TEXTURE INVESTIGATION OF RECONSTRUCTED PREFRIED AND CRUMBLED MEAT SLICES

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Background
The meat processing plants have always a lot of trimmings, which have to be utilised. Now we established a new technology line for processing.

Objectives
Our aims was to investigate the effect of the production technology on the consistency parameters of the reconstructed, crumbled pork loins and differences between the consistency parameters of crumbled steaks made with reconstuction technology and traditionally way from different raw materials (loin, leg, shoulder).

Materials and methods
We prepared control samples made according to the home technology. The 8-10 mm thick loin, leg and shoulder slices are clopped turned flour, and egg and then crumled in. Then the slices were baked in hot oil (140°C-160°C) for about 8 minutes till the reaching a brown colour. The reconstructed meat are produced from desinewed meat. They are heat treated in hot air. For the consistency investigation we have chosen 3 measuring points in the inner part of the slices corresponding to a regular triangle with 4 cm long sides. We measured 3 slices from each kind of slices.
We applied the following parameters for the consistency measurements: the sample body was a metal cylinder with 8 mm diameter, the type of the investigation was texture profile analysis, speed of the movement of the sample body is 30 mm/min, the commencing force 5,00 g, the penetration depth 5,00 mm, number of cycles: 2, temperature of the measurements: 20±1°C.
For the better comparability of the samples the consistency measurements were carried out on fresh prepared samples at 20°C stored for 24 hours. From the 22 consistency parameters we have chosen 6 measuring values (Hardness 1,2; cohesivity, gumminess, toughness, modulus) having a variation coefficients lower than 20%. According to our experience this condition gives better reproducibility (Bourne, 1976, 1978; Bara-Herczegh et all. 2001). In the evaluation of the results we use the proposals of Peleg (1987) and Rosenthal (1999) as well. The samples considered as different from each other if their standard deviation range did not reach the corresponding average values.

Results and discussions
The average values and standard deviations of the consistency figures of different samples can be found in the Table 1. and Table 2.
There were no significant difference among the consistency parameters of samples made freshly, or thawed or cooled to 20°C. The hardness of the samples was about the same in both cycles. The slope belonging to the hardness (modulus) showed nearly the same value. We can state that the changes in softness, consistency and byting of enscisors teeth are not different. The parameters (cohesivity, gumminess) referring to the elasticity of the products were similar. If we take into account that the cohesivity of the ideally elastic body equal to 1 and the cohesivity of the totally plastic body is zero, the investigated samples had both properties, although the elasticity property more dominant, so the samples can be considered plasto-elastic body. The number of bites needed organoleptically for slucking the samples were about the same in all samples. After storing the samples at room temperature for 24 hours the consistency parameters of the samples lowered. The reason of it derives from the character of the products. After reconstruction and forming, there are not so high binding forces as in the original steaks, which weaken during storage. We experienced significant lowering in hardness values in case of the products prepared with convection oven technology.
In the course of the consistency investigation of crumbled steaks we experienced significant differences in consistency values hardness 1 and 2 gumminess and toughness) among samples prepared freshly and cooled to room temperature. The listed parameters changed in the three types of meat a similar way. The values are the highest in case of leg samples followed by the loin steaks which showed significantly lower values, and shoulder steaks had the lowest value although the steaks made from loin and and shoulder did not differ significantly. We obtain a similar tendency in case of cohesivity and modulus but the differences differed not significantly.
After 24 hours storing at room temperature the hardness and toughness values increased significantly in steaks made from loin and leg meanwhile there was a lowering in these values in shoulders but it was not significantly The cohesivity values lowered as well but these did not show significant differences. This experience can be related to the composition of meats. According to the Codex Alimentarius Hungaricus (1995) classifies the meat raw materials on the base of the tissue character and ratios and processing quality. In this way, the raw loin steaks can be considered as S95 (there is no visible fatty tissue and connective and sinew) the leg steaks as S90k (no visible fatty tissue, but having connective tissue films) and the shoulder as S80 (a mean meat having visible fatty tissue and looser structure. The original slices of pork we obtained an increase in hardness due to the fibrous structure and the sinews. The higher fat content resulted a looser structure.
In the course of the comparison of consistency parameters of steaks made by reconstructed and traditional technology we can state the following: the hardness, gumminess and toughness is higher in loins and shoulders and lower in legs meanwhile these values in the reconstructed slices are so high as in the crumbbled steaks.
After 24 hours of storing the consistency parameter values of the reconstructed loin slices have not increased. The hardness increase due to the fibrous structure and higher connective tissue content is lacking. We obtain a similar pattern as in crumbled shoulder steaks having looser, softer structure
We can conclude that the reconstructed meat slices made with the new technology were very close to the slices prepared from loin, legs and shoulder originally and traditionally

Litrerature
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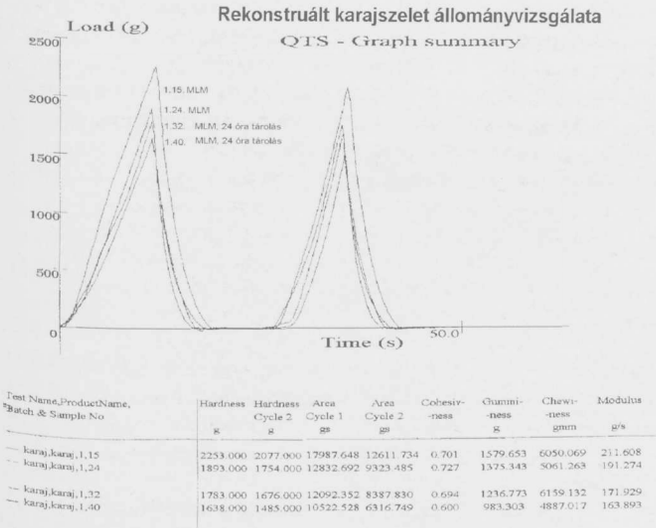
Acknowledgerments

Table 1: Measured texture parameters I.

Minta kod	Minta neve vagy jele	Kem±s	Koh±s	Gum±s
1	MLM at room temperature	1938±337	0,722±0,027	1396±229
2	MLM after 24 hours storage at room temperature.	1414±178	0,666±0,021	942±137
3	Crumbled loin steaks (fryed and then cooled to room temperature)	1518±340	0,705±0,053	1057±189
4	Crumbled leg steaks (fryed and then cooled to room temperature)	2122±498	0,729±0,031	1540±334
5	Crumbled shoulder steak (fryed and then cooled to room temperature)	1366±277	0,679±0,032	924±176
6	Crumbled loin steaks (after 24 hours storage at room temperature)	2414±324	0,642±0,032	1542±172
7	Crumbled leg steaks (after 24 hours storage at room temperature)	2894±559	0,680±0,059	1949±323
8	Crumbled shoulder steak (after 24 hours storage at room temperature)	1283±161	0,634±0,058	807±84

Table 2: Measured texture parameters II.

Minta kod	Minta neve vagy jele	Rágósság±s	Mod±s	Kem2±s
1	MLM at room temperature	5979±1351	190±33	1789±308
2	MLM after 24 hours storage at room temperature.	4335±834	141±16	1322±167
3	Crumbled loin steaks (fryed and then cooled to room temperature)	4532±1069	141±27	1410±308
4	Crumbled leg steaks (fryed and then cooled to room temperature)	6321±1558	198±55	1978±451
5	Crumbled shoulder steak (fryed and then cooled to room temperature)	3747±761	120±23	1280±256
6	Crumbled loin steaks (after 24 hours storage at room temperature)	5917±1093	219±29	2210±309
7	Crumbled leg steaks (after 24 hours storage at room temperature)	7916±1539	277±48	2660±495
8	Crumbled shoulder steak (after 24 hours storage at room temperature)	2925±497	125±17	1179±144



Test Name,ProductName, Batch & Sample No	Hardness 1 g	Hardness Cycle 2 g	Area Cycle 1 gs	Area Cycle 2 gs	Cohesiv--ness	Gummi--ness g	Chewi--ness gmm	Modulus g/s
karaj,karaj,1,15	2253.000	2077.000	17987.648	12611.734	0.701	1579.653	6050.069	211.608
karaj,karaj,1,24	1893.000	1754.000	12832.692	9323.485	0.727	1375.343	5061.263	191.274
karaj,karaj,1,32	1783.000	1676.000	12092.352	8387.830	0.694	1236.773	6159.132	171.929
karaj,karaj,1,40	1638.000	1485.000	10522.528	6316.749	0.600	983.303	4887.017	163.893

1. Ábra Rekonstruált karajszeletek állományprofil görbéi