DETERMINATION OF RHEOLOGICAL PROPERTIES OF DOUGH

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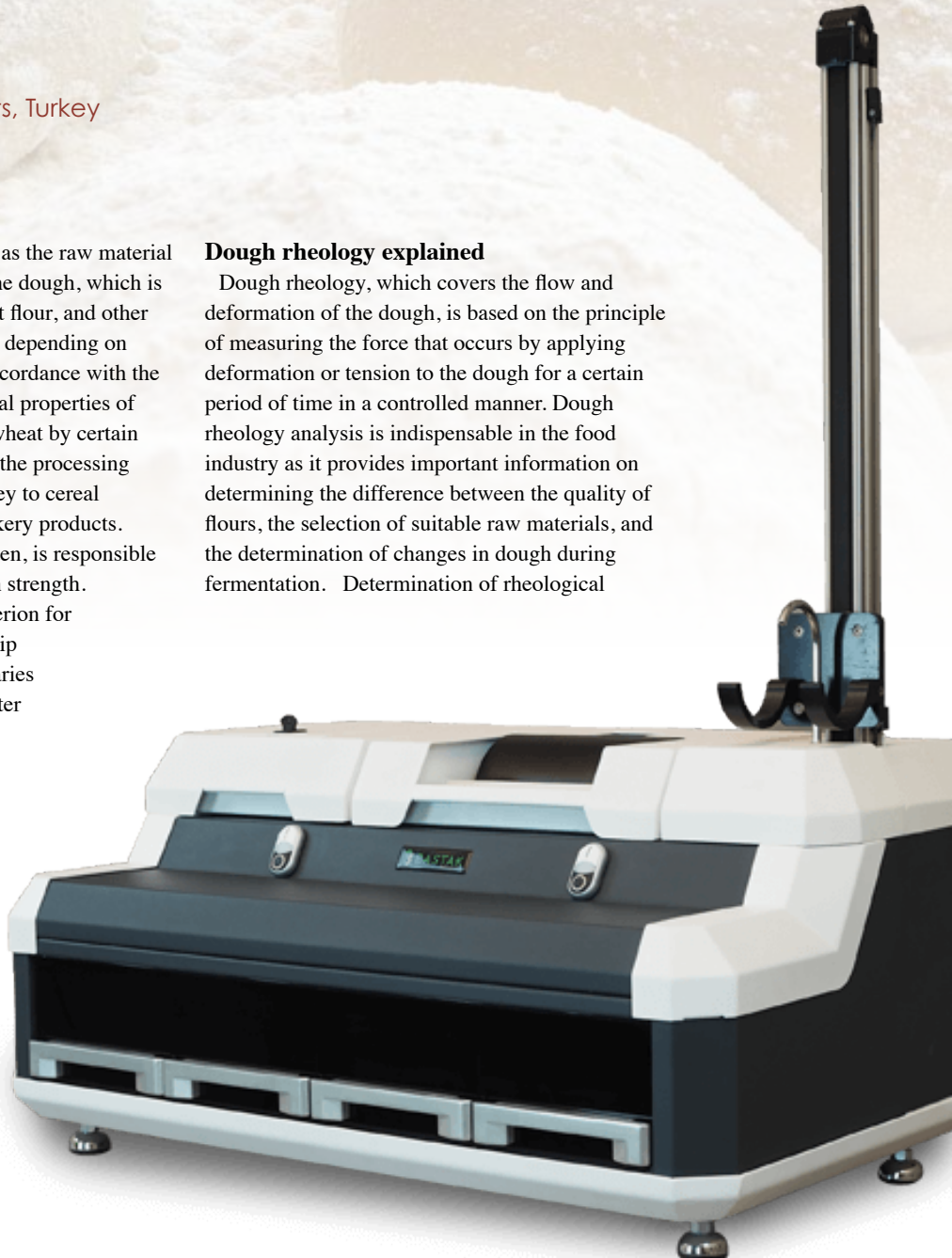
Food products with wheat as the raw material are obtained by baking the dough, which is formed with water, wheat flour, and other ingredients and additives depending on the type of product, in accordance with the technique. The rheological properties of the dough formed from wheat by certain processes change during the processing time and constitute the key to cereal chemistry by directly affecting the quality of bakery products.

The protein content of wheat flour, mainly gluten, is responsible for gas retention, structure formation, and dough strength. The protein content is the most widely used criterion for determining the wheat quality and the relationship between protein content and water absorption varies depending on protein quality. The amount of water added to flour during dough making has a great effect on the rheological properties of the dough.

The important steps of dough production in food processes are kneading, shaping, and fermentation and physical and chemical changes are observed in the dough with the effect of mechanical force applied during kneading. The kneading process, which mainly affects the final product quality, is a very important parameter in the evaluation of dough quality.

Dough rheology explained

Dough rheology, which covers the flow and deformation of the dough, is based on the principle of measuring the force that occurs by applying deformation or tension to the dough for a certain period of time in a controlled manner. Dough rheology analysis is indispensable in the food industry as it provides important information on determining the difference between the quality of flours, the selection of suitable raw materials, and the determination of changes in dough during fermentation. Determination of rheological



properties, especially in non-Newtonian and shear stress materials, is of great importance in the bakery.

The concept of dough rheology, which is more often defined in doughs with 35-65 percent water content, includes properties such as extensibility, elasticity, resistance, maximum resistance, energy, water absorption, development time, degree of softening and stability, allowing the producer to determine the type of wheat to be processed. In addition, rheological data plays a critical role in the selection and development of new cultivars, quality control of milling and baking products, determination of the effects of ingredients added in the production process, and process adaptation.

The rheological properties required for different wheat products are different from each other. The optimum extensibility desired in the production of wheat products also varies according to each product; in the bread industry, it is desired to have a high value during the final fermentation period and in the first rows of the baking process. While the dough's extensibility and resistance are expected to be high in bread, in biscuits it is desirable to have a high extensibility value and a low resistance value.

Flours desired in the bread industry should have high water absorption properties

and kneading times should not be long. Long kneading time increases the cost due to energy and time requirements, which is not desired by the producer. If the kneading time is too short, the bread quality decreases. The amount and quality of the core of the flour is also related to the rise of the core. The dough development time depends on the amount of protein in the flour, and as the number of protein increases, the dough development time increases. Bread volume will decrease as the development time decreases.

If the stability value, which is an indicator of the durability of the dough in the processing process, is not long, it is an indication of the low processing ability of the dough and the short fermentation period.

In bread production, the resistance value must be high in order to prevent the collapse of the gas cells in the dough weight. In biscuit production, low resistance value and high extensibility value are desired to prevent the collapse of dough pieces after the dough structure is stabilized by baking.

Bastak's solution

With Bastak Brand Absograph 500 and Resistograph 500 devices, the rheological properties of the dough and the rheological behavior of the dough, which is one of the critical parameters for revealing the bakery value of flour, can be determined in international standards with high repeatability, high accuracy, ease of use, remote software update features and can be determined directly with its effect on the final product quality.

Based on the principle of measuring the force on the blades of the device depending on the fluidity of the dough and transferring this effect to the touch screen as graphics and data, the water absorption, stabilisation, softening value, and development time of the flour analysed with Bastak Brand Absograph 500 Device are determined in accordance with world standards and its suitability for bread and other products is determined and transferred to the graph. It offers a unique analysis experience to the user with easy operation thanks to its ergonomic design and touch screen, remote software support, saving test results as PDF, saving and outputting results to Flash Disk via USB, no need for additional computer and screen, easy cleaning features designed considering the laborious cleaning phase during the test.

The dough obtained in accordance with international standards with the Absograph 500 device is first formed into dough balls in the dough rolling unit on the Bastak Brand Resistograph 500 device, then cylindrically shaped in the dough cylinder unit and kept in fermentation chambers at international standard temperatures. In order to work with more than one sample at the same time, there is an additional fermentation room. Four fermentation chambers save time. At 45, 90, and 135 minutes, which are long enough test times to understand the rheological properties of the dough, the negative effects of gravity are eliminated by using a special rail dough stretching mechanism moving from bottom to top with R&D studies. The applied force is recorded, and a graph is obtained. In order to obtain bakery products with ideal properties, the elasticity, resistance, and energy of the dough are determined in accordance with international standards and converted into graphs. Touch screen PC-controlled heating system, Parallel test possibility, the Touch screen of Absograph 500 and manual time control, It also offers the features of working in harmony with the Absograph device without the need for a computer and screen and tracking and recording data with the same touch screen.