

# Dairy worker safety and health: Respiratory protections

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Lung diseases have been recognized among dairy workers for decades. While changes on modern dairies have reduced the risk of lung disease, dairy workers continue to experience an excess of chronic bronchitis and occupational asthma with measurable decreases in their pulmonary function and increased symptoms including wheezing, cough and phlegm production.

The increased workforce demands on expanding modern dairies have been met primarily through immigrant workers, many of whom have not worked on a farm previously.

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These inexperienced workers appear to be at greater risk for developing respiratory problems that reduce their productivity and may result in these workers leaving the industry.

Lung disease in dairy workers (and other livestock workers) is associated with occupational exposures to organic dusts and their microbial constituents, especially endotoxin. The severity of lung disease is related to both the amount of exposure (dose) and duration or number of years of work.

Although there have been fatalities on dairies associated with entry into manure-handling systems, there is little published research on modern dairy worker exposure to ammonia, hydrogen sulfide and other gases and chemicals.

The fatalities have been related to the clean-out of stored manure including stirring up of slurry with subsequent release of high concentrations of hydrogen sulfide.

*For more detailed information on manure handling and hazards of confined spaces, read a previous column about [manure pit safety](#) by Dennis Murphy and David Douphrate.*

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The few studies that have measured ammonia on dairies have found lower levels than those reported historically; however, the evidence for synergism with organic dust from poultry and swine operations suggests this is an issue in need of research.

Organic dust aerosols in dairies are a complex mixture of fecal material, urine, cow dander and other animal proteins and hair, plant material (feed), insects, mites, bacteria, fungi and other agents.

Much of the research into respiratory effects and exposure control in dairies and other agricultural settings has focused on gram-negative bacterial endotoxins; however, other components of these dusts are also important causes of inflammation in the respiratory system.

Measurement of inhalation exposures on modern large scale dairies in the U.S. and Europe have found concentrations of organic dust and endotoxin to be highly variable, with a significant proportion of workers exposed at concentrations exceeding suggested occupational exposure guidelines for agricultural dust and endotoxin. Some of the highest exposures measured have been associated with feeding, moving cows, milking cows and re-bedding stalls.

Occupational exposure guidelines (OELs) such as the ACGIH threshold limit values (TLVs) are best practice guidelines intended to reduce disease risk among workers. They are not regulatory standards like the OSHA permissible exposure limits (PELs).

Since OSHA does not have many PELs specifically for agriculture, there have been instances where OSHA has cited the most up to date guidelines and research in enforcement actions. OSHA does have a PEL for exposure to grain dust and for ammonia, although these are not up to date for the purpose of risk management.

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Exposure monitoring can be used to identify potential problem areas and to evaluate the effectiveness of controls or improvements in task performance that can lower exposures.

Although exposure monitoring can be sophisticated, there are some direct-reading instruments that can provide immediate data to help evaluate exposure to dust and gasses including ammonia, methane, hydrogen sulfide and (the lack of) oxygen.

These need to be properly calibrated and interpreted. Sensors for direct reading instruments are integrated into controls such as ventilation in other livestock production industries, but this has not been widely explored in the dairy industry.

Controls used to reduce exposure and lung disease among dairy workers have shown promise, but implementation feasibility and effectiveness remain largely untested.

Approaches include engineering controls (e.g., ventilation to remove the hazardous agent from the work environment, spraying water to suppress dust), substitution of another less problematic product (e.g., feed or bedding) and administrative measures (e.g., worker rotation).

In principle, engineering controls are preferable because of a higher level of effectiveness. OSHA requires these approaches before using respirators.

Respirators can be effective if properly selected and used, but they are uncomfortable and not 100 percent reliable. Bandanas and dust masks are NOT respirators and offer very little protection.

A respirator is a device that fits tightly on the face and can have filters or cartridges to remove aerosols and/or gases and vapors. These types of air purifying respirators (APR) do not supply oxygen and cannot be used for high gas exposures where oxygen may not be sufficient – i.e. in manure pit/confined space areas.

Supplied air systems (self contained breathing apparatus, SCBA) provide a higher level of protection and provide breathable air.

N95 disposable filtering face piece respirators are a popular choice since they are comfortable and easy to use. They do not provide any protection for gases or vapors. They do not provide the same level of protection for dusts as a tight fitting rubber/elastomeric APR.

Because of the risks associated with respirator use, OSHA's Respiratory Protection Standard (CFR 1910.134) requires medical evaluation, training, proper selection and fit testing.

Dairy managers can reduce risk of lung disease through:

- Identifying tasks or locations with potential high dust exposures (including milking parlors with wet aerosols)
- Implementing and evaluating control strategies, including modification of tasks
- Conducting medical screening of workers including baseline and annual follow-up to detect lung problems early and prevent or reduce worsening of lung disease
- Addressing smoking and other behavioral risk factors in addition to exposure reduction strategies

Respiratory disease in livestock is also a significant problem. Optimal risk management strategies improve health and productivity for dairy workers and cows. **PD**

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