

Technical Notes

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Tips and Techniques to get reproducible Farinograph® results

The **Farinograph®** is a fundamental tool in every cereal processing facility. The estimation of water absorption and other dough properties allows researchers to understand the dough characteristics and make decisions on the subsequent operations. It is critical that all steps are performed successfully to ensure accurate, reliable and reproducible results. Sometimes, **Farinograph®** data and curves show a mismatch. Faulty farinograms® are not normal and signal that sometimes needs attention!

Presented are tips and techniques to avoid the most common mistakes on a **Farinograph®** and to obtain robust and reproducible results.

1. Cleaning of the measuring mixer:

- Dough residues that have dried in the measuring mixer cause friction and as a consequence, lead to wrong measuring results. If the interior of the measuring mixer has not been cleaned properly the torque may exceed 20 FU already before water is added. This leads to a wrong starting time and faulty data collection. For this reason, thoroughly clean the interior of the measuring mixer with clear water and carefully dry it after each test in order to provide for correct transmission of the torque during the measurement.
- Removing the soft dough from the measuring mixer is facilitated by adding a cleaning mixture consisting of flour, salt, and bran or durum wheat to the dough and mixing it for a short duration with the dough. Prepare the cleaning mixture by thoroughly mixing the approximate quantities of these ingredients: flour (1000 g), fine salt (150g) and bran or durum wheat (100g). This makes approximately 1250g of cleaning mixture.
- Never use any soapy water or scouring agents as they also cause damage to the surfaces of the measuring mixer and the blades. Soap residue or grease films may falsify the measuring results.

2. Lack of Adequate Training:

- One of the major causes of unreliable results is failing to properly train the technician using the farinograph®. By knowing the proper method of **Farinograph®** operation, how to avoid incorrect usage and how to spot maintenance issues, technicians become the first line of defense for minimizing problems in the routine operation of the lab and the processes that depend on the farinographic output.
- Careful sample preparation and execution of experimental steps are crucial. Videos showing proper handling and operations of the Brabender® instruments can be viewed using the following link <http://www.brabender.com/englisch/food/download/appliance-videos.html>

3. Flour preparation:

- The flour to be tested must have a uniform temperature which is equal to ambient temperature. It is recommended to have new samples or refrigerated/frozen samples rest some time at ambient temperature in order to allow the material to uniformly adapt to ambient temperature. When the flour has reached uniform temperature, thoroughly mix and seal the flour container. This is to eliminate faults that may become evident in comparative tests.
- The sample weight of the flour to be used for the test depends on the moisture content of the flour. Therefore, it is imperative to determine the moisture content of the flour.
- The sample weight to be used for the test, using the constant flour weight method when comparing to 14% moisture basis, depends on the moisture content of the flour. Therefore, it is imperative to determine the moisture content of the flour. To calculate moisture sample weight, please use the following equations below.

300 gram bowl equation:

$$\text{Flour weight g} = \left(\frac{100 - 14}{1.00 - [\% \text{ of moisture sample}]} \right) \times 3$$

50 gram bowl equation:

$$\text{Flour weight g} = \left(\frac{100 - 14}{1.00 - [\% \text{ of moisture sample}]} \right) / 2$$

- Weigh scales should be properly calibrated. Disseminate sample without scattering.

4. Quality of water:

- Never use normal tap water in the water bath of the thermostat. It causes corrosion and calcification in the circulation thermostat and in the heating/cooling lines of the measuring mixer. Also, normal tap water in the burette calcifies the water hoses and may cause wrong measuring results.
- Only fill distilled or deionized water (grade 3, ISO 3639) up to the filling level mark into the circulation thermostat and the burette. It is ok to clean the burette with soap/bleach and water but it needs to be thoroughly rinsed with DI or DO water, to remove any and all left over residue.

5. Temperature:

- As fever in our body disturbs our physical and mental well-being. Similarly, variations in temperature also cause changes in the properties of dough. Therefore it is critical to maintain the **Farinograph®** bowl at 30°C. Prior to testing, the flour sample and dosing water need to be maintained at ambient room temperature (typically 26°C to 32°C).

- In order to ensure that the mixer blades have correct temperature to maintain the integrity of the test it is imperative to ensure that the blades are clean dry and at ambient room temperature before mounting them and starting a test.
- Wrong connection of the hoses for mixer heating/cooling and air in the heating/cooling tubes in the mixer bowl may lead to faulty temperatures adjustments. Additionally, if there isn't proper circulation through the hoses, the bowl will not maintain the $30^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$.

6. Errors during entry of test parameters:

- When the parameter window opens, it shows the test parameters of the previous measurement so that data that remains unchanged (e.g. user, method) does not need to be entered again. However, water absorption parameter needs more attention. Carefully, note the amount of water added for each test, if the amount of water used for the test deviates from the value entered in parameter window, subsequent correction of the water absorption needs be done while the test is running. This value is used to calculate the original water absorption of the flour.
- If the chosen quantity of water does not lead to the desired consistency, the program calculates a corresponding correction. The resulting computed correction is only reasonable if the deviation from the peak time is within ± 20 FU of the standard torque line of 500 FU. In case of major deviations, repeat the test.

While some may see a **Farinograph®** as "only an instrument", others recognize it as a critical link in understanding the dough properties upon which the subsequent processing operations rely. Avoiding unnecessary mistakes with the **Farinograph®** simply ensures reliability and consistency in the entire process.

