ABC OF WHEAT QUALITY

Wheat quality means different things to different people, depending on whose hands it's passing through from harvesting until being consumed as bread.

Farmers expect a high yield, millers expect a good milling quality and bakers expect flour suitable for the end-product they wish to produce. Consumers rely on their senses – what they see, feel, smell and taste. Therefore, quality regarding bread wheat means the specific characteristics that the wheat possesses to make it suitable for the final product – bread production.

Wheat breeders can manipulate the genetic make-up of a cultivar and they aim to combine all the traits in a cultivar as required by the industry, but the environmental effect makes it difficult. Wheat quality traits of importance to farmers are:

- Hectoliter mass (test weight);
- Falling number; and
- Protein content.

What is hectoliter mass and why is it important?

Hectoliter mass indicates the density of wheat kernels and denser kernels yield more flour, therefore denser kernels are more profitable for millers.

What influences hectoliter mass?

Denser kernels mean kernels are plump and well-filled. Stress-factors occurring during the grain-filling period of the wheat plant result in lower hectoliter mass. These factors include drought, excessive soil moisture, a shortage of nutrients, too little sunlight, too low or too high temperatures, insect damage and weather damage like frost and hail. The reaction that the kernels will have toward these environmental conditions though is under genetic control.

Kernel shape, which can be genetically manipulated, also influences hectoliter mass – kernels that are rounder and having smaller grooves are preferable.

> *"Wheat quality analyses confirms that South African cultivars adhere to acceptable standards set and that they perform well under different production practices and they are well adapted to different environments.*

Photo 1: A loaf of bread made from unsprouted wheat (back), where the structure, crust colour and texture are acceptable, compared to a loaf of bread made from sprouted wheat (front) where it could not be cut mechanically, due to a poor structure and coarse texture. Also, note the darker crust colour caused by the excessive sugar in sprouted wheat (front).

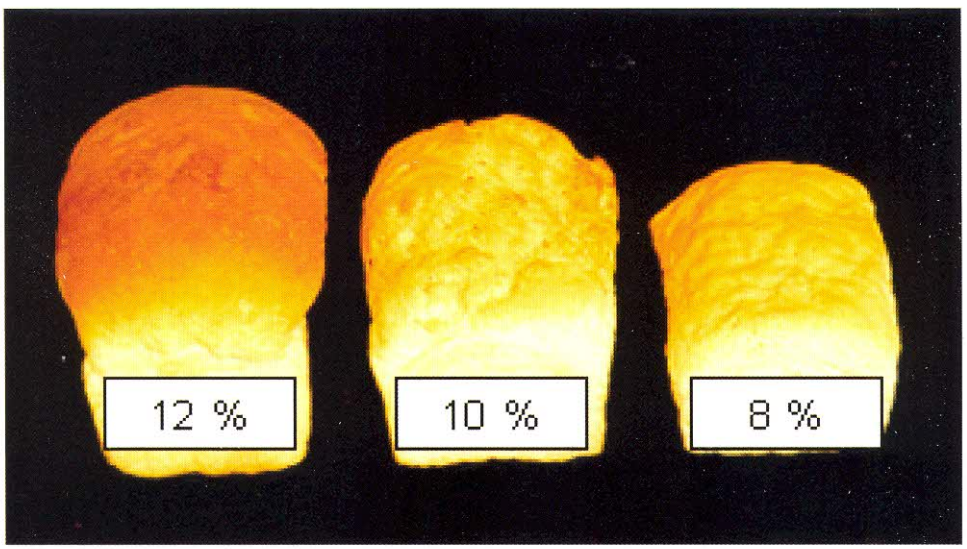

Photo 2: Higher loaf volumes obtained from flour having higher protein contents.

What is falling number and why is it important?

Wheat flour exists mainly of protein and starch. Starch plays the largest role in bread structure and if it rains on ripe wheat and favourable weather conditions follow, pre-harvest sprouting can occur.

When this happens, the starch is broken down by an enzyme, alpha-amylase, and excessive sugars form (low falling numbers occur). The excessive sugars lead to 'sticky', runny dough and this dough is difficult to handle mechanically. Bread will also have a dark crust, a coarse texture and a poor structure and this results in bread that cannot be cut mechanically.

What influences falling number?

Environmental factors like wet weather and day temperatures have a large effect on pre-harvest sprouting. Wheat tends also to be more susceptible to pre-harvest sprouting during the kernel-hardening growth-stage. This trait is mostly genetically determined and breeding lines that exhibit no resistance to pre-harvest sprouting are discarded during the early breeding phases.

The environmental impact on this trait is large in South Africa, because only little genetic resistance to pre-harvest sprouting is currently available in the South African market.

The effect of normal wheat versus pre-harvest sprouted wheat on the end-product can be seen in **Photo 1**.