DPI&F note

Grain storage - why install aeration?

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Aeration is a cheap way of managing grain quality to meet market requirements.
Aeration, if used carefully, can cool or dry grain. This will:

- preserve grain quality
- slow or prevent mould development
- slow or prevent insect development

Temperature, moisture and grain quality

Under hot moist conditions grain quality deteriorates rapidly, mould problems can develop within days and insect problems in a month or two.
Germination rate, milling and baking quality, oil composition, and grain colour and odour are all affected by high temperature and high moisture.
Insects and moulds impair grain quality directly by their feeding and development, and indirectly through generation of heat and moisture. Any reduction in temperature or moisture will slow development of insects and moulds. Development of insects is limited by temperatures below 15^{o}C, and by moistures below 9% in cereal grains. Development of moulds is limited by temperatures below 10^{o}C, and by moistures below 13% in cereal grains.

Aeration prevents storage problems

Some of the storage problems that aeration can prevent are:

- development of hot-spots
- moisture migration from warmer to cooler grain causing caking
- mould development in over-moisture grain
- decrease in seed germination
- decrease in malting quality of barley
- decrease in baking quality of milling wheat
- colour deterioration of pulses
- rancidity in oilseeds

Aeration reduces insect problems. Some growers successfully control insects by a combination of good hygiene and controlled aeration, and they do not need to use chemicals. This reduces the problem of chemical residues on grain.

Aeration to meet market requirements

Grain buyers are increasingly recognising the quality advantages of aeration. Many grain buyers prefer to buy grain from aerated storages, and some will only buy grain that has been aerated. These include wheat millers, barley maltsters and canola processors.

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Early harvest at high moisture

Beginning the harvest when moisture is above receival limits maximises yield and quality and minimises the risk of rain damage. However, the advantages of harvesting early can be lost if the high moisture grain is not handled and stored carefully.
Aeration cooling allows the high moisture grain to be stored safely until it can be blended or dried, or aeration can be used to dry the grain if weather conditions are dry.

Aeration increases efficiency of hot-air drying

Using aeration cooling to hold high moisture grain until a hot-air dryer is available allows the use of a smaller capacity, and thus a cheaper dryer. Aeration capacity is cheaper than dryer capacity.
As well as keeping the grain safe, aeration evens out temperature and moisture so the dryer operator can maintain constant heat and speed settings.
Aeration cooling can also be used to remove heat after grain comes out of a hot-air dryer. This can be used to reduce time spent in the dryer.

Aeration costs

Aeration **cooling** is a very cheap method of quality management for stored grain. The capital cost of aeration fans and ducting are usually 50c - $1 per tonne storage capacity. Automatic controllers for cooling are $1500 - $3000, and installation costs are extra, but these can control fans in up to 8 storages. Running costs for cooling are 5 - 10c/tonne/month.
The costs of an aeration **drying** system are much less than a hot-air drying system. The costs of fans and ducting are 2 -3 times higher than for cooling. An automatic controller for drying is available from Agridry for about $3000, and other controllers are expected on the market within a few years. Running costs will vary with the number of hours that the fans run.
The *ADC Grain Aeration Manager*, developed by CSIRO is now available through Modern Engineering and Construction, Walla Walla, NSW.. This system can automatically manage drying and cooling functions. Approximate cost is currently $8000, and the unit is capable of controlling eight silo applications.

Further information

For general information on drying and cooling see:

- DPI&F Call Centre open from 8.00am to 6.00pm Monday to Friday (telephone 13 25 23 for the cost of a local call within Queensland; interstate callers 07 3404 6999) or email callweb@dpi.qld.gov.au
- the Agridry Australia website www.agridry.com.au
- the Customvac Australia Pty Ltd website www.customvac.com.au
- GRDC website: http://www.grdc.com.au/growers/as (recent Update Advice papers, 'Aeration in on-farm storage – what's possible?, and 'How aeration works').

For other information on a wide range of grain storage issues, see:

- The DPI&F website www.dpi.qld.gov.au/fieldcrops/3947.html
- Or, contact one of the National Grain Storage Extension Team

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