Marketing the Crop - Getting the Best Income for your Crop

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Summary

- The opportunity to achieve the best price for your crop is enhanced by your ability to safely store the crop for up to 10 months post-harvest.
- Record grain moisture, temperature and specific weight coming into store.
- Be consistent and thorough in your approach to grain cooling.
- Adopt a regular routine for in-store sampling and monitoring.

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This year's harvest has been both rapid and relatively cheap in terms of drying costs; all good news. The downside however is that stores will have been filled quickly and with ambient daytime temperatures often exceeding 25ºC during combining, grains will have carried that temperature into store and increased the risks of spoilage, if not cooled effectively.

Grain is a good insulator and loses heat slowly therefore cooling should commence as soon as the grain comes into store. This permits grain to be stored at higher moisture contents and effectively increases the safe storage times.

Cool storage extends grain storage life for a given moisture content (Table 1), it reduces germination loss, maintains Hagberg and protects against infestation. Cool storage also permits grain to be stored at higher moisture contents.

Table 1

SAFE STORAGE PERIODS FOR COMBINABLE CROPS RELATIVE TO MOISTURE CONTENT AND TEMPERATURE.

Commodity	% Moisture Content (Wet Basis)								
Rape	**6.5**	**7**	**7.5**	**8**	**9**	**10**	**12**	**14**	**17**
Barley	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**19**	**23**
Storage Temperature	No of Weeks Safe Storage								
20 Deg C	**110**	**80**	**50**	**32**	**19**	**10**	**5**	**2**	**0.5**
10 Deg C	**600**	**400**	**260**	**160**	**90**	**50**	**21**	**8.5**	**2**
Commodity	% Moisture Content (Wet Basis)								
Oats	**11**	**11.5**	**12.5**	**13**	**14**	**15**	**17**	**19**	**22**
Peas	**11**	**12**	**13**	**14**	**16**	**18**	**21**	**24**	**29**
Storage Temperature	No of Weeks Safe Storage								
20 Deg C	**80**	**55**	**38**	**26**	**15**	**8**	**4.5**	**2**	**0.5**
10 Deg C	**350**	**230**	**150**	**95**	**55**	**30**	**16**	**6**	**1.5**
Commodity	% Moisture Content (Wet Basis)								
Wheat	**12**	**13**	**13.5**	**14.5**	**15.5**	**16.5**	**17.5**	**19.5**	
Beans	**11**	**12**	**13**	**14**	**16**	**18**	**20.5**	**23**	
Storage Temperature	No of Weeks Safe Storage								
20 Deg C	**55**	**40**	**28**	**19**	**13**	**7**	**3.5**	**1.5**	
10 Deg C	**200**	**140**	**95**	**60**	**38**	**20**	**11**	**4.5**	

Grain temperature also affects the degree of insect activity:

- above 40°C: most insects die within a day
- 33–25°C: most insects breed rapidly
- 25–15°C: mycotoxin formation is most likely
- 15–12°C: most insect species stop breeding, although grain weevils may still reproduce (although slowly)
- 5°C: in moist grain, mites and fungi may still increase (although slowly)
- below 5°C: insects stop feeding and mites stop increasing

Aim to reduce grain temperature by low volume aeration:

- to below 15ºC within 2–3 weeks to prevent saw-toothed grain beetles completing their life cycle.
- to below 12ºC within 4 months to prevent grain weevils completing their life cycle.
- to below 5ºC by end-December to kill surviving adult insects and to prevent mites increasing

Malting barley cooling/moisture targets and germination

A natural condition, dormancy prevents grain sprouting in the ear. Malting barley is purchased based on a germinative capacity test (ideally, viability is 100%). Germination should be tested before storage, after three months' storage and/or prior to delivery. Usually, stored barley grain is not cooled to below 10°C, as it can increase the risk of inducing secondary dormancy. Ideally, for long-term storage, malting barley is dried to about 13% MC. Germination capacity declines rapidly at higher moisture contents and temperature.

Relative humidity (RH) and moisture content

Relative humidity is a measure of the air's moisture content. It is expressed as a percentage of the moisture that it could hold, if fully saturated, at a given temperature. The safe moisture content of grain for storage is related to RH with mould growth and mite reproduction stopping at 65% RH. Lowering the temperature lowers the RH in equilibrium with the moisture content and this effectively increases storage time.

Equilibrium relative humidity (ERH)

Grain exchanges water with surrounding air. In enclosed spaces, this exchange continues until a balance is reached referred to as the equilibrium relative humidity. ERH decreases with temperature (Table 2). For a given moisture content cooler grain is safer to store because its ERH is lower. For example, the table shows that at 5ºC, wheat at 14.5% moisture content has an ERH of 56%. The same grain stored at 25ºC at the same moisture content has an ERH of 66% and is prone to quality issues.

Table 2

Moisture content	Wheat temperature		
	5°C	15°C	25°C
16.5% mc	68% erh	74% erh	76% erh
15.5% mc	62% erh	69% erh	71% erh
14.5% mc	56% erh	64% erh	66% erh
13.5% mc	49% erh	58% erh	59% erh

Key: over 65% erh; below 65% erh

Moisture changes at grain surface

Do remember that the grain surface absorbs moisture in winter. Even when bulk moisture content is low, increases in surface moisture content can lead to very high mite populations (Table 3). Such problems are less likely where initial moisture content is very low. The risk of moulds is increased by high moisture and can lead to mycotoxin production and grain rejection. Moisture content is less critical for insects. However, lowering grain moisture content below 14.5% also reduces rate of insect breeding and increases development time.

Table 3

Initial bulk mc	Surface mc in winter	*Lepidoglyphus* mites at surface
13.5%	17.5%	124/kg
15.0%	18.6%	3762/kg
16.5%	19.4%	8488/kg

Dispelling the myth of damp air and cooling

Farmers lose many opportunities to cool grain due to the misconception that blowing damp air will increase grain moisture. In fact, if blowing with cooler air (4–6ºC differential), it is not possible to dampen grain. Thirty years' experience shows that grain around 15% moisture content usually loses 0.25–0.5% during 150–300 hours of aeration with cooler air at recommended rates in a normal storage season. It does not become damp. The only circumstances in which grain may become damper from blowing require combinations of excessive aeration rates, very dry grain, condensation around ducts in spring, rain driven into uncovered external fans and successive days of condensing fog.

Financial gains in crop value through storage

No one could have foreseen that wheat sold and moved in October 2021 at £204/t would have commanded a price of £330/ton just 7 months later in April 2022. This is of course an extreme example demonstrating the volatility in the markets and unlikely to be repeated. However, we can look back historically at the value of October traded wheat and compare it to the value achieved if it were stored on farm and traded in the following March instead. Over the 8 years from 2012 to 2020 the average lift in value has been an increase of £8.50/ton. At a modest average yield of 8t/ha that equates to an annual increase in output margin of £68/ha before storage costs are deducted. Whether a late market seller or not, conditioning grain correctly will open up more opportunities to sell when you want to sell.