

The effect of wheat flour starch damage on physical characteristics of short pasta

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ABSTRACT: This study was conducted to evaluation of wheat flour starch damage effects on physical characteristics of short pasta. 4 types of commercial pasta samples were used for investigations: control with 12% damaged starch, sample with 15% damaged starch, sample with 20% damaged starch and sample with 25% damaged starch. Experiments were performed in a completely randomized design. The results from physicochemical tests stated that damaged starch contents didn't have significant effect on dry and wet ash, wet gluten amounts and gluten index and moisture of flours and pasta sample ($p>0.05$). The overall results showed that increasing damaged starch level in pasta caused an increase in the Solid content in the cooking water and cooking number with a decrease in consumer acceptance ($p<0.05$). In general, the samples with 15% damaged starch were introduced as the best sample.

Keywords: Cooking number, Damaged Starch, Pasta.

INTRODUCTION

Pasta is one of oldest foods cereal-based and it placed worldwide popularity due to the low cost, easy consumer, versatility and storage, (Bergman *et al.*, 1994). Simple and easy formulation has led to pasta known as a relatively cheap food (Dendy and Dobraszczyk, 2001). The structure of the pasta and pasta production process can therefore affect the digestibility of starch and protein (Simonato *et al.*, 2004). The role of starch in pasta cooking quality has been better understood in the last decade (Delcour *et al.*, 2000). Although starch is considered as a less important factor in pasta cooking quality, starch gelatinization during pasta drying has a major contribution to pasta quality (Güler *et al.*, 2002). Sheu *et al.* (33) reported that macaroni cooking characteristics were greatly influenced by the interchange of gluten and water-soluble fractions. Nevertheless, interchange of starch and sludge fractions had only a small effect on the cooking qualities of pasta. Banks and Greenwood (1975) proposed that durum wheat pasta was better than soft wheat pasta in cooking qualities because of differences in flour granule size which influences starch gelatinized temperature. In conjunction with damaged starch, Barrera *et al* (2007) evaluated influence of damaged starch on cookie and bread-making quality, the solvent absorption of flours and Alkaline Water Retention Capacity was significantly incremented by the damaged starch content, There was a consistent loss in cookie quality as the damaged starch content increased. The aim of this study was evaluation of wheat flour damaged starch effects on physical characteristics of short pasta.

MATERIALS AND METHODS

Table 1 shows treatment at this study and percent of damaged starch. This experiment was performed in a completely randomized design with 4 treatments and 3 replications. The tests were carried out in the laboratory of Zar Macaron Company. Iran National standard methods number 103 and 19052 were used for measuring of ash wheat flour and Crude protein content wheat flour, respectively. The damaged starch was determined by SD Matic No. 16933 using the Iran national standard. Pasta ash and protein were determined by Iran National standard methods number 2706 and 19052 respectively.

C	Pasta with semolina flour contains 12% ± 1 starch damaged (control)
M1	Pasta contains flour with 15% ± 1 damaged starch
M2	Pasta contains flour with 20% ± 1 damaged starch
M3	Pasta contains flour with 25% ± 1 damaged starch

RESULTS AND DISCUSSION

According to results, it was founded that damaged starch contents didn't have significant effect on dry and wet ash, wet gluten amounts and gluten index and moisture of flours and pasta samples ($p > 0.05$).

Lack of impact damage on gluten content of flour starch used can be of the same variety of wheat flour was used to prepare samples. Although several studies have shown that after increasing the amount of damaged starch, water absorption increases (Noorka et al., 2009) but this is not observed in our study because The effect of damaged starch on the moisture content depend greatly on the conditions of grinding, ash and protein content (Keskin et al., 2012).

According to the analysis of variance, it was determined that treatments had statistical significant effect on Glaze number at 5% probability levels, also mean comparisons showed that highest (6.57) and lowest (6.19) value were observed by M3 treatment and control, respectively (figure 1). Cooking test increased with increasing damaged starch percentage and treatments had significant effect on cooking test, So that the lowest number (46.2) of cooking related to the control sample and highest value (51.6) were obtained in 25% damaged starch (Fig 2). Results obtained by (Dexter et al., 1994) also stated that the damaged starch had positive correlation with cooking and cooking number increased with increasing damaged starch percentage. The overall results showed that increasing damaged starch level in pasta caused an increase in the Solid content in the cooking water and cooking number with a decrease in consumer acceptance ($p < 0.05$). In general, the samples with 15% damaged starch were introduced as the best sample.

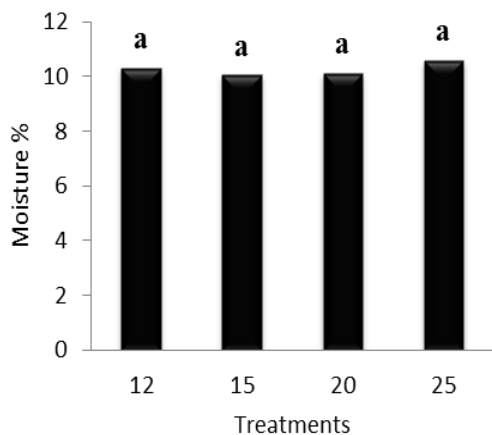


Figure 1. effect of damaged starch percentage on pasta moisture%

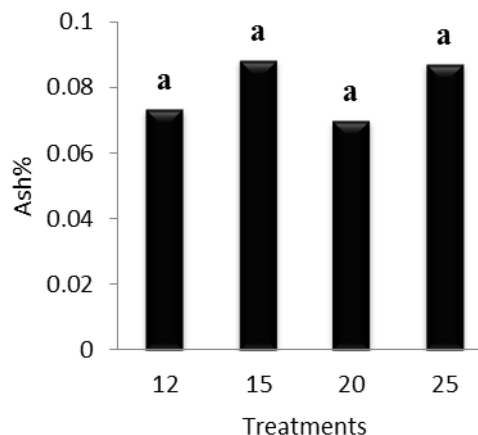


Figure 2. effect of damaged starch percentage on pasta ash%

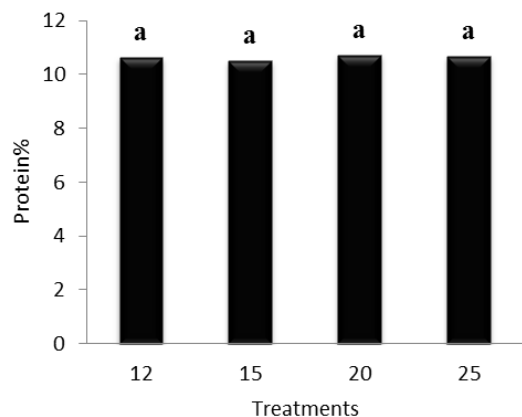


Figure 3. effect of damaged starch percentage on pasta protein%

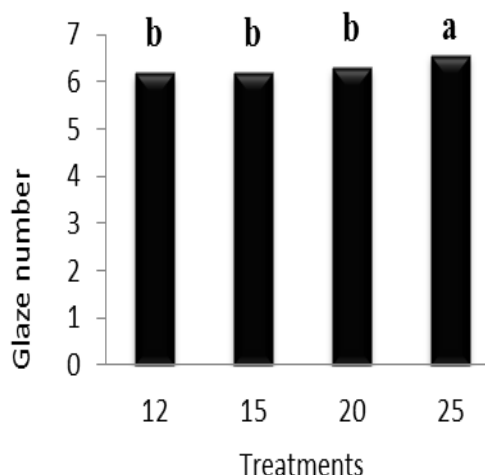


Figure 4. effect of damaged starch percentage on pasta glaze number

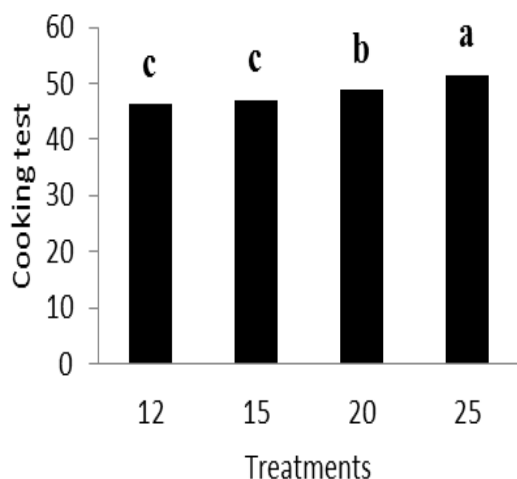


Figure 5. effect of damaged starch percentage on pasta cooking test

REFERENCES

- Bank W & Greenwood CT. 1975. Fractionation of the starch granule and the fine structure of its components. *Starch and its Components*, 6-8.
- Barrera GN, Pérez GT, Ribotta PD & León AE. 2007. Influence of damaged starch on cookie and bread-making quality. *European Food Research and Technology*, 225(1), 1-7.
- Bergman CJ, Gualberto DG & Weber CW. 1994. Development of a high-temperature-dried soft wheat pasta supplemented with cowpea (*Vigna unguiculata* (L.) Walp). *Cooking quality, color, and sensory evaluation. Cereal chemistry*, 71(6), 523-527.
- Delcour JA, Vansteelandt J, Hythier MC & Abecassis J. 2000. Fractionation and reconstitution experiments provide insight into the role of starch gelatinization and pasting properties in pasta quality. *Journal of agricultural and food chemistry*, 48(9), 3774-3778.
- Dendy DA & Dobraszczyk BJ. 2001. *Cereals and cereal products: chemistry and technology*. Aspen publishers.
- Dexter JE, Preston KR, Martin DG & Gander EJ. 1994. The effects of protein content and starch damage on the physical dough properties and bread-making quality of Canadian durum wheat. *Journal of Cereal Science*, 20(2), 139-151.
- Güler S, Köksel H & Ng P. KW. 2002. Effects of industrial pasta drying temperatures on starch properties and pasta quality. *Food Research International*, 35(5), 421-427.
- Keşkin S, Özkaya H & Turkoş S. 2012. Effects of Damaged Starch on Physicochemical Properties of Wheat Flour and its Bread Making Potential. *Academic Food Journal/Akademik GIDA*, 10(2).

- Noorka IR, Rehman S, Haidry JR, Khaliq I, Tabassam S & Din M. 2009. Effect of water stress on physico-chemical properties of wheat (*Triticum aestivum* L.). *Pakistan Journal of Botany*, 41(6), 2917-2924.
- Sheu RY, Medcalf DG, Gilles KA & Sibbitt LD. 1967. Effect of biochemical constituents on macaroni quality. I.—Differences between hard red spring and durum wheats. *Journal of the Science of Food and Agriculture*, 18(6), 237-239.
- Simonato B, Pasini G, De Zorzi M, Vegro M & Curioni A. 2004. Potential allergens in durum wheat semolina and pasta: fate during cooking and digestion. *Italian journal of food science*, 16(2), 151-164.
- Sung WC & Stone M. 2003. Characterization of various wheat starch in pasta development. *Journal of Marine Science and Technology*, 11(2), 61-69.