

Low Volume Ventilation for Bulk Grain Stores

Introduction

After drying, grain stored in bulk needs to be kept cool to avoid the formation of mould and prevent infestation by insects. Target storage temperatures should be about 12°C. Although refrigeration can be used to cool the grain, the most common method is to blow cold ambient air through the bed of grain with a fan.

Fans for Cooling

With bulk drying systems it is possible to cool the grain with the main drying fan. However this is not very efficient as the airflows produced by the drying fan are higher than would normally be recommended for cooling. This leads to several disadvantages:

- Electricity consumption is unnecessarily high.
- Some reheating of the cooling air takes place through the fan.
- Over-drying or rewetting of the grain during the cooling process can take place. This of course will depend on the ambient conditions when the fan is operating.
- Farmers who are charged on maximum demand electricity tariffs will pay a high cost for using the main fan during the winter.

Low Volume Ventilation

The established alternative to cooling with the main fan is to use Low Volume Ventilation (LVV). Here a small secondary fan designed to provide air at a rate of 8.5 m³/h/tonne is used.

Traditional LVV systems use a distribution ducting system under

the grain which is separate from the main drying ducting. It is possible, however, to use the main air distribution system for the cooling air by fitting the LVV fan to the main air duct. Some shuttering is necessary to prevent cooling air being fed back through the drying fan during cooling, and the drying air being fed through the cooling fan during drying.

An LVV fan used in this way has been nicknamed a 'Parasite' fan as it is often positioned to 'ride on the back' of the main drying fan.

Controls

The LVV fan can be operated manually when ambient conditions are right for cooling. It is however more effective to provide automatic control using two thermostats. The first thermostat should be used to sense the temperature of the grain and should be set at the required grain temperature, allowing the fan to operate when bed temperature is higher than the set point. The second thermostat should be what is called a differential thermostat. This should be used to sense the difference between ambient temperature and grain bed temperature. When the outside temperature is lower than the grain bed temperature the fan is allowed to run. The use of the two thermostats wired in series will give most effective and most economical cooling.

