

CHANGES OF GLUTEN PROTEINS DURING THE CONDITIONING PERIOD AFTER HARVEST

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Abstract

During the rainy periods during wheat harvesting, storage is conditioned by its humidity, which cannot exceed 15%. To reduce the humidity, these grains are dried with the help of dryers that remove part of the humidity by means of a stream of hot air. As the humidity exceeds the percentage of 15%, the time of exposure to the streams of hot air will be longer. In certain situations where the drying process is forced by raising the temperature of the air stream above 40 degrees Celsius, the phenomenon of gluten protein degradation can occur, thus leading to a significant decrease in its quality. Due to these decreases in quality, the bakery products obtained from their flour will also be of poor quality, although from a quantitative point of view, the gluten is within the parameters required by the bakery.

Keywords: temperature, gluten, quality.

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INTRODUCTION

So that the grains can be stored in safe conditions without entering the autofermenter, the humidity must be below 15%. If it rains for several days before the harvest period, the wheat grains absorb moisture even in larger quantities, exceeding the limit beyond which it can be stored. These situations are not very frequent given the time of year when these cereals are harvested.

In these situations, the wheat is directed to dry until the moisture percentage does not fall below 15%. Given the fact that this situation occurs frequently, unpleasant events may occur that are due to the lack of routine of those who operate these dryers and the particularity that wheat has due to its chemical composition.

A very important role in baking is played by exactly one of these characteristics, namely the quantity and quality of gluten. This is formed by the two gluten proteins, gliadin and glutenin, which, following the mechanical activity during kneading, form the gluten network, which has the role of retaining the fermentation gases.

In order for the flour to be bakeable, according to European standards, it must be at least 27% wet gluten relative to the flour mass, and the higher this percentage is, the better the quality of the flour. But not only the amount of

gluten is important, but also its quality, which influences the rheological properties, which are important from the point of view of the capacity to retain fermentation gases and the behavior of the dough during its processing. The most important of these properties are elasticity, extensibility, deformation, resistance to gas pressure and stability during kneading. In order for the flour to be declared of good quality, all of the above must correspond and be within the limits of certain parameters.

MATERIAL AND METHOD

In order to be able to highlight the possible influence on the quality of the gluten and the exposure to a higher temperature to which the wheat grains are exposed during the drying period, a quantity of wheat was taken and all the determinations that are made upon purchase were made.

The quantity was divided into 3 batches in which L will be the control, L1 which will be exposed to a stream of hot air similar to the one in the correct drying conditions and L2 which will be subjected to drying conditions where the temperature is higher with 10 degrees Celsius, the temperature that does not create problems in the case of drying other grains such as corn. After exposing the two wheat samples L1 and L2, all the

determinations that were made initially will be repeated.

RESULTS AND DISCUSSIONS

Following the laboratory determinations of the control sample in comparison with the other two, changes were observed only in those that influence the rheological properties of the dough. Comparing the most significant data such as dough deformation, elasticity, extensibility and pressure resistance, it was found that exposure to a higher temperature during drying leads to a considerable deterioration of the bakery quality, so that it simply it can no longer be processed in the bakery units reaching below the standards that are provided for them. Problems arise especially in cases where complex laboratory

determinations are not made after the drying process.

If during the harvesting period there is a large flow of wheat that needs to be dried, there is this tendency to speed up the drying process by increasing the temperature, and when the consequences appear it is much too late due to the fact that the obtained flour cannot be processed alone. They can be used in a mixture with appropriate flours, but in fairly small percentages, below 20%.

From the point of view of the wheat processor, this situation is very harmful because it blocks a large amount of non-compliant wheat in stock, which causes very large financial losses.

Influence on the rheological parameters exposure to a temperature that exceeds the normal drying temperature by 10 degrees Celsius

The relevant parameters referred to	L	L1	L2
Wet gluten %	32,4	32,2	32,4
Maximum pressure according to the curve in the Chopin Alveograph P mm	65	62	80
Extensibility according to the curve in the Chopin Alveograph L mm	50	48	22
Elasticity mm	12,4	12,2	6

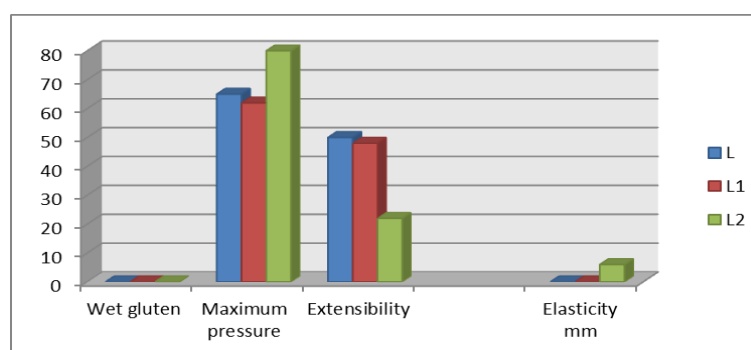


Figure 1. The influence on the rheological parameters of exposure to a temperature that exceeds the normal drying temperature by 10 degrees Celsius

CONCLUSIONS

From the resulting data, it can be seen that the flour that is dried under normal conditions at a temperature that is lower than 40 degrees Celsius, does not change the baking parameters.

On the other hand, where the temperature during the drying period exceeded this value by 10 degrees Celsius, the rheological

properties of the flour decreased drastically due to the denaturation of a significant amount of gluten proteins, which in the technological processing process no longer succeeds in forming an elastic and extensible dough, which leads to obtain quality bakery products. The dough became very plastic, offering a very high resistance to the fermentation gases, but greatly reducing the elasticity and ability to retain the fermentation gases.

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