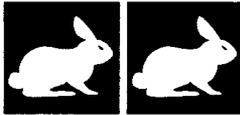
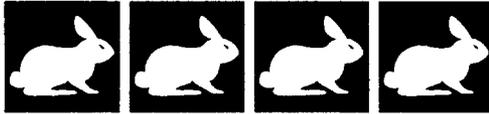
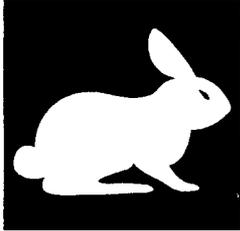


AE-1060



Rabbit Facilities FOR THE NORTHERN PLAINS



Harvey J. Hirning
Extension Agricultural Engineer

Rabbits can tolerate a wide range of temperatures if they are kept dry and draft free. Keeping them draft free during the winter in the Northern Plains is nearly impossible unless a totally enclosed building with a mechanical ventilation system is used. Conditions must be favorable to both the rabbits and those working in the building and caring for the rabbits. Warmer conditions may be needed for those working in the building and for the kits prior to weaning than is needed for mature rabbits.

Summer temperatures may be a problem for a breeding herd since fertility drops off very rapidly above 85 degrees Fahrenheit (30C). The minimum facility for the summer is a sun shade with some type of cooling. Cooling may be provided by placing blocks of ice in the cages for the rabbits to sit on or by cooling the air with an evaporative cooler.



Buildings

Climate is the major factor to consider in selecting a building type for raising rabbits. Under Northern Great Plains winter conditions a totally enclosed, insulated and ventilated building is highly desirable. A good manure handling system is essential.

During the summer a sun shade is needed to help keep the rabbits cool. Additional cooling may be needed to maintain high levels of fertility in breeding herds. Protection must be provided to keep predators from the rabbits.

Mature rabbits can tolerate a wide range of temperatures. The workers are more likely to do a thorough job of caring for the rabbits if the temperature is in the range of 40 F (8C) to 72 F (22C).

Many types of buildings can provide the environment needed for rabbit production. An easily cleanable floor is needed, especially in the work alleys. If suspended cages are used, the building must be strong enough to hold the weight of the cages and the rabbits. Clear span trusses should be able to carry 10 pounds per square foot of live load in addition to the wind and snow loads in the area. For most of North Dakota a 25 pound per square foot snow load is adequate except in sheltered areas where the wind cannot blow the snow off of the roof.

The choice of construction materials for a rabbit facility is primarily a matter of personal preference. Steel and wood are commonly used, because builders are familiar with these materials and they are fairly easy to work with. Concrete is usually limited to floors and foundations. Existing buildings such as a garage, pole building, barn or trailer home have all been used successfully as rabbit facilities.

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Environmental Considerations

Best performance is achieved if temperatures are kept near 55 F (13C). At lower temperatures, the rabbits will consume more feed in an effort to keep warm, but the rate of gain does not decrease very rapidly until temperatures drop well below freezing. Newborn kits may need to be placed in a warmer room except during feeding periods if the building is kept colder than 55 F (13C).

High temperatures result in decreased rate of gain because the rabbits reduce feed intake. Feed efficiency remains fairly high until heat exhaustion occurs. Fertility, especially among the males begins to fall off rapidly above 85 F (30C). It may take four to six weeks for fertility levels to be restored if males are exposed to high temperatures for several days in a row.

Relative humidity levels should be between 35 and 50 percent. This results in a dry manure pack. Lower relative humidity levels increase the risk of respiratory infections and higher levels increase ammonia levels in the building. During very cold periods you may elect to let relative humidity levels rise as high as 80 percent by reducing ventilation levels in an effort to reduce heating costs with an increase in odor levels.

Ammonia is the most common odor produced in a rabbit facility. For worker comfort it is important that the ammonia level be kept below 10 ppm. Higher levels are uncomfortable. Occupational Safety recommendations are that ammonia levels not be higher than 25 ppm if workers are exposed for more than eight hours per day. About 5 ppm is the lowest detectable level. High levels of ammonia will affect rabbit production as it causes respiratory irritation that leads to snuffles.

Ventilation to control moisture and ammonia will usually be sufficient to control other gases such as carbon dioxide and hydrogen sulfide. Ammonia levels are sometimes used to indicate whether adequate ventilation is being provided. If there is no odor of ammonia, carbon dioxide levels should be acceptable except in cases of malfunctioning heating equipment.

Dust may be a problem at the lower ranges of the recommended relative humidity levels. Dust is made up of skin, hair, feed and fecal materials. Excessive dust levels may reduce production levels and will frequently contribute to chronic respiratory problems for those working in the facility.



Ventilation Systems

The ventilation system has four primary functions: temperature control, moisture control, ensure adequate oxygen levels, and remove odors, dust and other undesirable gases. Normally ventilation is used to control temperature inside the building when outside temperatures are above freezing and to control moisture and odors when outside temperatures drop below freezing. During spring and fall conditions, higher levels of ventilation may be needed for odor control than would be expected for temperature or moisture control.

A good ventilation system will bring air into a building through planned openings. The fresh air is mixed with the air inside the building and then exhausted through fans or planned openings. During the summer a natural ventilation system will provide more ventilation than a mechanical system. For winter conditions, a mechanical ventilation system provides more accurate control of ventilation air and will have the lowest heating costs.

Minimum ventilation requirements vary from 0.1 cfm/lb of rabbits in the winter to about 1.0 cfm/lb in the summer. In small facilities, the minimum winter ventilation rate is often provided accidentally because of the natural leakage around doors and windows. Larger facilities will need a fan and air handling system to provide adequate ventilation without drafts.

Summer ventilation can be provided with a fan and inlet system or with a natural ventilation system. Even with light winds, a natural ventilation system will provide more air movement than a fan system. If we assume that 25 percent of the wall area on a 40 by 100-foot building with 8-foot side-walls is open, a 5 mph wind will provide an air change about every 30 seconds. This works out to a ventilation rate of 30 cfm/lb of rabbits. A fan powered system with 1.0 cfm/lb would require about 15 minutes to completely change the air in the building. (Figures 1 and 2)

The ammonia associated with rabbit manure makes it desirable to move the ventilation across the manure and then directly out of the building. One simple way to do this is to bring the air in through a slot inlet on one side of the building, down the sidewall, under the cages and out through a fan on the opposite side of the building. (Figure 3)

If rabbit cages are placed next to the wall, then the air should move across the ceiling and be mixed with the room air to prevent drafts on the rabbits.

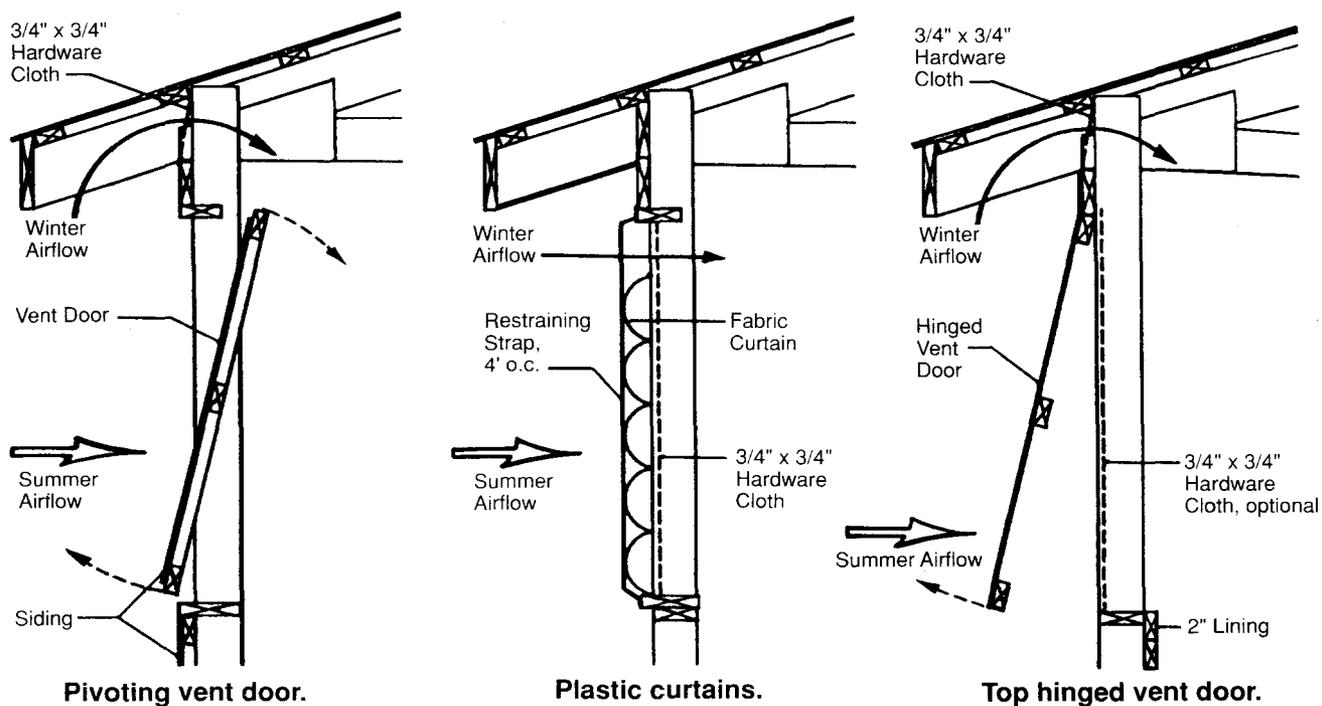


Figure 1. Sidewall openings for natural ventilation systems.

(Figure 3) With this system, a baffle is used to force the air to blow along the ceiling rather than allowing it to drop to the floor. A velocity of about 800 feet per minute (about 10 mph) through the slot is desired.

Ventilation requirements for a 40 by 100 foot building with 4000 pounds of rabbits during the winter would require a ventilation rate of 400 cfm. To provide an air velocity of 800 feet per minute through a slot inlet would require a slot 100 feet long by 1/16 inch ($400 \text{ cfm} / 800 \text{ fpm} = 0.5 \text{ sq ft}$ or 72 square inches. $0.5 / 100 = .005 \text{ ft}$ or .06 inch). An alternative would be to only make the slot 16 ft long by spacing 4 slots 4 feet long every 16 feet along the 100-foot wall. Then the slot would be about 1/2 inch wide.

Since caged rabbits are not be able to move out of drafts that might occur, you must be especially observant to notice if there are any differences in performance between various parts of the building. By watching the rabbits, you may be able to observe which ones are exposed to drafts. Another method of checking air distribution through the ventilation system is to use a smoke generator and watch where the smoke goes.

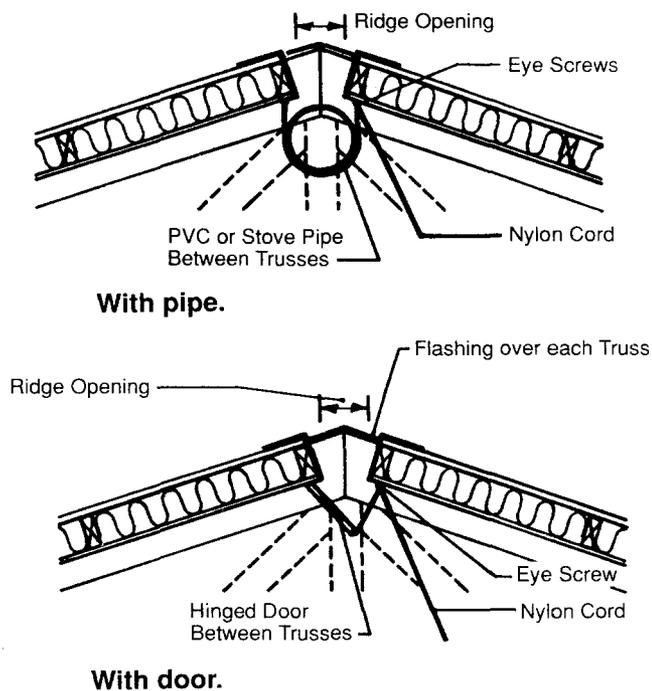
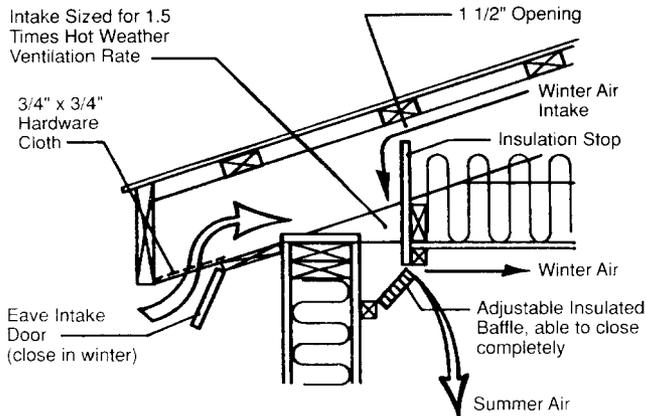
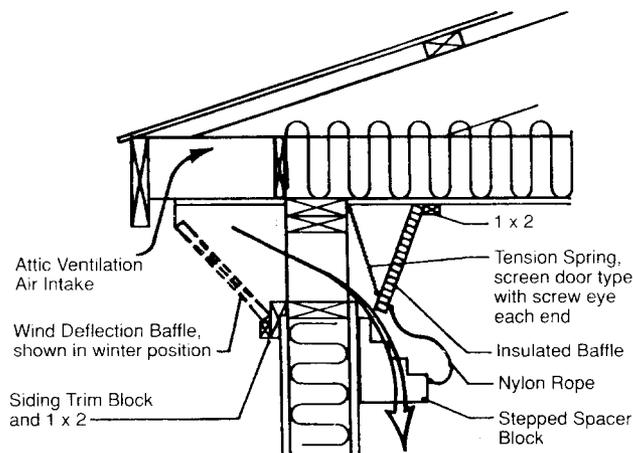


Figure 2. Ridge openings for natural ventilation systems.



Continuous slot inlet for ceiling mixing.



Continuous slot inlet for down the wall mixing.

Protect rabbits from drafts.

Figure 3. Slot inlet openings for mechanically ventilated buildings.



Controlling Condensation

Moisture will form on any surface when the dew point temperature of the air is greater than the temperature of the surface. This means that any cool or cold surface is likely to have condensation form on it. If this condensation occurs on the ceiling, there is a high probability that it will drip onto the rabbits and into the feeders. This will increase the probability of disease problems as well as spoiled feed.

Two methods that can be used to keep condensation from forming are to make sure that all surfaces are warmer than the dew point and by keeping the moisture level in the building below the relative humidity that would cause condensation to form. Most producers will use a combination of the two techniques. They will put insulation onto surfaces that might be a problem and ventilate the building to keep the moisture level down.

For North Dakota conditions, the following guidelines will help to reduce condensation problems:

Location	Minimum R-Value of Insulation	
	Natural Ventilation	Mechanical Ventilation
Ceiling	R-5	R-30
Walls	R-1	R-13
Foundation	R-1	R-8

If rabbits must be next to the wall, then a minimum R-13 insulation should be used in the wall to avoid having the rabbits next to a cold wall surface and possible condensation.

Helping You Put Knowledge To Work



AE-1060

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