

Consider the wind when planning poultry houses

GEORGETOWN, Del. — Energy conservation is something that needs to be taken into consideration from the very start when you're planning a poultry farmstead. This includes knowing which way the prevailing winds blow.

The orientation and placement of buildings in relation to the wind has a lot to do with how much energy you'll need for both heat and ventilation, says University of Delaware energy management specialist Norman Collins.

A researcher at the Delaware Agricultural Experiment Station, has spent much of his time over the past six years studying the energy needs of poultry producers on the Delmarva peninsula.

One of the first things to consider, says Collins, is wind action. As air passes over a poultry house it produces a high pressure area on one side and a low pressure area on the other. This pressure differential has a lot to do with how much energy is required for fan operation or heating.

The magnitude of the pressure difference is a function of wind velocity and increases at a geometric rate. The higher the velocity, the greater the difference.

A five-mile-per-hour wind and a ten-mile-per-hour wind will have much different effects on energy demand since four times as much air is forced through the same building cracks at ten miles per hour as at five.

Another important factor is wind direction. You need to find out the prevailing wind direction and orient your poultry house accordingly. The pressure differential will be greatest when the

wind hits the structure at right angles to its long side.

If the wind hits the building at any other angle than 90 degrees, this difference tends to be reduced. You'll get the greatest reduction in wind pressure differential if the long side of the building runs parallel to the prevailing wind, says the engineer.

This creates a certain conflict of interest when you're planning a poultry farmstead, points out Delaware extension agricultural engineer Ernest Walpole, who has worked with Collins on many of his poultry energy studies.

Farmers generally want good natural ventilation in the summer in which case you want to orient the building so that it's perpendicular to the summer wind. But they're also trying to save heat in the winter.

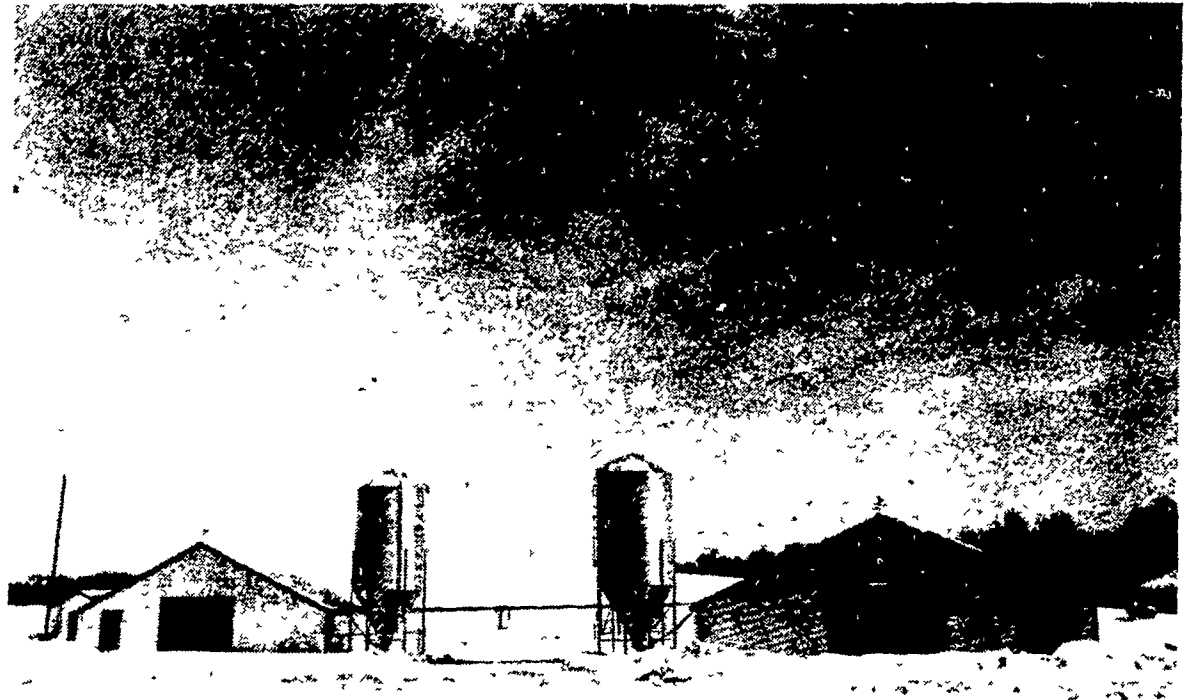
So they're better off placing it parallel to prevailing winter winds to reduce the amount of unwanted air infiltration.

"On Delmarva you can have it both ways," says Walpole. "In summer the prevailing winds come from the south, so you can get maximum natural ventilation when a broiler house is oriented east-west. In winter the prevailing winds come from the north-northwest, so you get the least infiltration from the same east-west orientation."

There are three terms the builder, the grower and the planner need to know, when they're talking about air movement in relation to a building structure, says Collins.

The first is air exchange rate.

This is the total volume of air per unit of time that will pass through the structure. You can divide this



Wind direction affects energy costs in poultry houses whether you're cooling them in the summer or heating them in the winter.

Farmers should take into account the prevailing winds when locating a new poultry house. It could save money.

total volume of air into several parts, one of which is ventilation.

This is the amount of air movement required to maintain desired environmental conditions inside the house — to eliminate relative humidity and ammonia.

A grower can do this either with fans or through natural ventilation.

The third term you need to understand is infiltration. This is the difference between total air exchange and the amount required for ventilation.

It's unneeded air that filters in through cracks when ventilating fans aren't running. In the winter it boosts your heating load and fuel costs.

Research on turkeys in the North Central U.S. suggests that air exchange for whatever purpose in a poultry house accounts for 80 percent of the total heat load.

"Our work with a computer model of broiler growout indicates that in this part of the country infiltration (excess air exchange) accounts for 30 percent of this

heating load," says Collins. "This is assuming that power ventilation is used to maintain the house environment. This amounts to one-third of your total fuel requirement in the broiler house."

In an existing house there are many ways to reduce the winter fuel load caused by infiltration, though there's probably no way to get it down to zero. (1) Use properly installed automatic inlet systems. (2) Caulk the big cracks

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