

Effect of structure forming additives on the of water bond forms in gluten-free macaroni dough made from corn flour

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Brief introduction: The water bond forms in dough for gluten-free macaroni products made from corn fine meal flour with addition of different structure forming additives have been investigated. Analysis suggest the correlation between amount of unbound and bound moisture, rheological properties, both kinetics of drying process and quality of macaroni products.

The effect of structure forming ingredients: xanthan, carboxymethylcellulose (CMC), gelatin and dry egg white - on the moisture bond forms in corn dough was also investigated. Research shows that structure forming ingredients should be added in colloidal solutions.

Body of text: Study of the forms of moisture were carried out by means of "Derivatograph Q-1000" differential-thermal analysis unit for temperatures ranging from 0 - 200 °C. Samples weighing 1 g were heated at 1.25 °C min⁻¹.

As shown by our study the amount of moisture of macro and microcapillaries is prevalent in corn dough - 39.40 – 54.69 % of the overall mass of water. Amount of this moisture bond is higher in dough with gelatin and dry egg white. Amount of osmotically bound moisture in the dough is 18.75-28.04 % of the total mass of water, where most of it is in the dough with xanthan and dry egg white. Amount of adsorbed bound moisture in dough samples made from corn flour is 18,49-23,13 % of the total mass of water, and most of it is in the dough with structure forming ingredients of carbohydrate origin.

Research shows correlation between moisture bond forms in the dough with different structure forming ingredients and speed of drying of macaroni products. As can be clearly seen that increasing of amount of moisture of macro and micro capillaries and lower content of adsorbed bound moisture results increasing of speed of drying of corn macaroni products.

Conclusion. Speed of drying of macaroni products made from corn flour with different structure forming ingredients (till first critical moisture (W_1^{cr})) is higher that contribute to apply harder drying regimes in first period. It is more evident for samples with xanthan, gelatin and dry egg white, which have higher speed of drying compared to other samples made from corn flour and significantly exceeds for samples from the wheat flour. W_1^{cr} for corn macaroni samples is 28.70-23.40 % that is less than in the wheat products.

Keywords: gluten-free macaroni products, forms of water bonds, structure forming additives, speed of drying.