PRODUCTION OF COOKED MEAT PRODUCTS - POSSIBILITIES FOR IMPROVEMENT

MARIN CHAKAROV, ANI DASKALOVA and VLADI VLADOV
Institute of Meat Industry, Blvd.Cherni Vrah 65, Sofia 1407, Bulgaria

ABSTRACT: The investigations are carried out for production improvement of cooked and cooked-smoked meat products from non-comminuted meat. The experiments are conducted after the analysis of advantages and disadvantages of the current production and as a result a technology is created, which dramatically decreased the curing materials and the means, that ensure necessary texture of the finished products. The experiments are carried out with dry accelerating salting method, that ensure uniform penetration of curing materials. With the variation in curing mixtures, containing salt - 2,5% to 2% and sodium nitrite - 0,01% to 0,05%, their optimal ratios are established. The results from the observations are determined with physicochemical and organoleptic analyses. The received experimental data show, that the quantity of curing materials can be reduced to such levels, that have a positive influence on the health-prophylactic effect. The received good aroma-flavour parameters are due to the use of honey, which is not only flavour corrector, but a good reductor and hence in the finished product there are only nitrite traces.

INTRODUCTION: Cooked ham is one of the most valuable products of meat industry, according to which producers, control authorities and consumers have always had high requirements, regarding quality. The production of cooked meat products can be systemized and reduces to processing of pork leg or pork shoulder, that are treated with suitable salt solutions with combination of express ripening and cooking at such a temperature, ensuring the product pasteurizing /Pizra et al., 1906/. Recently the curing is carried out with previously prepared salt solutions by injecting them into the muscle tissue before the mechanical treatment or during it /"Langen"system/. This curing is similar to the curing of non-comminuted meat raw materials, designed for cooking or drying. The essential here is that after injection, the raw materials is cured completely in salt solutions /Konig, 1980/. Nevertheless of many advantages of this method, the availability of disadvantages is a prerequisite for searching of other curing methods. Salting as the oldest method /Donald et al., 1980/ has its advantages and disadvantages - the process is carried out slowly and there is an impossibility to regulate salt level in finished product. In spite of the existing tradition in using this method, it is improved by Chakarov et al. /1979/. Some of disadvantages of this method are overcome by massarating of raw materials, which breaks the sarcolemma entity and as a result accelerates the salt penetration /Nestorov et al., 1980/. The objective of this study is to examine the possibilities of salting use in cooked ham and cooked meat products manufacturing from non-comminuted meat raw materials.

MATERIALS AND METHODS: In order to conduct our investigations, we used the method of Chakarov et al. /1979/ and the following raw materials - meat from pork leg and shoulder and the muscle groups: m. quadriceps femoris, m. semimembranosus and m.gracilis. We carried out also observations of three variants, that differes in curing mixtures and are presented in table 1.

Table 1

VARIANTS	Curing materials, %		
	Salt	Nitrite	Ascorbic acid
A	2.5	0.010	0.04
B	2.3	0.005	0.03
C	2.0	0.002	0.03

The curing was conducted by smearing and massarating of muscles with previously homogenized curing materials and by addition of honey. After 4-days ripening of cured raw materials, they were subjected on thermal processing /cooking/. Then by mechanical treatment we added honey and definite % water to the ham raw materials after salting /0.600% honey/. We replaced 3/4 of necessary quantity /0.600%/ phosphates with glyceride emulsifier GMC-C in quantity - to 1%. The curing materials included 2% salt, 0,080% nitrite and 0,003% ascorbic acid. The received results were framed variational-statistically.

RESULTS AND DISCUSSION: In table 2 are presented the results from chemical analysis of finished cooked-smoked meat products of different muscle groups.

Table 2.-The results from chemical analysis (%)

Muscle groups and variants		Water content	Fat content	Protein	Salt	Residual nitrite, mg%
Variant A	max	70.12	1.5	26.68	2.32	1.15
	min	67.72	1.0	23.47	2.13	0.35
Variant B	max	68.80	2.5	25.39	2.1	1.20
	min	67.40	1.5	22.46	2.0	0.80
Variant C	max	68.98	3.0	24.73	2.2	0.63
	min	67.92	2.2	23.25	1.8	0.35
Variant A	max	71.17	2.1	24.76	2.4	2.9
	min	67.90	1.9	23.89	2.3	2.65
Variant B	max	70.53	2.2	24.00	2.00	1.56
	min	68.76	2.0	22.79	1.85	0.89
Variant C	max	69.95	2.56	23.68	2.00	0.79
	min	69.78	2.43	23.42	1.80	0.65

Table 3.-The results from organoleptic analysis

PARAMETERS		Muscle groups and variants					
		A	B	C	A	B	C
Colour	max	6.2	6.1	2.1	6.5	6.3	3.1
	min	6.0	6.0	1.9	6.2	6.1	2.5
Consistency	max	7.8	7.7	7.1	7.9	7.7	7.4
	min	7.6	7.6	7.0	7.4	7.5	7.2
Aroma	max	7.2	7.4	7.4	7.3	7.5	7.2
	min	6.9	6.8	7.1	6.7	7.3	7.0
Flavour	max	6.9	7.4	7.5	7.1	7.6	7.5
	min	6.7	7.2	7.1	6.8	7.2	7.3
Total score		6.6	6.7	7.2	6.7	7.3	7.4

The received results show, that the finished products from the two muscle groups are with good organoleptic parameters. This regards especially the variants B. The only exception is parameter colour, which proves that 0.002% nitrite are not enough for a good colouring. Approximately equal scores of the same parameter in other two variants, give us grounds to consider, that 0.005% are enough for a good colouring. Regarding flavour, the variants with min quantity salt are with the highest scores. The received total high scores from organoleptic analysis can prove, that salting together with mechanical treatment is able not only to accelerate the technological process, but to ensure products with high quality, with the use of min quantity curing materials. A few series of produced cooked ham with reduced quantity curing materials and with replacement of the greater part of emulsifying and stabilizing phosphates effect with monoglyceride, proved, that with the help of salting can be avoided expensive equipments. In table 4 are presented the results from the conducted investigations of physico-chemical composition of cooked ham, produced according to this new technology.

Table 4.-The results from physico-chemical analysis n = 10

	PARAMETERS, %					
	Water content	Total fat content	Total protein	Salt	Nitrite, mg%	pH
$\bar{x}$	72.70	4.10	19.95	2.2	1.74	6.43
$\pm S$	2.85	0.12	0.90	0.11	0.08	0.45

The results from these investigations inform us about the rendered parameters, regarding especially significant parameters of rational nutrition - salt level, free nitrites level and protein content. At the rate of residual nitrites - 4.5 mg%, in the finished products, we established in our examinations approximately triple lower scores. 50% lower salt level is also

established, which does matter for avoiding some social significant deseases. The conducted observations give us grounds to consider, that it is possible to reduce salt level and to replace one part of phosphates with natural emusifiers in cooked ham production. This is proved also by the received high scores from the organoleptic analysis, presented in table 5. The results from the sensory analysis show, that the reduced phosphates level does not influence negatively the organoleptic score. The honey has a big influence on the high total score of cooked ham, produced with such a technology, which effects not only as a flavour corrector, but with its rich enzyme system, the biochemical processes, connected with the ripening of cured meat raw materials.

Table 5

	PARAMETERS					
	Colour	Consistency	Smell	Flavour	Juiciness	Total score
$\bar{x}$	7.8	7.6	7.9	8.0	7.8	7.8
$\pm S$	0.25	0.30	0.19	0.32	0.21	0.28

CONCLUSIONS: The following conclusions can be drawn, according to the conducted investigations: 1. The accelerated salting method develops possibility for prediction and control of curing materials use in the production of cooked, non-comminuted meat products. 2. 2% salt and 0.005% nitrite are enough for regular conducting of the curing and ripening and for production of cooked products with excellent aroma- flavour properties. 3. Salting can be used successfully in cooked ham production without use of specialized lines and equipments.

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