FARINOGRAPHIC AND ALVEOGRAPHIC PROPERTIES OF WHEAT FLOUR INCORPORATED WITH BUCKWHEAT FLOUR (*Fagopyrum esculentum* Moench)

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Abstract

Buckwheat (*Fagopyrum esculentum* Moench) is a pseudocereal that has been highlighted in global research for its rich nutritional composition. This study had as objective to investigate the farinographic and alveographic properties of wheat flour (WF) with the incorporation of 30 and 45% whole grain buckwheat flour (WGBF). The following parameters were evaluated: water absorption (WA), arrival time (AT), dough development time (DDT), stability (S), resistance to extension (P), extensibility (L) and flour strength (W). Differences were observed in farinographic and alveographic behavior with the addition of WGBF. However, it can be predicted that the incorporation of 30 and 45% of WGBF is possible without causing major damages to parameters such as WA and P, expanding the possibility of the production of breads with the addition of buckwheat flour.

Key words:

buckwheat; farinograph; alveograph.

Introduction

Buckwheat (*Fagopyrum esculentum* Moench) is a pseudocereal that has no gluten and contains a variety of nutrients and phenolic compound, the consumption of which is associated with a lower risk of diseases¹.

The incorporation of raw materials without gluten in breadmaking products alters dough characteristics, usually causing great effects on rheological properties. The farinograph and the alveograph are two devices widely used to assess the behavior of flours.

This study had as objective to investigate the farinographic and alveographic properties of WF with the incorporation of 30 and 45% WGBF.

Results and Discussion

Table 1 shows the farinographic properties of WF and of blends with 30 and 45% WGBF. The flours used had $2.39 \pm 0.15\%$ (WF) and $24.43 \pm 0.91\%$ (WGBF) total dietary fiber contents.

Table 1. Farinographic properties of WF and of the blends with 30 and 45% WGBF.

Blends	WA (%)	AT (min)	DDT (min)	S (min)
100% WF	58.30±0.57a	1.20±0.07bc	11.80±0.35a	16.17±0.87a
30% WGBF	56.93±0.21a	1.30±0.17b	7.07±0.59b	9.93±0.21b
45% WGBF	57.03±0.15a	4.73±0.13a	7.37±0.76b	8.93±0.25b

It was observed that the samples did not present significant difference in WA values. Gluten-free raw materials tend to decrease WA; however, when using the WF associated with WGBF, that is rich in fiber, the WA remained the same.

For AT, it can be seen that the blend with 45% WGBF presented a longer time compared to the other samples, probably due to the higher fiber content, as they have a lower rate of hydration than the proteins³

DDT and S followed the same behavior and there was a decrease in the parameters with the addition of 30 and 45% of WGBF, due to the dilution of gluten in the blends⁴.

Table 2 shows the alveographic properties.

Relative to P, it was observed that the incorporation of 30% WGBF increased the value of this parameter; and that for L, the value decreased in relation to 100% WF. This behavior was expected, since WGBF has a high fiber content, generating a firm dough with greater

resistance to extension (elasticity), but without extensibility, easily breaking⁵.

Table 2. Alveographic properties of WF and of the blends with 30 and 45% of WGBF.

Blends	P (mm)	L (mm)	W (x10-4 J)
100% WF	100.77±5.13b	61.00±2.65a	271.07±24.95a
30% WGBF	128.22±14.64a	24.33±3.21b	133.29±22.17b
45% WGBF	n.d.	n.d.	n.d.

The analysis of the blend with 45% WGBF could not be accomplished by having parameters that were not read by the equipment due to the strength of fibers in the sample.

Conclusions

With the results of the analyses it can be concluded that the evaluation of farinographic and alveographic properties proved to be important for predicting the behavior of blends, being interesting processing bread with the addition of 30 and 45% of FSG, because of its nutritional benefits.

Acknowledgements

To SAE/Unicamp and FAPESP, for the scientific initiation scholarship granted to the student Juliana Araujo Bonadio (period: August/2015 to November/2015 and period: December/2015 to November/2016, respectively).

To CAPES for the PhD scholarship granted to student Lara Tatiane Geremias Ferreira Brites.

To Moinho Paulista, for the donation of the WF used.

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