STUDIES ON PHYSICAL AND CHEMICAL PROPERTIES OF CHICKEN SURIMI

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SUMMARY : Spent hens were used to prepare the surimi-like material of chicken using fish surimi manufacturing process. The breast and thigh were removed from the spent hens and deboned by deboner. The mechanical deboned meat was washed three times with cooling water. 0.20 to 0.25% of salt solution was used at the last washing to aid removing moisture form surimi. The surimi obtained from the above process was used to determine its chemical composition, total pigments, myoglobin, the Hunter L, a, b values, pH and yield. Emulsifying capacity, emulsion stability, water holing capacity, viscosity and rheological properties were also tested. Meanwhile, effects of salt coneentration, temperature, pH and protein concentration on the gel formation of chicken surimi were studied. The results were as follows:

Extractability of water soluble protein tended to be constant after 3 times washing. It was found that the ratio of meat : washing solution by 1 : 4 was more suitable and economic and washing solution with 0.20 to 0.25% NaCl for last washing could reduce 1 to 2% water from surimi. Surimi obtained had lower fat content and higher in water binding than chicken meat paste. Total pigments of breast and thigh decreased approximately in 55% totally by washing, and myoglobin contents of breast and thigh decreased in 15% and 43%, respectively. L value for breast and thigh muscle all increased, while a-value decreased. Yields of surimi were found 58.3% and 65.7% from the washed breast and thigh muscles, respectively. pH value, emulsifying capacity and emulsion stability, water holding capacity and rheological properties of chicken surimi were better than

those of untreated chicken meat. However, the surimi prepared from breast was better than from thigh.
The optimal conditions for gel formation of chicken surimi were 2.0 to 2.5% for salt concentration, temperature at 60°C to 70°C and pH 6.0 to 6.5. And gel strength increased as protein concentration increased.

INTRODUTION : Surimi is a Japanese term for mechanically deboned fish flesh that has been washed with water and mixed with cryoprotectants for a good frozen shelf life (4). It is widly marketed as fabricated seafoods, a binder and emulsifier (3). The simulated products can be made from mechanically deboned poultry meat (MDPM). Thus, a large amount of spent hens in Taiwan can be ulilized to produce chicken surimi which can be used in processed meat products or new prduct development. The purposes of this study is to seek suitable preparation method and to investigation the characteristics of chicken surimi.

MATERIALS AND METHODS : Chicken surimi was prepared from spent Leghon breed hens. Fresh breast and thigh muscles were run through a Bibun deboner (Model No.13) with a drum having performation 5.0mm in diameter, the minced meat was washed with water by a ratio of 1 : 4 (meat : water w/v). The schematic of chicken surimi production were shown in Fig. 1. Sample of chicken surimi and MDPM were used to measure its chemical composition, color (L. a. b. scale), total pigment concentration, myoglobin content and yield. Then, the changes of pH value, emulsifying capacity, emulsion stability, water-holding capacity, viscosity and rheological properties (Breaking force, folding test) were measured. Further, the changes in gel hardness of chicken surimi under various conditions (salt, temperature, pH and protein concentration) were measured to investigate the factors affecting the heat-induced gelation of chicken surimi.

RESULTS AND DISCUSSION : Table 1 showed that the composition of chicken surimi and MDPM. The moishture contents of chicken surimi increased as pH increased (table 1, 3). The influence of pH on muscle hydration was well documented due to the pH affecting on protein net charges (2). The losses in protein of breast and ash (table 1) were likely due to the removal of water-soluble fraction from the tissues (1, 5). Table 2 showed that effects of washing procedures on the total pigment, myoglobin, color (L. a. b. scale) and yield of chicken surimi and MDPM. Myoglobin content was reduced 15% in breast meat and 43% in thigh meat by washing. Similarly, total pigment concentration also was reduced about 55%. Unwashed thigh meat had the lowest "L" (lightness) and "b" (yellowness) value and the highest "a" (redness) value. The a/b value also reduced 33% for the thigh and 44% for the breast (see table 2). The results indicated that chicken surimi had functional properties better than MDPM, particularly in breast meat (table 3). The optimal conditions for gel-forming ability of chicken surimi were shown in table 4. It also was noted that gel-forming ability of chicken surimi increased as the protein levels increased.

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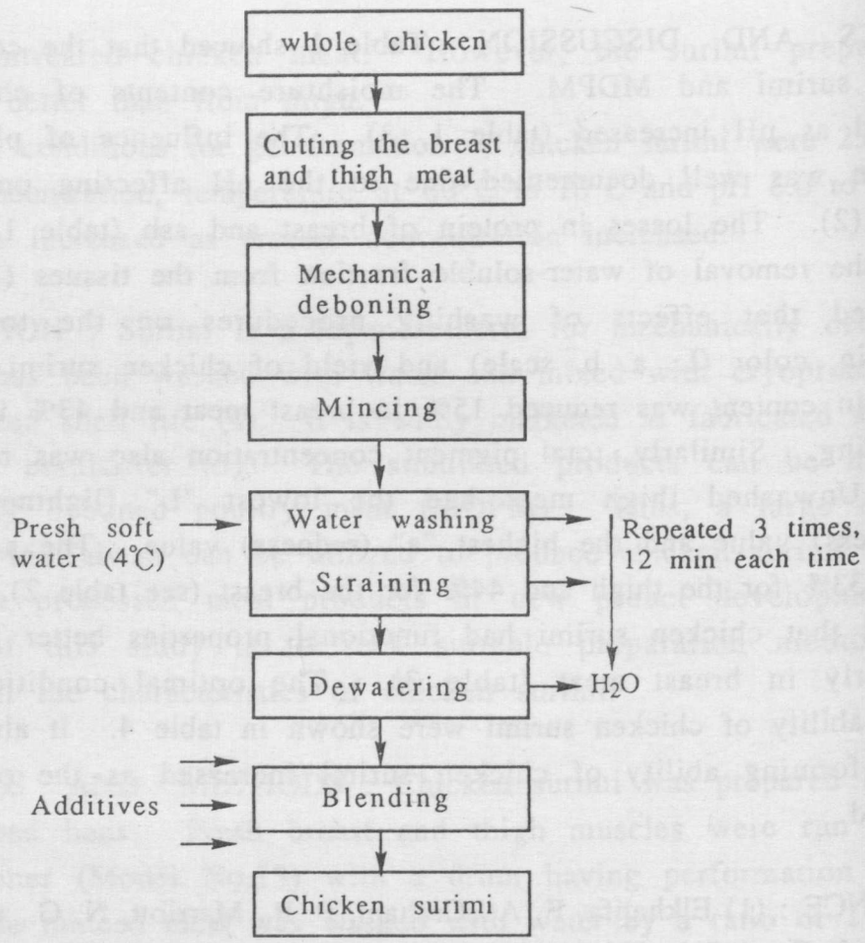

Fig. 1 Schematic of chicken surimi production

Table 1 Chemical composition of chicken surimi and MDPM

Sample / Chemital composition(%)	MDPM		Surimi	
	Breast	Thigh	Breast	Thigh
Moisture	76.82 ± 1.21	76.11 ± 0.95	78.46 ± 0.75	78.86 ± 0.56
Crude protein	20.74 ± 1.12	17.75 ± 0.58	20.29 ± 0.33	18.96 ± 0.38
Crude fat	0.76 ± 0.16	5.26 ± 0.50	0.53 ± 0.18	1.40 ± 0.38
Ash	1.38 ± 0.39	0.83 ± 0.07	0.28 ± 0.08	0.66 ± 0.19

Table 2 Changes of total pigment; myoglobin, color (L. a. b scale) and yield of the chicken surimi and MDPM.

Sample / Item	MDPM		Surimi	
	Breast	Thigh	Breast	Thigh
Total pigment (mg/g wet tissue)	0.59 ± 0.04	1.28 ± 0.12	0.28 ± 0.01	0.52 ± 0.24
Myoglobin (mg/g wet tissue)	0.20 ± 0.08	0.37 ± 0.10	0.17 ± 0.05	0.23 ± 0.04
L	51.88	36.13	61.76	44.60
a	8.49	15.58	4.54	11.52
b	13.78	10.70	13.02	11.78
a/b	0.62	1.46	0.35	0.98
Yield(%)	—	—	58.3 ± 5.1	65.7 ± 4.9

Table 3 functional properties evaluation of chicken surimi and MDPM

Item \ Sample	MDPM		Surimi	
	Breast	Thigh	Breast	Thigh
pH value	6.08	6.75	7.00	7.20
Emulsifying capacity (ml oil/g protein)	371	376	410	380
Emulsion stability(%)	65.4	62.4	84.5	85.6
Water-holding capacity(%)	52.5	46.3	63.1	57.6
Viscosity(C. P)	61.5	57.3	158.0	88.6
Breaking force(X 10^4g)	14.46	9.74	18.5	13.23
Folding test	AA–A	AA–A	AA	AA

Table 4 The best conditions for the heat-induced gelation of chicken surimi

Condition \ Sample	Breast	Thigh
Salt concentration(%)	2.0～2.5	2.5
Temperature(°C)	60～70	70
pH value	6.0～6.5	6.5