A COMPARISON of the CURING EFFECTIVENESS of UNCHILLED and CHILLED CHICKEN BROILER MEAT / Model Study/

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INTRODUCTION

The advantages of producing culinary meat and manufacturing of processed meat products from hot-boned carcasses were described elsewhere./3,5,7,8,10,11,12,13,14,15,16,17,18,19,20/. The behaviour of proteins of the pre-rigor,hot-boned beef used for preparation of sausages are presented in an excellent monographic paper by R.Hamm published recently./6/.Most of the published data reveal advantages of the hot-boned meat features with regard to pork and beef. Furumoto and Stadelman /4/ were dealing also with tenderness of chicken and turkey rolls processed from hot-boned meat as influenced by common salt addition.

This research aimed at comparison of the curing effectiveness of poultry meat /breast and thigh muscles separately/ removed from the chilled and unchilled chicken broiler carcasses.

MATERIAL and METHODS

The breast and thigh muscles from chicken broilers of 1.0 - 1.3 kg dressed weight were cut - out either before cooling i.e.directly from dressing line or after chilling according to commercial technology in ice-water to the temperature of 6-8°C and afterwards during 24 h. in refrigerator at 2-4°C.Muscles were minced in laboratory grinder using plate with 2 mm in diameter holes and cured using for each 100 g of grinded tissue of the curing brine consisting of:NaCl - 2.5g,$NaNO_2$ - 15mg,sodium ascorbate - 30.00g and water 47.5g /ml/.In order to eliminate the interference of initially differenciated pH of the poultry muscle used for the model study,the pH of minced meat tissue,before adding the curing brine,was adjusted,using 0.1n NaOH and/or 0.1n HCl to 5.6 and 6.0 pH for chilled breast and thigh muscles and to 6.0 and

6.4 pH for hot cured breast and thigh muscles, respectively.
Curing time, after addition of curing ingredients dissolved in water and well mixed with meat was 60 min. after which glass containers of 150 ml filled up with the experimental batches of cured mince were heated for 30 min. in water bath at 85°C during which the temperature of cured mince of 73 - 75°C in geometrical centre was reached. The model sausage /mince/ was then cooled in running cold tap water for 10 min. and thereafter the heat /thermal/ drip was determined by gravity dripping for 15 min. aiming at estimation of the production yield.
The curing effectiveness of poultry meat cured after chilling of carcasses and obtained from hot-boned one was evaluated by determining: percentage of the yield, amount of the residual nitrite /1/, degree of nitrosation of the heme pigments after determination of the sum of mio and hemoglobine pigments and nitrosopigments /9/, NaCl /2/, dry matter, pH and physical colour parameters i.e. dominant wavelenght / d/, luminance /Y/ and excitation purity /Pe/ at 540 and 640nm using spectrophotometer SPECOL, Carl Zeiss, Jena - fitted with reflectance chamber Rd 45/0 and zeroing the instrument with an MgO block.

RESULTS and DISCUSSION

The most pronoumced effect of curing of the hot-boned poultry breast and thigh muscles are demonstrated in substantial, statistically significant /P= 0.05/ increase of the production yield of the model, comminuted meat products. The observed production yield was by 4.46% ±U 1.56% and 8.93% U± 3.24% higher for products processed from cured breast and thigh muscles, respectively in comparison with the similar manufactured from muscles cured after chilling during 24h. at 2-4°C. Roughly speaking double as good were water binding capacity and water holding capacity shown by thigh muscles when compared with breast and when the assessment was based on the production yield. Both observations allow to recommed the use of thigh muscle, particularly from unstandard chicken broiler carcasses for manufacturing of the fine comminuted, emulsified meat products such as scalded sausages and/or patties. Our data with regard to poultry meat *also confirm the general opinion regarding possibility of manufacturing of the high yielding* meat products from hot /unchilled/ meat provided that salting or curing will commence shortly say 1.5 - 2 h.post mortem.

Curing of chilled or hot-boned breast poultry meat did not influence the amount of the residual nitrite content in ready products, while significant difference /P = 0.05/ in the amount of $NaNO_2$ in free form was observed in a model product manufactured from either chilled or hot-boned thigh muscles, being sligjtly greater in processed from hot meat. An average amount of the residual nitrite determined in the model final products was 87.76 ppm i.e. 41.49% of the initially added nitrite reacted with components of breast and thigh muscle tissue of chicken broilers, though reactivity of the chilled muscles was slightly better.

No statistically significant difference /P = 0.05/ was observed in the degree of the pigments nitrosation of the products processed from both breast and thigh muscles cured as hot and after chilling and averaged to 54.41% and 57.38%, respectively, which for the poultry meat should be considered as satisfactory.

The binding of NaCl was slight by significantly /P = 0.05/ worse for the model products manufactured from unchilled thigh muscles in comparison with similar but chilled raw material used which could reveal somehow more pronounced salinity of the ready products when assessed organoleptically though generaly the common salt content was low. No difference was observed between experimental batches processed from breast muscles /chilled and unchilled/ with regard to the strength of natrium chloride binding.

The dominant wavelength / d/ of the colour was longer and the percentage of excitation purity /Pe/ higher for model products manufactured from thigh in relation to those processed from breast muscles. No significant difference /P = 0.05/ was noticed with regard to both colour parameters mentioned above between ready products processed from hot and chilled thigh muscles, while the data related to products manufactured from chilled and unchilled beast muscles regarding the same parameters differed significantly. The difference in luminance of colour /Y/

was found significant /P = 0.05/ independently the obtained ready product was processed from hot and/or chilled breast and thigh muscles. Brighter in colour was of course the model products prepared from breast muscles and in both cases from chilled meat.

The pH of the ready model cured poultry meat products manufactured from hot breast and thigh muscles was by 0.44 pH and 0.33 pH, respectively more alkaline than those processed from chilled muscles, though the observed differences were not statistically significant at P = 0.05. It could be therefore preliminary concluded that higher pH of the products processed from unchilled meat and particularly those manufactured from hot-boned thigh muscles will probably - - - - - - - - negatively influence the keeping ability of the final product. Moreover, the greater alkalinity of the ready model products processed from hot-boned breast and thigh muscles is well correlated with higher level of the residual nitrite content, showing that pH is strongly influencing the process of nitrosation.

CONCLUSIONS

Manufacturing of the comminuted cured poultry meat products from the meat obtained from unchilled carcasses should be strongly recommended considering only much higher production yield when compared with those processed from chilled meat appart from the similarity of the results of other parameters examined which were more or less comparable.

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TABLE 1. EFFECTIVENESS of CURING CHILLED and UNCHILLED POULTRY MEAT

TRAITS	Breast muscles				Thigh muscles			
	chilled		unchilled		chilled		unchilled	
	$\bar{x}$	± U	$\bar{x}$	± U	$\bar{x}$	± U	$\bar{x}$	± U
1. Production yield % /n=16/	134.82	1.56	139.28^{x}	1.51	123.26	3.47	132.19^{x}	3.24
2. Residual nitrite ppm /n=24-28/	84.72	1.22	86.64	2.03	88.58	1.68	91.09^{x}	1.16
3. Nitrosation % /n=28-31/	54.03	1.19	54.80	1.59	58.02	1.19	56.75	0.88
4. Sum of pigments ppm hematine /n=28-31/	23.87	1.27	20.68^{x}	1.49	65.89	3.69	52.20^{x}	2.44
5. NaCl % /n=20-22/	1.91	0.02	1.92	0.02	1.88	0.02	1.96^{x}	0.02
6. Dry matter % /n32-25/	21.53	0.23	21.11^{x}	0.27	21.59	0.45	20.79^{x}	0.57
7. Physical parameters of colour /n=16-24/								
a. dominant wavelength nm / d/	575.65	0.25	576.03^{x}	0.21	582.13	0.44	582.04	0.53
b. excitation purity % /Pe/	20.888	0.460	21.603^{x}	0.393	33.741	0.903	33.553	1.125
c. luminance % /Y/	62.756	0.728	58.635^{x}	1.183	41.110	0.700	38.964^{x}	1.138
8. pH before curing /n=7-8/	5.69	0.078	5.66	0.054	6.36	0.032	6.26	0.114
9. pH after thermal treatment /n=7-8/	5.88	0.052	6.22	0.074	6.29	0.074	6.62	0.105

x/ = statistically significant difference at $P < 0.05$.