

EFFECT ON MEAT QUALITY AND STORAGE CHARACTERISTICS DEPENDING ON PSE STATUS OF BROILERS BREAST MEAT

H.S. Chae*, N.K. Singh, Y.M. Yoo, C.N. Ahn, S.G. Jong, J.S. Ham and D.H. Kim

National Livestock Research Institute Rural Development Administration, 77 Chooksan-gil, Kwonsun-gu, Suwon, 441706, Korea. Email: hs6226@rda.go.kr

Keywords: broilers breast meat, PSE, storage characteristics, meat quality

Introduction

During the recent past, increases in the consumption of parted chicken have been noticed in the Korean consumption trade. Due to the increase in company franchises, a simultaneous increase has also been noticed in the consumption of parted chickens. However, there is growing concern over the PSE status of parted chicken among consumers because of the appearance of chicken parts. Certain advanced countries have been practicing regulations for parted chickens. United States follows USDA, 1998 (3 step system) for the quality grading of poultry parts whereas Japan and UK (MAFF, 1999) follow a 2 step system for the same. Whole chicken has basically 3 large parts i.e. Breast, legs and wings. Consumers who preferred drum sticks previously have recently started to like breast parts because of its low fat percentage. The present study focuses on the PSE status of broiler's breast to investigate the effects of different degrees of PSE on its quality and storage characteristics.

Materials and Methods

Samples were collected from the large scale slaughter house (70,000 birds/day). Thirty five-day raised broiler chickens were considered for the study. Prepared chicken averaging 1251-1350g was selected for the study. Breast was separated and skin was removed. Thereafter, analysis was done on the basis of pH, meat color, storage characteristics (until 3 days). Thiobarbituric acid reactive substances (TBARS), volatile base nitrogen (VBN), shear force, cooking loss and water holding capacity were also measured.

Results and Discussion

Breast PSE examination revealed that PSE meat either slight or serious had a low pH range below 6.0 in 80-100% of the samples compared to normal PSE (Table 1). Similar findings have also been reported for PSE meat (Petraacci *et al.*, 2004). In 70 to 100% of samples either slight or serious PSE was observed to have lightness more than 67 compared to normal. Only 20% of the slight PSE was below 64 whereas none of the sample in serious PSE was either in the range of 64 to 67 or less than 64. (Table 2). Almost 100% of the samples showed the redness range of 3 to 6 (data not shown). Fifty percent of the slight PSE was less than 3, whereas 20% was in the range of 3-6, another 20% was between 6-9 and only 10% was above 9. The average redness for slight PSE was 4.23 ± 4.01 . 73.3% was found to be below 3 and 3.3% was in the range of 3-6. Ten per cent was between 6-9 and 13.3% of samples were observed to be above 9. The average redness calculated for normal PSE was 3.54 ± 3.53 . The average yellowness was 12.68 ± 4.09 (serious), 11.93 ± 3.70 (slight) and 8.39 ± 3.01 (normal). The average yellowness followed an increasing pattern with the increase in the degree of PSE. TBARS values showed increasing trend with the degree of PSE during storage. The values were found to be significantly different ($P < 0.05$) for slight and serious PSE's compared to normal (Table 3). VBN values for slight and serious PSEs were significantly different on day 1 compared to normal (data not shown).

Table 1: Relationship between PSE and pH of meat breast; (Unit: %).

Items	Average pH	pH range		
		< 6.0	6.0 ~ 6.2	> 6.2
Normal	6.10 ± 0.13	23.3	53.3	23.3
PSE(Slight)	5.95 ± 0.06	80.0	20.0	-
PSE(Serious)	5.87 ± 0.12	100	-	-

* Survey numbers: 43 heads.

The cooking loss % during storage showed an increasing trend with increase in the degree of PSE. Slight and serious PSEs were significantly different ($p < 0.05$) compared to the normal. A decreasing trend was also observed in shear force during storage (Table 4). However, there was no significant difference observed. No significant variation was noticed in terms of water holding capacity.

Table 2: Relationship between PSE and lightness (L*) of breast meat; (Unit: %).

Items	Avar. L*	CIE(L*) range			
		< 64	64 ~ 67	>67 ~ 70	>70
Normal	65.04±4.08	36.7	30.0	23.3	10.0
PSE(Slight)	67.93±4.43	20.0	10.0	50.0	20.0
PSE(Serious)	69.29±2.25	-	-	33.3	66.6

Table 3: Relationship between PSE and TBARS of breast meat during storage; (Unit: mg MA/kg).

Items	1day	3day
Normal	0.032±0.006 ^b	0.052±0.007 ^b
PSE(Slight)	0.023±0.002 ^c	0.065±0.006 ^{ab}
PSE(Serious)	0.041±0.004 ^a	0.075±0.011 ^a

^{ab}Means±SE in the same row with different superscripts differ significantly. (p<0.05)

Table 4: Physical characteristics of breast meat during storage.

Items	Cooking loss (%)		Shear force(kg/0.5inch ²)		Water holding capacity (%)	
	1day	3day	1day	3day	1day	3day
Normal	15.54±2.06 ^c	18.60±1.12 ^b	1.73±0.19 ^a	1.66±0.44 ^a	61.17±1.94 ^b	61.44±2.14 ^b
PSE(Slight)	18.19±1.02 ^b	20.31±2.12 ^b	1.68±0.44 ^a	1.35±0.46 ^a	65.18±0.72 ^a	65.14±1.01 ^a
PSE(Serious)	23.49±1.08 ^a	24.04±0.95 ^a	1.38±0.18 ^a	1.21±0.38 ^a	64.42±1.43 ^a	60.26±0.84 ^b

^{abc}Means±SE in the same column with different superscripts differ significantly. (p<0.05).

Conclusion

Increase in the degree of PSE of broiler breast meat during storage causes a fall in pH and shear force and an increase in lightness, cooking loss, TBARS and VBN. Breast meat PSE status confirms the actual pale soft and exudative nature of meat.

References

- Petracci, M.; Bianchi, M.; Cavani, C. (2004). Color Variation and characteristics of broiler breast meat during processing in Italy. *Poultry Science*, 83(12): 2086-92
- UK MAFF (1999). Enforcement guide to EC Poultrymeat marketing standards regulations.
- USDA (1998). United States Classes, Standards and Grades for poultry.