Wheat

Inspecting grain for defects and impurities

Smell

When inspecting grain, note any unusual smells. A sweet or minty smell indicates mites; musty and fishy smells indicate moulds; chemical smells, such as cleaning fluids and diesel, can also occur.

If the grain is visibly mouldy or dusty, do not smell it. Moulds and grain dust can be harmful and cause respiratory problems.

Physical damage

Broken grains

Exposed endosperm, usually due to aggressive handling, provides potential sites for mould infections.

Broken grains are removed during the cleaning process. This reduces the yield of clean, white flour from each tonne purchased.

Sprouted grains

Sprouted (germinated) grains, caused by wet harvest conditions, have very high levels of alpha-amylase. Even a few in a bulk can reduce Hagberg Falling Number to unacceptable values, resulting in rejection of milling wheat.

Lost embryos

Embryos may be damaged mechanically or by mites (as shown) or insects.

Damage by mites or insects may indicate poor storage.

Burnt grains/heat damage

Heat damage arises from localised ‘hot spots’ or excessive temperatures during drying.

Grains can range in colour from bronze to dark brown (charred). Such wheat is unacceptable. Over-dried grain will have irreversibly damaged gluten.

Screenings

Unwanted non-cereal matter (e.g. chaff, straw, stones) must be removed before milling. Stones can damage machinery; metal objects may cause sparks.

Large screenings

Large screenings include straw, beans, unthreshed grain, sticks and stones.

Small screenings

Small screenings include broken grains, shrivelled grains, chaff, weed seeds and small straw pieces.

Mud and stones

Mud balls are a particular problem during wet harvests.

Stones can be picked up during combining, particularly when harvesting conditions are difficult.

Dust, chaff and fine soil

If dust is visible, do not smell it. Grain dust can be harmful if inhaled and can cause respiratory problems.

Diseases

Fusarium

Pink moulds indicate possible *Fusarium* infection.

Some *Fusarium* fungi can produce mycotoxins that are toxic to humans andanimals. Permitted mycotoxin levels are governed by legislation or trading specifications.

Mouldy grains

Dull looking, weathered grains indicate poor harvest conditions and may impair quality.

Dullness may be due to spores or moulds, which are unacceptable to all users due to the risk of mycotoxin formation.

Spores present possible health hazards and must not be inhaled.

Ergot

The fruiting body of the fungus *Claviceps purpurea* affects grasses as well as cereals.

The inside of an ergot is grey/white, which distinguishes it from rodent droppings.

Ergot is toxic to humans and animals. It is unacceptable to any processor.

Bunt

Fragile grains, dark in colour. Part of the grain may have eroded.

Surface cracks may reveal black powdery spores within the endosperm. Bunt balls occur occasionally and spores give grains a dull look.

Grain affected by bunt can have a pungent fishy smell, making it unacceptable for cereal products.

Blackpoint

Blackpoint is often associated with *Alternaria* infection but this is not the only cause. Some varieties are more prone to blackpoint than others.

As a response to infection, the plant produces chemicals in the bran which vary from brown to black over the germ area.

Dark bran specks in flour can affect flour quality.

Pests

To check for insects, grain samples should be sieved (typically using a 2 mm mesh) and the material passing through the mesh examined thoroughly. This is especially important for grain going into storage.

Insect damage

This example shows weevil damage. Eggs are laid within the grain. Endosperm is eaten by the larvae inside the kernels.

Evidence of insects indicates poor storage and possibly local hot spots.

The presence of live insect pests is unacceptable to processors.

Orange blossom midge

Midges infest crops at flowering, laying eggs in empty florets.

The larvae attack immature grain, pierce the bran and inject enzymes into the grain. This can lead to water ingress and low Hagberg Falling Numbers.

Black areas indicate additional fungal infection.

Rodent droppings

Rodents directly damage grain and carry infection.

Rodents urinate on grain, posing a food safety risk.

Contaminated grain is unacceptable.

Weed seeds

Brome

25 mm

Actual size

Black-grass

6 mm

Actual size

Couch

7–14 mm

Actual size

Wild oats

20–30 mm

Actual size

Bindweed

3–4.5 mm

Actual size

Cleavers

2–5 mm

Actual size

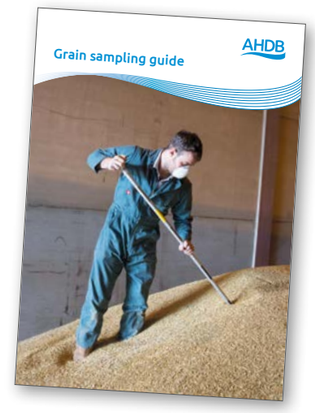
Brassica

2–3.5 mm

Actual size

For best practice grain sampling and storage for cereals and oilseeds, consult the Grain sampling guide and the Grain storage guide, or go to:

ahdb.org.uk/grain-sampling



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Barley

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Physical damage

Broken grains

Exposed endosperm, usually due to aggressive handling, provides potential sites for mould infections.

Broken grains can cause processing problems. These include excessive water uptake and mushy steep with starch leaching into steep water.

Burnt grains/heat damage

Heat damage arises from localised 'hot spots' or excessive temperatures during drying.

Grains can range in colour from bronze to dark brown (charred).

Over-dried grains are unlikely to germinateand may affect beer or malt flavour.

Splitting

Cracks through outer grain tissues may arise from excessive expansion or mechanical weakness. Splits often occur along the ventral crease but can also occur on the side (lateral) and back (dorsal). Exposed endosperm is susceptible to mould attack.

Processing problems include excessive water uptake and mushy steep with starch leaching into steep water.

Skinning

A separation and loss of lemma and palea (husk). Causes include developmental factors, weather conditions, rough harvest and post-harvest handling. May lead to filtration problems due to loss of husk. This can reduce the efficiency of malt production. Dust problems during handling may arise. More prevalent in spring varieties.

Gape

A gap between husk tissues (lemma and palea) due to poor development and/or excessive expansion. Endosperm remains intact.

Gape – a function of variety and environment – is not necessarily a defect unless associated with lateral splitting.

Lost embryos

Commonly caused by mechanical damage.

Of no use for malting as the grain will not germinate.

Pre-germination (light)

Recognised by a swollen and raised germ area. Pre-germinated grains may not malt, which will reduce malt yield.

Pre-germinated grains can be detected by laboratory testing.

Pre-germination (heavy)

Sprouted grains with visible rootlets will not malt, which will reduce malt yield.

Discoloured grain

Dull looking, weathered grains indicate poor harvest conditions and may lead to quality problems.

Dullness can be due to spores or moulds.

Diseases

Fusarium

Pink moulds indicate possible *Fusarium* infection.

Some *Fusarium* fungi can produce mycotoxins that are toxic to humans and animals. Permitted mycotoxin levels are governed by legislation or trading specifications.

May cause gushing of bottled beers.

Mouldy grains

May result from adverse growing, harvest or storage conditions. Quality may be impaired.

Dullness may be due to spores or moulds, which are unacceptable to all users due to the risk of mycotoxin forming.

Spores present possible health hazards and must not be inhaled.

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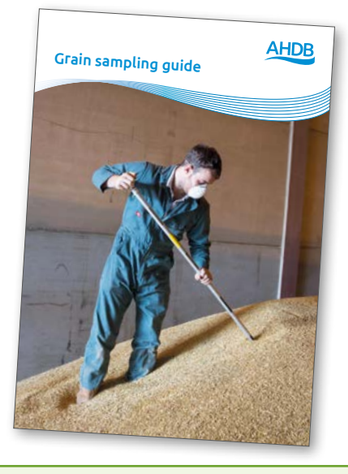

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