

Gluten Index

Application & Method



Wheat & Flour



Dough



Bread



Pasta

Measure Gluten Quantity and Quality



Gluten Index:
AACC/No. 38-12.02
ICC/No. 155 & 158
Gluten Content:
ICC/No. 137/1
ISO 21415-2 & -4

Perten
INSTRUMENTS
a PerkinElmer company

The World Standard Method



In many world markets, wheat and flour quality is often based upon protein content. While total protein content is very important, it is only part of the information required to determine suitable wheat and flour usage. Many situations require additional information about the functional properties and quality of the protein to predict dough and baking properties.

Gluten

Gluten is the functional component of protein and determines many dough and processing characteristics of wheat and wheat flour. Protein content is a purely quantitative analysis that may or may not be indicative of protein quality. While gluten content and protein content are correlated, there are situations during which protein content will not be indicative of quality. These situations include:

- Variable Growing Conditions
- Yearly Growing Variation
- Wheat Varietal Variation
- Wheat or Flour Blends
- Heat Damage
- Bug Damage
- Enzymatic Addition

It is under these conditions when the reported protein content is not indicative of quality that another set of tests is required. The Glutomatic system is designed to measure protein quality for the following parameters:

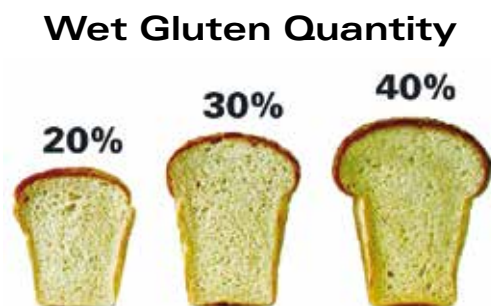
- Wet Gluten Content
- Dry Gluten Content
- Water Binding of Gluten
- Gluten strength by Gluten Index

The Glutomatic System Uses

The Glutomatic System helps users identify wheat and flour with the properties necessary for particular products. Most breads and pastas require high protein content with strong gluten. Cakes, crackers and pastries require weaker gluten to produce high quality end products.

The Glutomatic System is rapid, easy to use, and the results are easy to interpret. The test can be performed at silos, by grain traders, flour millers, bakers, pasta producers and any other flour users. By setting a Gluten Index specification on incoming materials, one of the more important properties can become more consistent. Gluten quality does not only effect end-product quality, but plays an important role in processing.

The Glutomatic Method provides a way for users to measure many gluten properties in one test. The Gluten Index method is the only method to determine gluten quality without first extracting flour. The method is suitable for both wheat meal and flour.



Calculation

$$\text{Gluten Index (GI)} = \frac{\text{Wet Gluten remained on sieve (g)}}{\text{Total Wet Gluten (g)}} \times 100$$

$$\text{Wet Gluten Content (WGC)} = \text{Total Wet Gluten (g)} \times 10$$

$$\text{Dry Gluten Content (DGC)} = \text{Dry Gluten Weight (g)} \times 10$$

$$\text{Water Binding in Wet Gluten (WB)} = \text{WGC} - \text{DGC}$$



The Gluten Index Method

The World Standard Test for
— ICC Standard No. 155 and 158, A

Definition: The Gluten Index is defined as the percentage of wet gluten which remains on a special sieve when prepared and centrifuged according to the prescribed standardized method.

1. Weighing

10.0 g \pm 0.01 g of whole meal or flour is weighed and put into the Glutomatic wash chamber with an 88 micron polyester sieve. When vital wheat gluten is measured, 1.5 \pm 0.01 g is weighed.

2. Dispensing

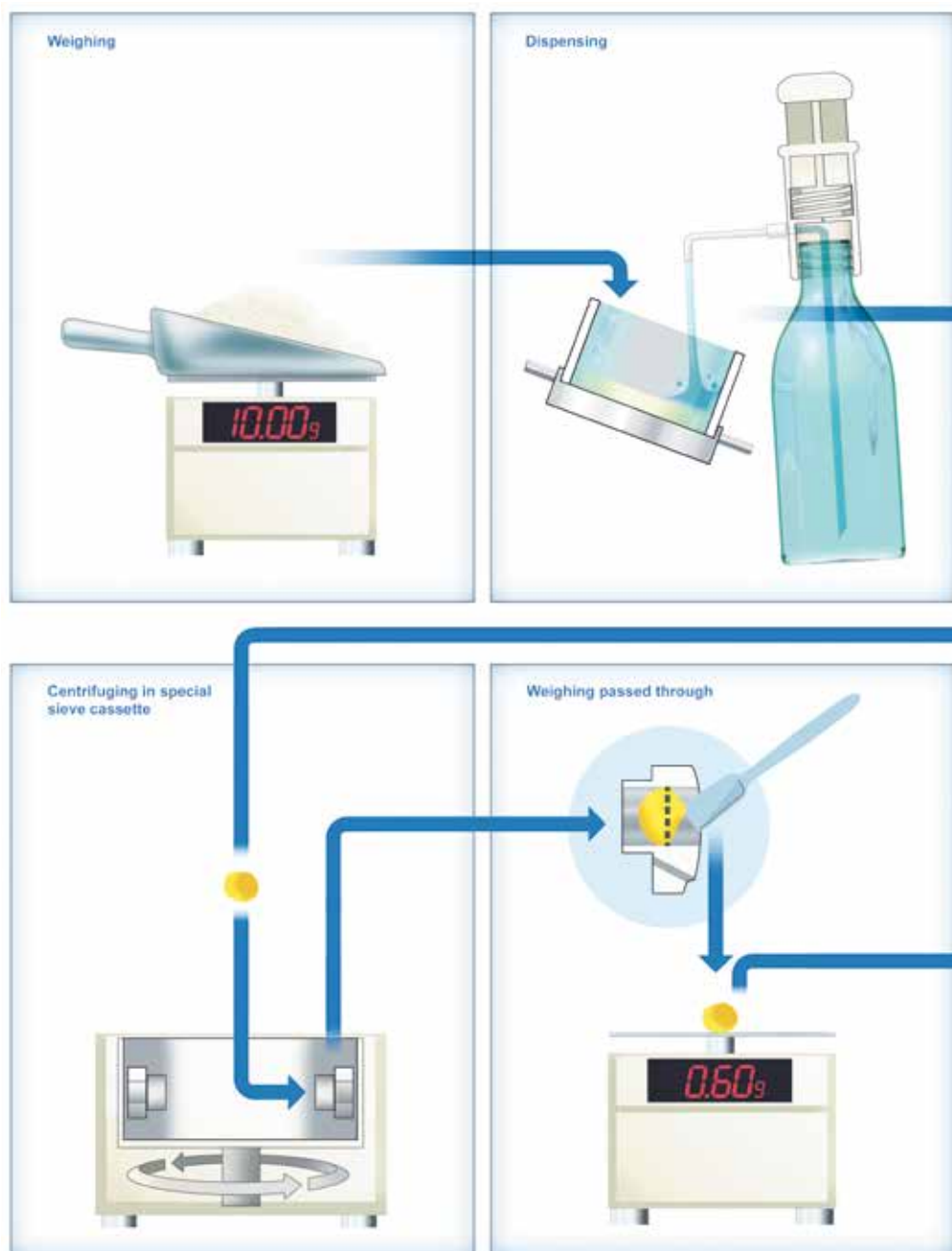
4.8 ml of salt solution is added to the meal or flour samples. No salt solution is added to vital wheat gluten samples.

3. Mixing

Meal or flour and the salt solution are mixed to form a dough during 20 seconds.

4. Washing

After termination of the mixing phase, the washing automatically starts and continues for five minutes. For wheat meal the sample is transferred to a chamber equipped with a coarse 840 micron sieve allowing bran particles to be washed out.



d by Perten Instruments

Gluten Quality and Quantity
ACC Method No. 38-12, ISO 21415



Principle: Wet Gluten is prepared from whole meal or flour by the Glutomatic 2200 gluten washer. Gluten Index Centrifuge 2015 is used to force the wet gluten through a specially designed sieve cassette. The relative amount of gluten passing through the sieve indicates the gluten characteristics. The wet gluten is further dried in the Glutork 2020 for dry gluten content and water binding in the wet gluten calculation.

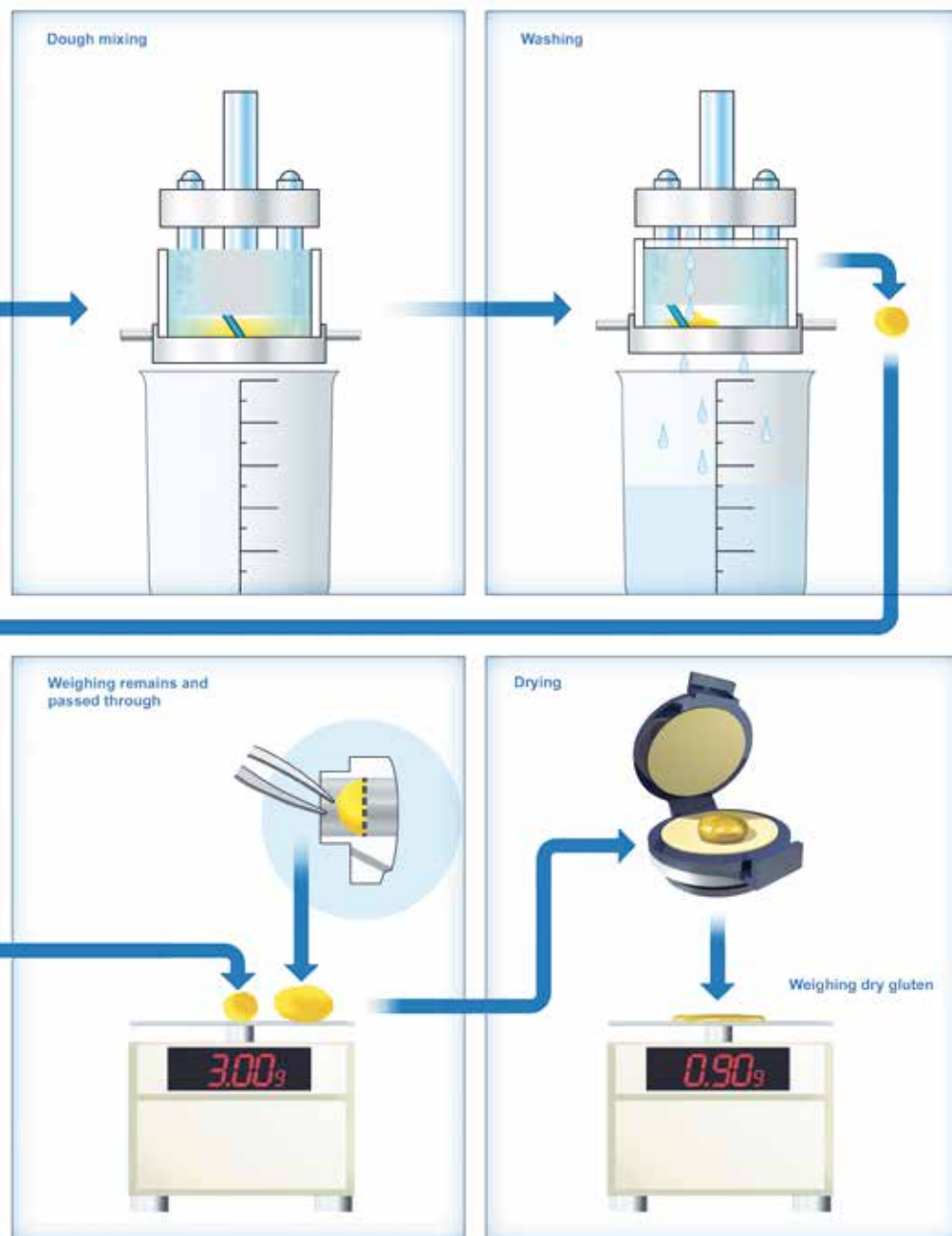


Illustration: Gluten Index Method

5. Centrifuging

The undivided wet gluten piece is transferred to the special sieve cassette and exactly 30 seconds after completed washing it is centrifuged one minute at 6000 \pm 5 rpm in Centrifuge 2015.

6. Weighing

The fraction passed through the sieves is scraped off with a spatula and weighed. The fraction remaining on the inside of the sieve is collected and added to the balance. The total wet gluten weight is obtained.

7. Drying

The total wet gluten piece is dried at min. 150°C during four minutes in the Glutork 2020. After drying the gluten is weighed on the balance.

8. Calculation

The amount of gluten remaining on the centrifuge sieve in relation to total wet gluten weight is the Gluten Index.

Benefits of the Gluten Index Test



The Glutomatic system provides important information of gluten properties. It is a valuable tool for breeders, grain traders/handlers, flour mills, bakeries, pasta producers

and vital wheat gluten manufacturers.

Breeding

By measuring the functional properties of protein at an early stage - without having to extract flour - breeders can select the appropriate wheat classes for further breeding and refinement.

Grain Trading and Handling

The ease of use and the speed of the method enable the user to classify the incoming wheat based on gluten quantity and quality, essential for maximizing trade margins and supplying products suitable for varying end-use purposes.

Flour Milling

Millers can blend flour to meet end-user demands while not selling high quality product at a low price thereby improving operating margins.

With the Gluten Index, the Wet Gluten Content and the Falling Number analysis results available, millers can quickly predict the final baking quality, reducing the requirement for test baking.

Baking

The gluten properties and structure are important to:

- Form elastic dough
- Retain gas during fermentation and baking
- Allow expansion
- Carry expansion
- Retain the shape of loaf

As baking quality is both related to starch and protein characteristics, a combination of the results from the Falling Number and Glutomatic tests can be used to predict the baking quality.

With the Gluten quality and quantity information at hand, bakeries are able to use the most cost effective grade of flour while still meeting end user quality. Maximizing the use of high quality flour and minimizing addition of expensive vital gluten results in substantial savings.

Durum and Pasta

The Gluten Index is reported worldwide in crop reports as an important quality indicator.

During pasta manufacturing, gluten has great influence in:

- Forming non-sticky dough
- Achieving desired processing characteristics
- Maintaining firmness and cooking stability
- Obtaining products with desired cooking characteristics



Required Equipment



Glutomatic 2200

Dual Glutomatic 2200 instrument, for dough mixing and gluten washing.



Gluten Index Centrifuge 2015

Speed controlled Gluten Index Centrifuge 2015 with two sieve cassettes for the Gluten Index Test.



Glutork 2020

For drying of gluten when determining the dry gluten content.



Accessories

Laboratory Mill 3100 or 120

Hammer type mills producing meal for quick and easy sample preparation for the Glutomatic tests as well as other analysis.

Balance: Required accuracy ± 0.01 g or better.