing the bioaerosol risk related to cleaning.

Risk Assessment:

Considering common industry practices, the pasteurized milk ordinance (PMO) and State regulations, any bioaerosols created through raw milk movement were considered a very low risk to spread FMD.

This conclusion was based on discussions with seven experts who were consulted during the risk assessment. Given that raw milk is typically held at a cool (<40F) temperature and that the milk particle is fairly large, any bioaerosol particles that formed would likely be heavy and quickly fall back into the liquid milk. The commonly used Runovent® filter is also designed to prevent milk and aerosols from escaping. It is a 3-piece plastic vent system creating a circuitous path for air to vent without allowing heavier particles, like milk from escaping. In addition, the PMO requires that the tanker manhole cover and dome lid remain closed except during milk sampling and examination. Ensuring that these lids remain tightly closed, without loosening the doglegs, will decrease the chance on any milk bioaerosols escaping during transit.



Schematic of how the Runovent® filter parts fit together (<http://runovent.com/index.html>)

Since the milk particle is heavy enough and kept at a cool temperature that discourages bioaerosols from remaining in the air and the lids offer an added barrier to any bioaerosols from escaping the milk tanker, the likelihood that FMD could spread from raw milk movement through bioaerosolization is **negligible to low**.

Acknowledgements

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Comments

Please send comments or suggested edits for improvement to: umnsf@umn.edu

Additional Resources

The Secure Milk Supply website has additional resources available at: www.securemilksupply.org