Effective ventilation boosts safety, productivity and sustainability

Controlling ventilation fans with variable speed drives (VSDs) teamed with high-efficiency motors can help fine-tune the conditions inside poultry houses. As well as improving the welfare of the animals, this approach can often reduce energy use by up to 40 percent and cut maintenance needs.

**Roof inlet/outlet system**

One of the main ventilation configurations used for poultry houses is the roof inlet/outlet system, with VSDs used to control the fan speed of the inlets and outlets used for standard climate control. With this equal pressure system, VSDs are the preferred choice as they enable the chickens to move freely between the house and the outside. In emergency situations, it should be possible to switch VSDs to an override mode and run fans according to a chosen strategy (ignoring warnings and faults). This allows extended fan runtime in adverse conditions.

**Tunnel ventilation system**

In countries where humidity and temperature are high, typically above 80% and 35°C, respectively, a tunnel ventilation system is used to provide extra cooling. However, if the temperature rises significantly, the standard ventilation system switches off. Multiple fans mounted on the walls of the house are used to create more air velocity, typically 3 m/s, to increase the cooling effect for the birds.

**Driving for Energy Efficiency**

Energy is one of the biggest costs in poultry production with ventilators, feeding machines and lighting the largest consumers. Therefore, efficient heating and ventilation systems can offer substantial savings. Efficient ventilation is also important as part of a serious circle that includes the overall productivity of a poultry farm. This is because birds that are too cold consume more food while birds that are too hot drink more water and gain less weight. Hot and humid conditions are not only dangerous but also result in chickens laying smaller and fewer eggs. While it is important to use high-efficiency fans motors, they can only yield energy improvements of 5-8%. In contrast, fans controlled by VSDs can result in very significant savings. This is because not only a small reduction in the speed of an electric motor results in a proportionally greater reduction of the energy it uses. It may therefore make sense to ensure the fan speed is matched as closely as possible to its required duty and efficiency.

**Banking on reduced energy bills**

It is possible to build on the energy saving effect of reducing the fan speed by creating fan banks that deliver the same level of air movement as a single fan running at full speed, but with potentially numerous energy savings. To illustrate this, consider a typical 1.4 m diameter axial fan of the type often found in poultry houses. Running at full speed (100%) the fan uses 1,500 Watts (W). At half speed (50%), it uses just 750 W. Therefore, if we use two of these fans banked togeth-er, controlled by a VSD to run at 50%, the volume of air moved is the same as a single fan running flat out. However, the energy consumption is 2 x 750 W = 300 W. A energy sav-
ing of over 75%! While there is an increased initial cost from purchasing and installing VSDs, the energy savings alone de-

erive a rapid payback. There is the added bonus that because the fans are operating at a slower speed, they run smoothly, with less noise and need less maintenance.

Variable speed drives are starting to play an increasingly im-
portant role in poultry house ventilation systems. In addition to saving energy and reducing carbon footprint, they create the ideal conditions for rearing happy chickens and thus ensuring optimum bird welfare and performance.


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