University of Delaware
Cooperative Extension
College of Agriculture and Natural Resources

Respiratory Health on the Poultry Farm

Safety Facts
SF-8

Introduction

Agricultural workers are exposed to numerous on-the-job respiratory hazards. Pesticides, fertilizers, dusts, disinfectants, paints and gases are just a few of the hazards, which may be encountered. Serious respiratory problems can develop from prolonged exposure to any of these airborne contaminants.

Despite smoking less, farmers have increased rates of chronic bronchitis. Components of agricultural dusts and gases are sufficiently irritating to the airways of the lung to cause mucus overproduction leading to repeated cough with phlegm. These respirable hazards are also a factor in the asthma and allergic problems, (runny nose and irritated eyes) which may occur with initial exposure.

To avoid these respiratory illnesses in the poultry house environment, it is important to recognize the specific hazards and wear the proper respiratory protection. This fact sheet will help you to identify the hazard, offer methods to reduce exposure, select the proper respirator, and consequently ensure your health and that of your employees.

Respiratory Hazards on the Poultry Farm

Respiratory hazards are usually categorized as smoke and fumes, sprays and mists, dusts, and gases and vapors. Smokes and fumes are very tiny solid particles suspended in the air. They can be generated from welding to burning plastic materials. Sprays and mists are small liquid droplets that occur from spraying pesticides, paints, disinfectants, etc. Dusts are suspended solid particles ranging greatly in size. Dusts can be generated from grinding, milling, drillings or created in the poultry house or in a dusty field. Gases and vapors are molecules in the air and are typically found in confined spaces. Examples in the poultry house include ammonia and carbon monoxide from engine exhaust of tractors or skid steer loaders.

Dust

Dust in the poultry house environment is a concern for growers. Some factors affecting dust concentrations include bird and litter age, temperature, relative humidity, ventilation rate, time of day and bird activity. Respiratory protection becomes especially important when dust levels rise in the houses such as during colder weather when ventilation is reduced, with built-up litter, and during the grow-out period. Poultry house dust contains feed and fecal particles, feather barbules, skin debris, fungal fragments, and spores, bacterial and bacterial fragments, viruses and particles of litter. This type of dust is typically known as organic dusts, since it is derived from materials formed by living organisms. Such dust was generally considered nuisance or inert, meaning it has little adverse effect on the lungs. New research though shows that because poultry house dusts are largely organic and contain bacteria and other bioactive substances, it cannot be considered inert.

Poultry house dusts also contain what is known as endotoxins, which are toxins of gram-negative bacteria. These inflammatory substances can cause toxin fever which is similar to influenza. Symptoms include headaches, nausea, coughing, nasal irritation, chest tightness, and phlegm. Endotoxins are responsible for a number of work-related acute and chronic illnesses such as those mentioned above.

Ammonia

Ammonia is prevalent in most poultry houses and especially during the winter months. It is produced from the breakdown of nitrogenous compounds and characterized by a sharp and pungent odor. Ammonia concentrations can be particularly damaging to your health during periods of minimum ventilation. This can be between flocks when the house is closed or during the brooding period.

Ammonia is considered an irritant and readily impacts the eyes and respiratory tract. Ammonia can increase the susceptibility of the respiratory system to airborne pathogens. This is due to impaired mucus flow and ciliary action in the upper respiratory tract which is the first-line of disease defense in humans and poultry.

Recent research has shown that ammonia levels can easily exceed OSHA and ACGIH recommended levels. The recommended level for short-term exposure (15 minutes) is no greater than 35 ppm. Unfortunately, many poultry growers who have worked in an ammonia-laden environment for years are unable to detect ammonia below 50 ppm.

If you fall in this category of individuals, there are several methods of detecting ammonia. These include litmus paper, detection tubes and electronic devices. Accuracy, ease of operation and calibration, and cost are factors to consider in the selection of ammonia detection devices best suited for your needs.

Other Respiratory Hazards

Pesticides, disinfectants and litter amendments are other potential respiratory hazards on poultry farms. These products are safe when applied according to manufacturer's recommendations. However, they can pose serious health concerns when applied inconsistent with recommended application procedures, and without the appropriate respiratory and personnel protection equipment. Also, remember all chemicals are not compatible and therefore mixing some chemicals can cause serious health consequence to you and your family.

Users of farm chemicals should thoroughly read and understand the label information and specifically the health hazards and safety precautions. If there are any questions, don't hesitate to contact the retail supplier, manufacturer or Extension Service.

Route of Entry

The above, identified respiratory hazards enter the body through the lungs which is the most vulnerable route of entry. The entry through the lungs represents the quickest and most direct route, because of its large surface area. This totals 100 square meters (1076 sq. ft.) or roughly the area of a tennis court.

The lungs have built-in mechanisms to defend against foreign matter. Coughing and sneezing help to remove some contaminants, but the capacity of the lungs is limited. If other measures to control exposure, such as ventilation, are not available or are insufficient, respiratory protective devices should be worn.

Types of Respirators

- Disposable particulate respirators or dust masks protect against dust particles and some mists. All particulate respirators approved under the newest testing requirements will have a certification label with the NIOSH and the Department of Health & Human Services (DHHS) emblems. They are made of a shaped piece of filter material held to the head by two straps.
- Chemical cartridge respirators protect against gases and vapors by using one or two replaceable cartridges containing a substance that absorbs specific gases and vapors. These respirators also come with replaceable pre-filters. These cartridges are color-coded for removal of different gases. In general, black cartridges are used for filtering organic vapors while the green are for ammonia.
- Powered air-purifying respirators pull ambient air through a filter and into the face piece. A rechargeable battery pack attaches to the belt of the wearer. This kind of respirator is especially good for individuals with heart and lung conditions who might not be able to use other respirators, or for individuals with beards or sideburns who cannot get a good fit with other respirators.
- SCBA or self contained breathing apparatus units supply safe air and shield you completely from toxic gases.

Selecting the Right Respirator for the Job

Employers are required by OSHA to assess the workplace to determine if respiratory hazards are present or are likely to be present. If hazards are found, employers must select and have affected employees properly fitted with a respirator suitable for protection from existing hazards.

A coding system is used by manufacturers to help users choose the right type of respirator for their work. The following coding systems are pertinent:

- TC codes. This refers to testing done by the National Institute for Occupational Safety and Health (NIOSH). A TC-21C code means the respirator will filter out particles as small as dusts and mold spores. TC-23C means the respirator will filter out specific gases and vapors such as those given off by certain agricultural chemicals. Check with your local safety equipment dealer to assure that the respirator and/or cartridge are the proper type.
- N, R and P codes. These certification codes apply only to non-powered particulate filter respirators. The designation "N" means the respirator is not resistant to oil; "R" means it is resistant to oil; and "P" means the unit is oil proof. All three classes of filters will be available in efficiency levels of 95%, 99%, and 99.7%. For example, a respirator marked **N95** would mean it is at least 95% efficient and is not resistant to oil.

Note that there are limitations with your respirators. The service life of the filter in all three categories is limited by considerations of hygiene, damage, and breathing resistance. All filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance (e.g., causing discomfort to the wearer).

Particle and chemical cartridge respirators don't protect against oxygen deficiency or contaminants not covered by their respective label or NIOSH approval number, such as TC-23C. The particle respirators also become clogged with particles and this makes breathing more difficult. When replacing cartridges, remember that a given cartridge protects only against the specific kinds and concentration of gases or vapors. Read the label on the cartridge to ensure proper use.

Fitting, Maintenance, and Storage of the Respirator

There are some medical considerations when selecting respirators. If a user has a heart condition, asthma, emphysema or other chronic lung conditions, they should check with their physician before using a respirator.

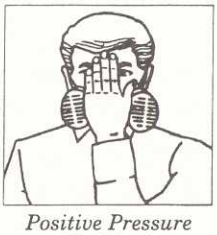
Only a snug fit protects you, so follow the manufacturer's fitting instructions carefully. Respirators come in different sizes, so find the one with the best fit. The shape of your face, facial hair, dentures, or skin condition can all prevent a snug fit.

In order for respirators to work effectively, they must be fit tested in compliance with OSHA 29 CFR 190.134. An improperly fitting respirator may allow contaminants to enter around the face piece and be inhaled by the wearer.

> WARNING: Under no circumstances should an employee enter a hazardous atmosphere without a respirator that was not properly fitted.

The following checks should be performed every time a non-powered, air purifying respirator is used:

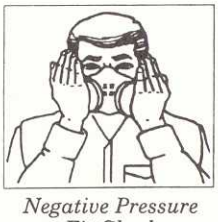
- **Positive Pressure Fit Check**



Positive Pressure Fit Check

1) Put on respirator according to manufacturer's instructions.
2) Block the exhalation valve with the palm of your hand.
3) Gently exhale and hold for about 10 seconds.
4) Check to see if the face piece is bulging slightly.
5) Try various facial expressions such as a smile and a frown.
6) If the face piece remains bulging and there are not air leaks between the face and face piece, you have a properly fitting respirator.

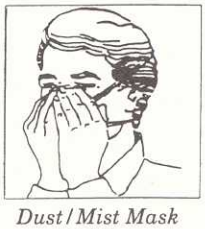
- **Negative Pressure Fit Check**



Negative Pressure Fit Check

1) Put on respirator according to manufacturer's instructions.
2) Block the air purifying elements with the palms of your hands.
3) Gently inhale and hold for about 10 seconds.
4) Check to see if the face piece is collapsing slightly.
5) Try various facial expressions such as a smile and a frown.
6) If the face piece remains collapsed and there are not air leaks between the face and face piece, you have a properly fitting respirator.

- **Dust Mask Fit Check**



Dust / Mist Mask Fit Check

1) Put on respirator according to manufacturer's instructions.
2) Pinch the metal nose clip (if available) to your face and ensure a snug fit.

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3) Cup both hands over the front of the mask and inhale. (Do not push on mask.)
4) Check to see if the face piece pulls in toward your face.
5) Try various facial expressions such as a smile and a frown.
6) If the mask is drawn in and no air leaks are detected around the face piece you have a proper fit.

Maintenance of a dust or disposable mask is quite simple – discard them after you use them. When the mask becomes clogged and breathing difficult, replace it with a new one. Never wash or try to blow out respirators or filters. With a half mask with a cartridge filter, wash your mask in warm water with a mild detergent, and sanitize as instructed.

Inspect your mask regularly for cracks and dents, and store it in a clean, cool, dry place. Since cartridges become less effective with use, replace them according to manufacturer's instructions. When not in use, store your respirator in a dry container such as a sealed plastic bag or a covered container. Don't store in direct sunlight, since it can deteriorate the respirator and/or the straps. They can be stored for convenience in the work area, if protected as indicated above.

Where to Purchase Respirators

For expert advice and a greater variety, always work with safety equipment suppliers. Some general farm supply stores, cooperatives and pharmacies carry respirators. Mail order is also an economical and convenient way to purchase a variety of types.

What Does a Respirator Cost?

Depending upon the supplier and the quantity purchased, NIOSH-approved dust respirators can be purchased for as little as $1.50 each. This is a small price to pay for your personal health!

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Authors:
Ronald C. Jester, P.E., Extension Safety Specialist
George W. Malone, Extension Poultry Specialist