

# AWB Wheat Quality Fact Sheet

## Vitreous Kernels In Durum

### AWB Receival Standards

On receipt of Durum, AWB's preferred position is to have load-by-load assessment of vitreous kernels. However, due to limitations associated with current testing methodologies and the subjective nature of assessment no Receival Agents have agreed to implement load-by-load testing, but rather, have implemented alternative techniques such as assessing stack averages based on 500MT running samples.

For the assessment of running samples a 300 – grain sub – sample is taken from above the 2mm screen following sieving and each individual grain is assessed visually to determine its vitreousness. Grains that are obviously non-vitreous are separated and those that are difficult to categorise because they are “bleached” or “washed out” are cut in half with a farinator to facilitate their assessment. The number of non-vitreous grains are counted and converted to a percentage of vitreous kernels.

There are strict tolerances for the number of non-vitreous grains allowed into Durum grades. For Australian Durum No.1 grade, there must be a minimum of 90% vitreous kernels. This level reflects the requirements of domestic and international customers for a high quality product. Durum No. 2 and No.3 have lower limits (80% and 70% respectively) and trade at discounts to the No. 1 grade.

### Nature

One of the key quality parameters in the determination of Durum quality is vitreous kernels, referring to the translucent, or “glassy” appearance of individual kernels, that is associated with high protein and hard grain. For durum to be classified as vitreous, the grains must be of a uniform amber colour exhibiting no traces of “mottling”.

Non-vitreous kernels are those that contain an “opaque” or “starchy” area. If these kernels are present in sufficient quantities it can result in the non-uniform or “mottled” appearance of an entire grain bulk. Grain with a starchy spot of any size is

considered non-vitreous. These starchy spots are normally a dull, yellowish/white colour and normally are easily identifiable against the amber coloured background of the otherwise vitreous grain.

In addition, immature grains, frost damaged grains, sprouted grains, and bread wheats are also classified as non-vitreous kernels.

### Cause

The vitreousness of a grain is linked to its protein and hardness levels and is therefore subject to GxE interactions, where “G” is genetic and “E” is environmental factors. “Soft-grained” wheats are typically opaque, whilst “hard-grained” wheats may be either vitreous or opaque depending mainly on the protein content of the grain, but also on environmental factors affecting kernel hardness.

Individual grains that have a protein content above the minimum for the Durum No. 1 grade (13 %) would be expected to be completely vitreous. However, the protein level is based on the average of a sample containing thousands of grains and it is likely that some of these grains will be very high in protein and others lower. It is these grains lower in protein that are likely to be non-vitreous.

### Impact

Vitreousness is one of the key quality parameters used in classifying Durum and customers are prepared to pay substantial premiums for grain that is highly vitreous given it meets other quality specifications.

Quality conscious markets such as Italy will require AWB Limited (AWB) to guarantee minimum vitreous levels for each shipment. If the grain delivered is found to have substandard vitreous levels it may be rejected or the price discounted, which ultimately erodes the premiums paid for Durum.

The aim of durum milling is to produce semolina, which consists of large sized endosperm particles as opposed to wheat flour with small sized endosperm particles.

The miller requires a hard vitreous Durum grain to produce a high level of semolina because:

- Vitreous grains enable high levels of coarse semolina to be produced, while non-vitreous softer grains will produce more flour particles, which is undesirable and considered a waste product in pasta production;
- Durum semolina exhibits a favourable yellow colour but as particle size decreases, the yellowness also diminishes;
- Coarse semolina has a low water absorption which is desirable for pasta manufacturers because there is less pasta shrinkage, less drying energy required and less cracking which is especially important for long pasta “spaghetti” types.

### What can be done?

As vitreousness is related to grain protein it is essential that growers implement sound agronomic practices to ensure that the protein content of grain produced is consistently high across the entire paddock. Poor agronomic practices can result in patches of low protein grain within a paddock that will probably produce non-vitreous grain.

Environmental factors can also influence grain protein and hardness, but growers can do obviously little in this regard.

The size or weight of non-vitreous grain does not differ from vitreous grain so there is no opportunity to grade grain to achieve a higher result.