

STUDIES ON THE BEHAVIOR OF GLUTEN-FREE PASTA TO BOILING

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REZUMAT. Celiachia este cea mai comună boală genetică din lume, iar singurul tratament este o dieta fără gluten. Pastele fără gluten sunt un aliment cu proprietăți nutriționale apreciate de consumatori. Aceste produse trebuie să fie lipsite de factori alergeni și trebuie să conțină nutrienții necesari pentru a ameliora dereglările de metabolism create de această boală. Lucrarea prezintă cercetări proprii privind fabricația pastelor și comportarea la fierbere.

Cuvinte cheie: gluten, celiachie, vâscozitate, gelatină, sedimentare.

ABSTRACT: Celiac disease is the most common genetic disease in the world and the only treatment is a gluten-free diet. Gluten-free pasta is a food with culinary and nutritional properties, appreciated by consumers. These products must be free of allergens factors and contain the nutrients necessary to correct disorders of metabolism caused by disease. The paper presents personal researches concerning pasta production and pasta behavior in boiling process

Keywords: gluten, celiac disease, viscosity, gelation, sediment.

1. INTRODUCTION

Manufacture of pasta from grain containing gluten has not incited research in the field and leading companies in the manufacture of pasta, pasta produce wheat flour alternative materials, which have the same taste and properties.

The raw materials used in the manufacture of gluten-free pasta made from grinding cereals are gluten-free flours such as rice, buckwheat flour, corn flour. The gluten-free pasta production can be added to fortified fruit and vegetables and increase nutritional value.

Regarding the behavior of boiling pasta generally persist among researchers, industrial operators and consumers, some differences regarding the main factors for evaluation of quality indicators, which is a main criterion for acceptance of pasta as a food.

2. MATERIALS AND METHODS

Were analyzed gluten-free pasta made from gluten-free raw materials, a pasta station P55 Dominion a press capacity 25 kg / hour, dried with hot air discontinuous system.

Boiling pasta has a triple purpose: gelatinization of starch to be digested, pasta texture change so give them the desired characteristics of the consumer, raising the product temperature.

Experiments conducted on the behavior of gluten-free pasta in boiling, depending on the influence of quality raw material and cooking time, are the:

- increase in volume gluten-free pasta to boiling;
- sediment in boiling water;
- gluten-free pasta viscosity - the tendency of agglomeration;
- gluten-free pasta color, while boiling and after boiling.

The 12 samples analyzed, made from gluten-free flour blends with the following composition: rice flour 50% + corn flour 50% (S 1); rice flour 75% + soy flour 25% (S 2); rice flour 50% + buckwheat flour 50% (S 3); rice flour 98% + breeder 2% (S 4); rice flour 50% + corn flour 50% + eggs (S 5); rice flour 75% + soy flour 25% + eggs (S 6); rice flour 50% + buckwheat flour 50% + eggs (S 7); rice flour 75% + corn starch 25% + eggs (S 8); rice flour 80% + corn starch 20% + eggs + breeder (S 9); rice flour 75% + buckwheat flour 25% + eggs (S 10); rice

flour 75% + corn flour 25% + eggs (S 11); rice flour 60% + corn flour 30% + corn starch 10% + eggs (S 12).

Table1. Boiling behavior of gluten-free pasta

Sample	Volume (%)	Residue (cm)	Viscosity
S 1	280	2,5	slightly sticky
S 2	380	0,4	slightly sticky
S 3	250	3,5	sticky
S 4	280	4,2	sticky
S 5	280	1,2	sticky
S 6	280	0,5	slightly sticky
S 7	380	5,5	sticky
S 8	200	5,0	sticky
S 9	290	3,7	sticky
S 10	280	1,5	Less sticky
S 11	212	total gelling	sticky
S 12	260	2,5	slightly sticky

Boiling behaviour of gluten-free pasta is presented in Table 1.

3. RESULTS AND DISCUSSIONS

Analyzing the behaviour of the gluten-free pasta boiling samples is observed that:

- samples S 1, S 3, S 6, S 7, S 8, S 9, S 10 and S 12 increase their volume over 2 times, they have a big residue in boiling water;
 - samples S 2 and S 5 retain the shape well good in cooking, the volume increases about 3 times and reduce the residue in boiling water;
 - sample S 11 increase their volume, break down in boiling water which is almost entirely a residue;
 - sample S 4 break down and form a large proportion of high residue in boiling water.
- Characteristics of the increase in volume and residue are plotted in Figure 1.

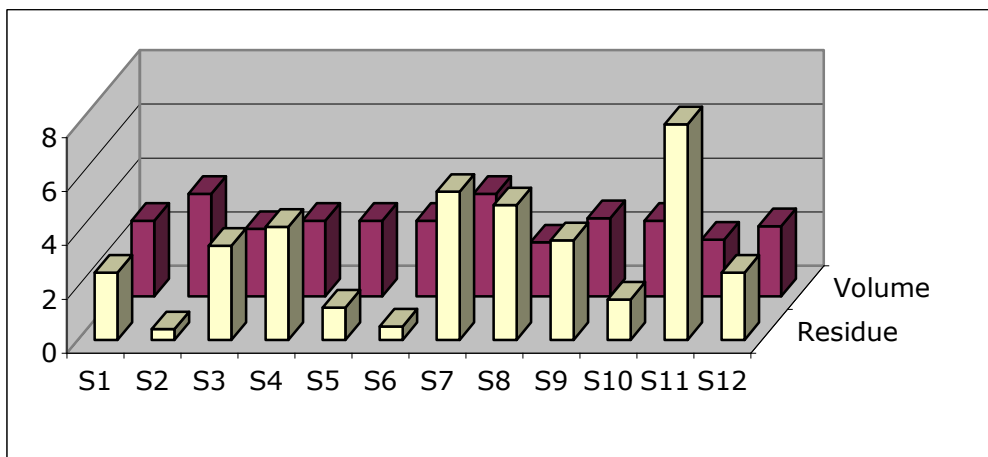


Figure 2. Variation in volume growth and residue

Comparing the two components of quality (increase in volume and residue) Figure 2, are:

- samples with the largest increase in volume had the lowest sediment (S 2 and S 6);
- the highest boiling-water residue corresponds to a lower cell volume (S 7, S 8 and S 11);
- the case of (S 7) have a large increase in volume, but also a significant increase in residue, which shows that the full buckwheat flour protein is low. In case of (S 10) has an increase in volume less then (S 7), but the residue is mach smaller.

The additions of eggs influence the growth in volume:

- S 7 has a 1,52% increase from S 3;
- S 1 and S 5 has the same volume, but that influence the residue which is reduced at half.

The viscosity of cooked gluten-free pasta is important for the culinary aspect also the sauces have an important influence on the agglomeration tendency.

The experiments of gluten-free pasta consist in sensory analysis of appearance, the sticky of fresh boiled pasta and after cooling, agglomeration and disintegration during mixing and the chewing texture.

Viscosity increases with increasing boiling time, pasta becomes sticky, agglomerate during boiling, but can reach an increased tendency of agglomeration.

All pasta has a sticky level, witch decrease in the following order as illustrated in Figure 2.

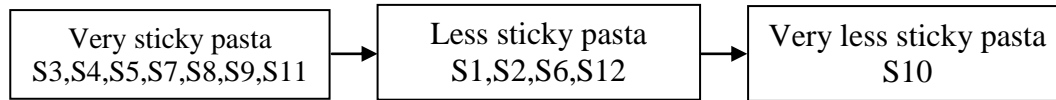


Figure 2. Viscosity variation of boiled pasta

During the boiling gluten-free pasta changes color, they fade and become tinged white to gray. This phenomenon is explained by the fact that some substances are oxidised carotenoids from high temperatures, and some go in boiling water

The cooked gluten-free pasta changes his colour as follow:

- rice flour pasta: white – white;
- rice flour + corn flour: yellow – white – yellow;
- rice + soy flour: yellow – yellow – weak brown;
- rice + buckwheat flour: reddish brown – grey and white, with brownish tinge;
- rice flour + starch: yellow – yellow – white.

4. CONCLUSIONS

The boiling of the gluten-free pasta have two phenomena wich occur simultaneously: coagulation of proteins and starch gelatinization.

High protein content is not good enough to cause a reaction to boled gluten-free pasta to because there are other factors affecting the physical properties of pasta: shape, tolerance to boiling, water absorption, degree of swelling, loss of boilig water, quality and quantity of starch.

Boiling water is turbid at all analyzed samples with different shades, residue is present in fairly large limits.

The addition of pasta boiling eggs improves behavior are not as sticky, retains better shape, and in some cases see a greater increase in volume.

The gluten free pasta with eggs have a better behavior at boiling, do not stick, not break, keeping their shape.

The optimal time for boiling gluten free pasta is 3 minutes an for noodle is 1 ÷ 2 minutes, and a much longer time produce the break-up of the pasta.

The color of the gluten free pasta is influenced by the additions of the used flour.

The addition of breeder does not improve the behavior, further research is required in this direction.

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