

# 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, eg 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 and hence milling potential is reduced due to a lower yield of clean, white flour from each tonne purchased.



### Sprouted grains

Germinated grains, caused by wet harvest conditions, will 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.



## 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.

### Mouldy grains

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

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 rye, wheat and barley.

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

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

### Bunt (*Tilletia tritici*)

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.

Infected grain has a pungent fishy smell, making it unacceptable for cereal products.

### Blackpoint

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

Blackpoint is often associated with *Alternaria* infection but this is not the only cause. So

# WHEAT

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## Weed seeds



**Brome**

25mm  
Actual size



**Black-grass**

6mm  
Actual size



**Couch**

7-14mm  
Actual size



**Wild oats**

20-30mm



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



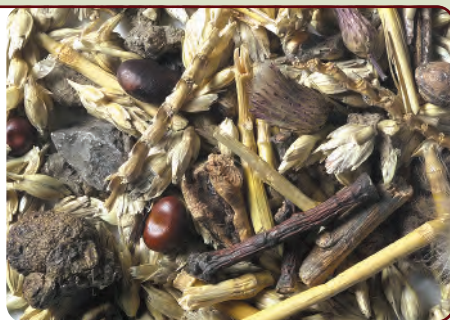
Infection by this is not the only cause. Some varieties are more prone to blackpoint than others.  
Dark bran specks in flour can affect flour quality.

# Screenings

Unwanted non-cereal matter (eg chaff, straw, stones) that has no value to the miller and must be removed before milling. Stones can damage machinery; metal objects may cause sparks.

## Large screenings

Straw, beans, unthreshed grain, sticks, stones, etc.



## Small screenings

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 as grain dust can be harmful if inhaled and can cause respiratory problems.



# Pests

To check for insects, the whole of a laboratory sample (typically using a 2mm mesh) and the material is checked thoroughly. This is especially important for grain.

## 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.

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