Biblid: 1821-4487 (2014) 18; 4; p 151-153
UDK: 532.135

Original Scientific Paper
Originalni naučni rad

REOLOGICAL PROPERTIES OF THE MIXTURE PRODUCT OF APPLE POMACE AND WHEAT FLOUR

REOLOŠKE OSOBINE MEŠAVINE JABUKOVOG KLJUKA I PŠENIČNOG BRAŠNA

Gerda DIÓSI, Mariann MÓRÉ, Péter SIPOS
University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management Institute of Food Science
138 Böszörményi street, H-4032 Debrecen, Hungary
e-mail: diosi.gerda@gmail.hu

ABSTRACT

Bread is an important part of our daily diet; one of the most often consumed products of the food industry. It is important that we eat day by day not just means of subsistence, but it may also have health care functions too. It is essential not just in our energy intake, but in the fibre intake, too.

Apple pomace contains the skin, pulp, seeds and stems of the fruit which is a by-product. The modern juice production technology made possible to produce pomace with the removal of materials unwanted for consumers.

In our experiment, the dried and milled apple pomace (contains only the fruit flesh) was mixed with BL55 flour and the rheological properties of its dough was investigated. Water absorption increased by higher apple pomace (10%, 15%, 20%) contents, the stability of the control had the highest value and it decreased with the increase of the amount of apple pomace. Significant differences were disclosed in the cases of the three parameters.

Key words: *apple pomace, wheat flour, reologic, quality of baked product.*

REZIME

Hleb je važan deo naše svakodnevne ishrane; jedan je od najčešće konzumiranih proizvoda u industriji hrane. Važno je naglasiti da jedemo hleb dan za danom ne samo kao sredstvo za preživljavanje, nego i zbog funkcije očuvanja zdravlja koju hleb pruža. Hleb je veoma važan ne samo zbog unosa energije, nego i zbog unosa vlakana, takođe.

Usitnjena jabuka sadrži kožu, pulpu, semenke i stabljike voća što je deo ploda. Moderna proizvodnja soka od jabuke omogućava proizvodnju soka od jabuke uz uklanjanje svih neželjenih primesa u soku.

U ovom eksperimentu, osušena i samlevena jabuka (samo meso jabuke) je pomešana sa BL55 brašnom i zatim su ispitivane reološke osobine ovog testa. Absorpcija vode se povećava sa povećanjem udela sadržaja jabuke (10%, 15%, 20%), kontrolna stabilnost je imala najveću vrednost i smanjivala se sa povećanjem jabukove kljuke. Značajne razlike su otkrivene u slučajevima tri parametra.

Ključne reči: *jabukoba kljuka, pšenično bračno, reologija, kvalitet pekarskog proizvoda.*

INTRODUCTION

Bread is our basic and at the same time the most important food. Nowadays we can make bread from cereal grains and other non-cereal ingredients which may increase its nutritive value. The claim against daily consumed products besides subsistence is a health care effect.

In nutrition physiology fibres have a significant role in the prevention of colon cancer, obesity and diabetes *(Rodler, 2005)*. Fibre helps the reproduction of the bacterial flora, decrease the probability of colon and colorectal cancer *(Malkki, 2004)*.

Alongside fruits, crops have high fibre levels. The most widely cultivated fruit is apple in Hungary which has high fibre level and versatile uses *(Ficzek, 2012)*. The pomace (apple skin, apple flesh, seed, steam and apple stalk) is the leftover of the fruit juice production which contains a significant amount of valuable substances (for example: dietary fibers) *(Kolodziejczyk et al., 2007)*. The apple pomace is mostly used for feeding purpose in Hungary but thanks to its diversified consistence it has a significant nutritional role. The apple pomace powder is used for the purpose of seasoning (pipe tobacco and tea).

The solid material that remains after squeezing the juice from the apple is the pomace. About 25 percent of the apple that has been processed commercially comes out in the form of pomace. There have been experiments about using apple pomace in some baked food products although the information about using apple pomace in cakes is limited *(Masoodi et al., 2002)*.

The apple fiber has good water binding capacity, which is based on its sorption nature. The hydration of apple fibers before mixing with wheat flour partially decrease the damaging effect on the loaf volume *(Chen, 1988)*. It assures the soluble and insoluble fibers in due proportion. Furthermore mixing the apple fiber with wheat flour can improve the water absorption capability of the flour slowing the decomposition of the bread *(Karimi et.al., 2006)*.

During our research, we mixed apple pomace powder with BL55 flour and then we tested the rheological features of the dough made from the mixture. These are the characteristics which are extremely important from the point of view of the classification and fundamentally determine the baking quality of the product.

MATERIAL AND METHOD

During the research we used BL55 flour, which was mixed with apple pomace powder at the following doses 10%, 15% and 20% (table 1).

Table 1. Mixing rates and amounts of flour and apple pomace in the blends

Blend	BL55 flour	Apple pomace mixed
Control	100% (330g)	0% (0g)
1	90% (270g)	10% (30g)
2	85% (255g)	15% (45g)
3	80% (240g)	20% (60g)

The tests were done at the University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management Institute of Food Science.

We determined the water absorption capacity and rheological characteristics of the flour mixtures with Farinograph. (MSZ ISO 5530-1).

During the Farinograph test we are examining the change of the dough consistency during mixing. According to the measured data we classify the flour mixtures into quality groups (table 2).

Table 2. Baking characteristic of different flour groups (Nádasi, 2005)

Baking quality group	Baking value	Characteristic
A1	100-84	outstanding quality, improving flour
A2	84.9-70	
B1	69.9-55	flour of average use, baking flour
B2	54.9-45	
C1	44.9-30	substandard flour, off-grade flour, improvable with "A" class flour
C2	29.9-	

Further rated parameter is water absorption capacity which describes the amount of water the given amount of flour can absorb. Dough stability time shows the time during which the curve is at the maximum consistency level.

Baking value was calculated by MSZ 6383:2012.

We carry out the ratings with one way analysis of variance performed by Microsoft Excel 2007. We performed the ratings at $p<0.05$ significance level.

RESULTS AND DISCUSSION

Figure 1 shows that the baking value proportionally changed with the increased dose of apple pomace powder in the dough. The control had the highest baking value (100% BL55 flour). By the increase of the apple pomace ration of the mixture it has baking increased. In the case of the 20% blending ratio the value was the lowest, followed by the 15% blending sample. Among the 10% and 15% blending ratios, there was no significant difference. In the case of baking value the grooving apple pomace rate it showed statistically proved difference ($p<0.05$).

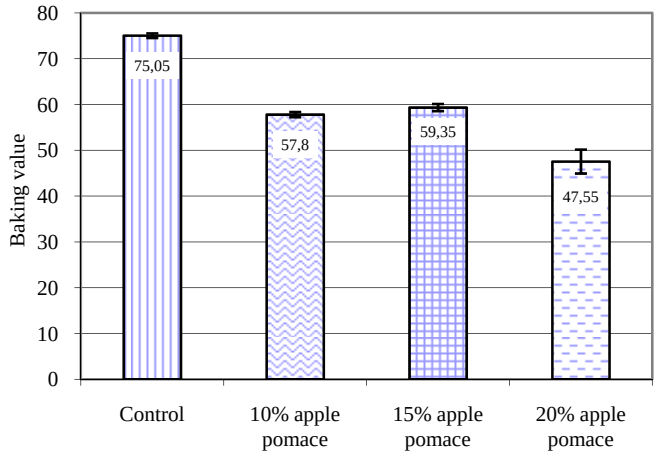

Fig. 1. Effect of the apple pomace powder addition on baking values

Figure 2 shows the water absorption capacity tested with farinograph. As a result of the test it can be said that the water absorbing capability of the flour containing apple pomace powder increased compared to the control. With a higher blending ratio water absorbing capability of the samples increased. The statistical test confirmed the significant difference between the samples ($p<0.05$).

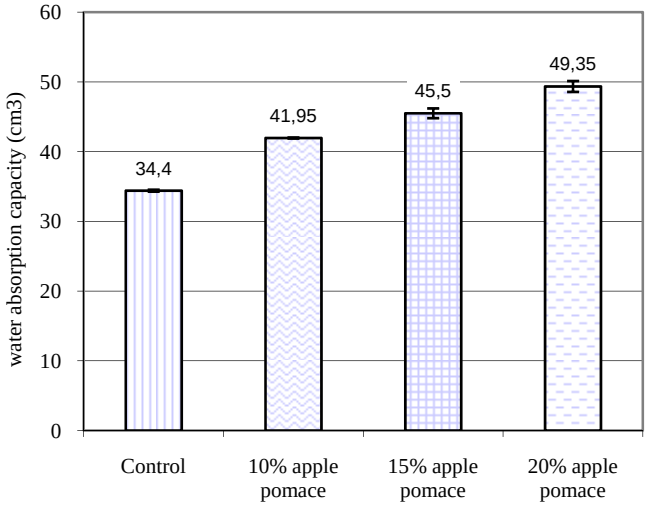

Fig. 2. Effect of the apple pomace powder addition on water absorption capacity (cm^3 per 48 g of flour depent from the flour moisture content)

The control flour had outstanding stability time (Figure 3). The water absorption capability of the blended flour scaled down with the increasing proportion of apple pomace in the blends. Minimal difference can be seen among the values obtained for samples blended with pomace. The stability time value followed the order: control >10% apple >15% apple >20% apple. The one way analysis of variance proved the significant difference between the samples ($p< 0.05$).

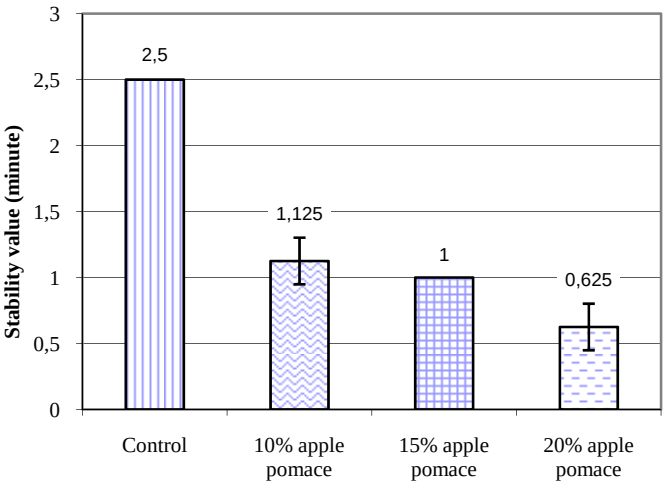

Fig. 3. Effect of the apple pomace powder addition on stability values (min)

CONCLUSION

The pomace which is a by-product of the fruit processing industry gives us a chance to increase the amount of fibre in the bread when blending it with flour. The baking value in the case of the flour pomace powder blending was worse than in the case of the control. The magnitudes of baking value between the 10% and 15% blends were nearly the same. Water absorption capacity of the flour blends changed inversely in contradiction to the baking value. The higher the blending ratio was, the higher the water absorption capacity of the blends became. In the case of the control, the stability time was the highest and then the

values proportionally decreased with the increased proportion of pomace in the blends with minimal difference within the pomace containing samples.

Among all of the tested parameters there was significant difference due to apple pomace addition.

REFERENCES

Chen, H., Rubernthaler, G. L., Schanus, E. G. (1988). Effect of apple fiber and cellulose on the physical properties of wheat flour. J. Food Sci. 53-304.

Ficzek, G. (2012). Healthcare and usage value of Hungarian bred apple and sour cherry varieties n the basis on fruit analysis, Corvinus University of Budapest, 3.

Karimi, M., Azizi, M. H. (2006). Effect of the different levels of sodium stearoyl-2-lactylate on the rheological properties of dough and quality of Taftoon bread .Thesis Master of Food Science and Technology Shahid Beheshti University of Medical Sciences, Faculty of Food Sciences and Nutrition.

Kołodziejczyk, K., Markowski, J., Kosmala, M., Król, B., Płocharski, W. (2007). Apple pomace as a potential source of nutraceutical products, Polish journal of food and nutrition sciences, 57, 291-295.

Malkki, Y. (2004). Trends in dietary fibre research and development, Acta Alimentaria. 33, 39-62.

Masoodi F. A, Sharma, B, Chauhan, G. S. (2002). Use of apple pomace as a source of dietary fibre in cakes. Plant Foods for Human Nutrition, 57, 1211-128.

MSZ 6383:2012 Wheat Hungarian Standard

MSZ ISO 5530-1 Wheat flour. Physical characteristics of doughs. Part 1: Determination of water absorption and rheological properties using a farinograph

Nádasi, M. (2005). Búza lisztvizsgálata, Budapesti Műszaki és Gazdálkodástudományi Egyetem, Bioskémiai és Élelmsizertechnológiai tanszék, 2-5.

Rodler, I. (2005). Élelmezés- és táplálkozás-egészségtan. Medicina Könyvkiadó, Budapest, 549.

Received: 01.03.2014. Accepted: 02.04.2014.