CRYOPROTECTANTS IN FROZEN MEAT CHARACTERISTIC OF SWEET TASTE

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Background

According to world literature and experience related mainly to surimi, the most effective cryoprotectants, preventing denaturation of myofibrillar proteins, belong to carbohydrates (MacDonald and Lanier, 1991). The use of such substances in red meat is limited by their sweet taste. The intensity of sweet taste differs among the substances.

Objectives

The aim of the study was to characterize the sweet taste which appears when cryoprotectants of carbohydrate group are used in red meat in order to establish the limiting levels of their addition.

Methods

The following cryoprotective substances were tested: saccharose, sorbitol, maltodextrine of DE-24.38 and synthetic polidextrose.

The intensities of sweet taste of water solutions of sorbitol, maltodextrine and polidextrose were compared to that of saccharose solution of concentration of 0.8 g/ml. The fitting method was used according to Baryłko-Pikielna (1990). The point of subjective equality for each cryoprotectant was verified by triangle test.

The relation of sweet taste intensity to cryoprotectant concentration was assessed with the use of scaling method (graphic scale 100 mm long, defined direction of stimulus change). For evaluation of stimulus intensity the following solutions were served to panel: saccharose 0.8; 1.6; 3.2; 6.4 g/100ml, sorbitol: 1.6; 3.2; 6.4; 12.8 g/100ml, polidextrose: 5.5; 11; 16.5; 22; 27.5 g/100ml and maltodextrine: 5; 10; 15; 20; 25 g/100ml.

The recognition thresholds were determined in water solutions, beef and pork according to stair-case method (Baryłko-Pikielna, 1975).

Sweet taste sensation relation to time was assessed in water solution of tested substances of comparable intensity of the taste. The computerized system of sensory analysis ANALSENS was used.

The panel consisted of 7-8 members.

Results and discussion

The points of subjective equality of sweet taste were 0.8, 1.6, 5.5 and 5.0 g/100ml for saccharose, sorbitol, polidextrose and maltodextrine, respectively. Statistical analysis of the results of triangle test showed a significant difference between reference and maltodextrine solution of similar sweetness. Maltodextrine contributed easy identified glue off-taste to a sample.

The relationship between sweetness sensation and cryoprotectant dose is presented in Fig. 1. The curves for saccharose and sorbitol had similar shape, but the sensation of the same stimulus value needed sorbitol concentration almost twice as high as saccharose.

The increase of sweetness intensity in polidextrose and maltodextrine solutions was very similar. Sweet taste appeared, increased and achieved its maximum at similar concentrations of both substances.

In Tab. 1 the recognition thresholds are presented. In pork meat as well as in beef the recognition thresholds for saccharose, sorbitol and polidextrose were of the same value equivalent to 1.0; 1.6 and 7.0 g/100g of meat, respectively. The recognition thresholds for maltodextrine were 5.0 g/100g and 5.5 g/100g in beef and pork meat, respectively and corresponded to the levels commonly used in red meat cryoprotection. In water solutions the recognition thresholds were considerably lower than in meat. The determined values were 0.3; 1.2; 0.5 and 3.5 g/100ml for saccharose, sorbitol, maltodextrine and polidextrose, respectively.

In Fig. 2 there are shown the time-intensity curves characterizing the changes of sweetness intensity sensation in time. As it can be seen, the maximal values of intensity are very similar what confirm the results of fitting test. The total time of sensation duration was different for different substances. The shortest time of appearance and disappearance of sweetness was observed for sorbitol and polidextrose solutions. Significantly longer was the time of sweetness sensation for saccharose and the longest one for maltodextrine.

Conclusion

The results concluded that, taking into account the characteristic of sweet taste, sorbitol and polidextrose are more suitable as potential cryoprotectants for red meat than the other tested substances.

Literature

1. Baryłko-Pikielna N.(1990) - Nowe i znowelizowane metody analizy sensorycznej stosowane w pracach badawczych nad żywnością. Postęp w analizie żywności. t. II, 1 -14,
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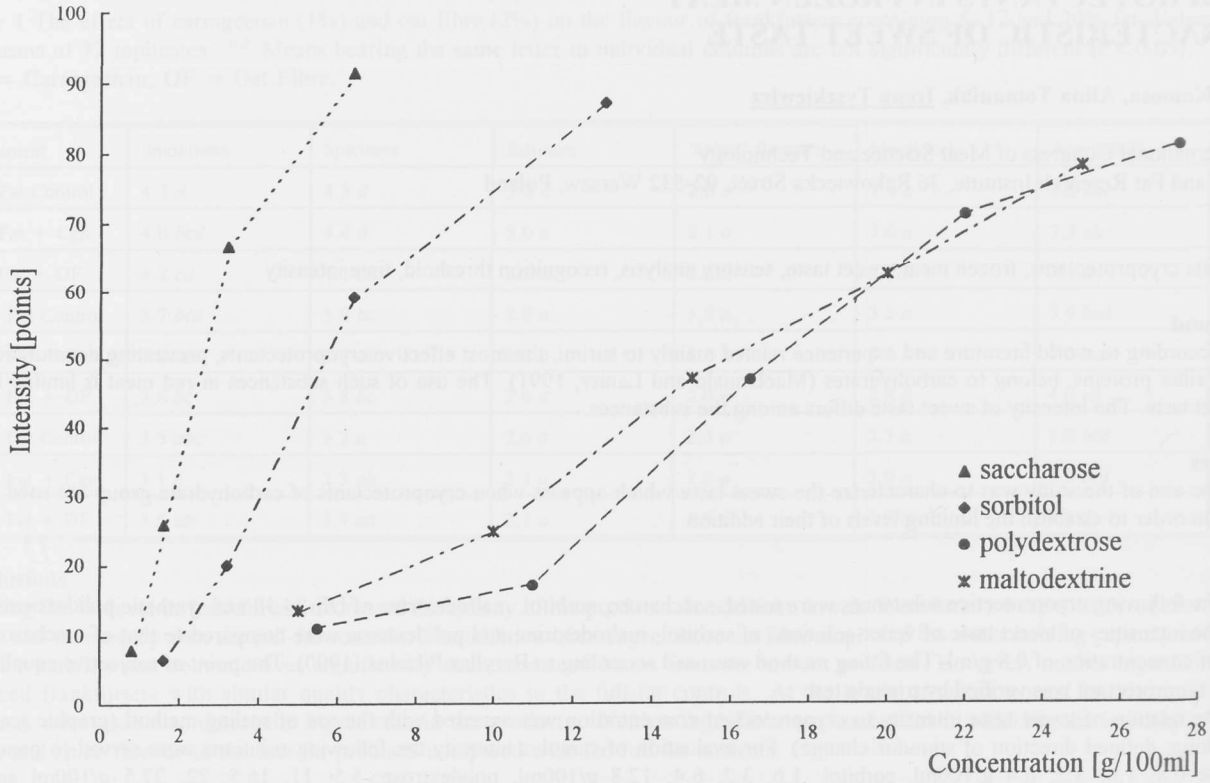
Fig. 1 Relationships between concentration and sweet taste intensity of different cryoprotectants



Tab. 1
Values of recognition threshold of cryoprotectants in different media.

medium / cryoprotectants	water [g/100ml]	pork [g/100g]	beef [g/100g]
saccharose	**0.3**	**1.0**	**1.0**
sorbitol	**1.2**	**1.6**	**1.6**
polydextrose	**3.5**	**7.0**	**7.0**
maltodextrine	**0.5**	**5.5**	**5.0**

Fig. 2
Mean time-intensity curves for sweetness intensity of cryoprotectants.