SMOKED PRODUCT FROM DUCK MEAT

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ABSTRACT

Six pork hindlegs, six 3-month old and six 2-year old Pekin ducks (represented as Treatments I, II and III, respectively) were processed into ham and smoked duck meat using the combination injection and dry cure method of curing. Results indicate that the three treatments had essentially similar physical and chemical composition except for pH and ether extract. Treatment III had the highest pH while treatment II had the highest ether extract content. Sensory evaluation made on the products after a seven-day aging period showed significant differences in organoleptic characteristics among the three treatments, except for off-flavor, saltiness, and general acceptability. Color, flavor, tenderness and juiciness scores for smoked duck meat were significantly higher than those for ham. Furthermore, the 3-month-old smoked ducks had the highest scores on most of the organoleptic qualities evaluated including general acceptability. Color and tenderness significantly decreased in smoked duck meats after 3-month storage while the reverse was true in ham. Smoked duck meat and ham had essentially similar sensory qualities except for tenderness regardless of storage. Ham was significantly more tender but had lower thiobarbituric acid (TBA) value. Regardless of species, the processed products stored for one week had significantly higher scores for flavor, tenderness, and general acceptability. However, these processed products were significantly lower in off-flavor, saltiness, and TBA value.

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INTRODUCTION

Red meat is the most popular source of animal protein because of its availability and variety of processed items. Poultry meat may supplement red meat since both have almost similar chemical composition. However, chicken are primarily raised only for their meat, while other poultry including ducks are generally valued for their eggs. As a result, most of the duck meat available in the market come from culled ducks which are either non-laying or unproductive. In spite of the lower price for ducks as compared to chicken, the demand is very low for duck meat because of its gamy flavor. If duck meat could be converted into more acceptable products, i.e., smoked duck meat, its demand may increase.

This study presents results on the chemical and organoleptic characteristics of smoked product from duck meat, the influence of age of birds on the quality of smoked duck meat, and the storage qualities of smoked ducks as compared to ham.

MATERIALS AND METHODS

Twelve female Pekin ducks of two age groups (three months and two years old) were used in the study. Pork hindlegs served as the control. Standard procedures in the slaughter and evisceration of ducks were followed. The dressed and eviscerated ducks were washed thoroughly, chilled for 24 hours at 2-4°C and then stored at -20°C prior to actual processing.

Curing. — The meat (duck or pork) was prepared following the standard method prior to curing. Combination injection and dry cure method with prague powder was used. Six replications were made for each treatment.

The amount of water for pump pickle was computed based on 10% of the fresh trimmed weight of the meat. The pump pickle mixture was composed of 0.155 g coarse salt, 0.036 g sugar and 0.033 g prague powder per cc of water. The mixture was dissolved thoroughly and its salinity tested and adjusted to 70° salinometer reading for ham and 55° for smoked duck.

The amount of dry mixture was computed based on the application rate of 40 g mixture per kg of meat consisting of 70% salt, 15% sugar and 15% prague powder. The meat was rubbed with the dry mixture, wrapped in a plastic bag, and cured at a temperature of 2-4°C for 7 days and 3 days for pork and smoked ducks, respectively. The meat was turned daily to insure equal penetration of the curing mixture.

Smoking. — The cured ham and duck were smoked in a thermostatically controlled smokehouse at a temperature maintained at 52°C for 19 and 8 hr, respectively. Both meats were allowed to age for one week in a 2-4°C chiller.

Sensory Evaluation. — After one week of aging, the cured smoked

duck meat was cut into two at the center, while the ham was divided into shank and butt portions. These were boiled individually for 2 hr in a mixture of water, pineapple juice, and brown sugar (4:2:1). Ten g of cracked black pepper, 30 g monosodium glutamate, and 2-3 bay leaves were added for every kg of meat cooked. The butt portion of the ham and the breast muscle of the duck were then panfried separately for 2 min and cut into approximately 2.5 cm^2 pieces.

Three samples, one from each treatment, were served to each of the seven taste panelists who participated in evaluating the products based on appearance, flavor, saltiness, tenderness, juiciness and general acceptability using a 9-point hedonic scale system. Replications were made at weekly intervals for six weeks.

Physical and Proximate Analyses. — The semitendenosus muscle was excised from the ham and one leg was removed from the cured duck. Analyses of salt content, pH, moisture, ether extract, ash, and protein were done.

Storage Study. — The cured and smoked ham shank and 3-month old smoked Pekin ducks were stored in a 2-4°C chiller. Sensory evaluation and rancidity development were done simultaneously after one- and 12-week storage. The modified procedure for extraction used by Vernon *et al.* (1970) was followed.

RESULTS AND DISCUSSION

Physical and Chemical Analyses.

Meats from either duck or pork had essentially similar salt, moisture, protein, and ash contents (Table 1). However, significant differences were obtained for pH and ether extract contents. Two-year-old ducks had significantly the highes pH and % salt, but the lowest moisture content. The result suggests that the more concentrated the mixture, the more salty the sample and the lower the moisture content. The rate of absorption, therefore, was similar for the three meats regardless of species and age.

Sensory Evaluation.

Color. — Ham had significantly lower color score, while three-month-old and two-year-old smoked duck had essentially similar color scores (Table 2). Nocito, *et al.* (1973) contended, however, that meat color as seen by the human eye may be influenced by other parameters.

Flavor. — Three-month-old ducks were rated the most flavorful while ham was the least flavorful. The amount of fat present influenced the flavor assessment of the products. As shown in Table 1, three-month-old ducks had the highest ether extract content while ham had the lowest value.

Table 1. Physical and chemical characteristics of smoked meat of ham and duck.[1]

Sensory Properties	Smoked Meat		
	Ham	Duck	
		3 mo	2 yr
pH	6.34a	6.45ab	6.56b
Salt content, %	3.82	3.27	3.96
Moisture, %	69.27	69.24	68.16
Ether extract, %	2.63a	5.34b	3.96ab
Crude protein, %	21.10	19.78	20.02
Ash, %	4.43	4.06	5.14

[1] Means in the same row followed by the same letters are not significant at 5% level based on Duncan's Multiple Range Test.

Table 2. Mean taste panel scores of smoked meat of ham and duck.[1]

Sensory Properties	Smoked Meat		
	Ham	Duck	
		3 mo	2 yr
Color	6.40a	7.50 b	7.45b
Flavor	6.48a	7.19b	6.65a
Off-flavor	1.26	1.51	1.62
Saltiness	4.76	4.62	5.02
Tenderness	6.90b	7.33c	6.40a
Juiciness	5.64a	6.52b	6.38b
General acceptability	6.86	7.19	6.98

[1]Means in the same row followed by the same letters are not significant at 5% level based on Duncan's Multiple Range Test.

Off-flavor. — There was no significant difference in saltiness perceptible off-flavor from any meat among the treatments. However, used. The two-year-old ducks, how- the older duck meat had the highest ever, had the most perceptible off- score of 5.02 while the younger duck flavor having the highest score meat had the lowest, 4.62. This (1.62) but this was not significantly result agrees with that obtained in different from the other two meats. the determination of salt content.

Saltiness. — There was no *Tenderness.* — Tenderness was

Table 3. Treatment and storage interaction on mean score for sensory properties of pork and duck meat.[1]

Sensory Properties	Pork		Duck	
	1 wk	12 wk	1 wk	12 wk
Color	6.46a	7.00ab	7.46b	6.37a
Flavor	6.68	6.40	7.06	6.03
Off-flavor	1.13	1.88	1.53	2.00
Saltiness	4.74	5.71	4.66	5.64
Tenderness	7.11b	7.26b	6.66b	4.70a
Juiciness	5.74	6.26	6.66	5.88
General acceptability	6.88	6.63	6.97	6.03
Optical density [2]	0.1249	0.2680	0.1691	0.3300

[1] Means in the same row followed by the same letters are not significant at 5% level based on Duncan's Multiple Range Test.
[2] Absorbance value of thiobarbituric acid (TBA).

Table 4. Mean scores of sensory properties and optical density as affected by kind of meat and length of storage.

Sensory Properties	Meat		Storage	
	Pork	Duck	1 wk	12 wk
Color	6.73	6.91	6.96	6.69
Flavor	6.54	6.54	6.87**	6.21
Off-flavor	1.51	1.77	1.33	1.94**
Saltiness	5.23	5.15	4.70	5.68**
Tenderness	7.19**	5.68	6.89**	5.98
Juiciness	6.00	6.27	6.20	6.07
General acceptability	6.76	6.50	6.93**	6.33
Optical density [1]	0.1964	0.2486*	0.1470	0.2990**

** Highly significant
* Significant
[1] Absorbance value of thiobarbituric acid (TBA).

the only parameter in which the taste panel scores differed significantly. Three-month-old duck meat was rated the most tender and the two-year-old the least tender.

Juiciness. — Smoked ducks differed significantly from ham in terms of juiciness. This could be expected since duck meat had higher ether extract (fat content)

than ham (Table 1). Fat content and juiciness of a product have a direct relationship. The higher the fat content of the meat, the more juicy it is. Weir (1960) noted that the sustained juiciness of cooked meat is caused by the slow release of animal fluid. The effect of fat on the salivary flow leaves a more lasting impression than the initial release of the fluid.

General Acceptability. — Although there was no significant difference among the meats, three-month-old duck meat came nearest to "like very much" category in the 9-point hedonic scale. Other sensory properties might have influenced the general acceptability assessment. This shows that young duck meat can be as acceptable as pork when cured and smoked.

Storage Study.

Except for changes in color and tenderness, there was no significant change noted in the sensory qualities evaluated for both ham and smoked ducks after three months of storage in a chiller (Table 3).

Color and tenderness significantly decreased in smoked duck meat after a three-month storage, while the reverse was true in ham. Regardless of storage, smoked duck meat and ham had essentially similar sensory qualities except for tenderness (Table 4). Ham was significantly more tender but had lower TBA value. Regardless of species, the processed products stored for one week had significantly higher scores for flavor, tenderness, and general acceptability but had significantly lower scores for off-flavor, saltiness, and TBA value.

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