Effect of Different Drying Methods on Quality Properties of Laying Hen Semi-Dried Jerky

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Abstract –Four groups of semi-dried jerky were tested as followed: T1 (laying hen breast), T2 (laying hen leg), T3 (cooked laying hen breast) and T4 (cooked laying hen leg). The moisture content of the T2 was higher than those of the other treatments (*P*<0.05). The semi-dried jerky processed with laying hen leg showed higher fat contents compared to jerky prepared with laying hen breast (*P*<0.05). The protein content was significantly higher in the T3 than the other treatments (*P*<0.05). The pH of the laying hen leg jerky was higher than laying hen breast jerky. The lightness, redness, and yellowness of the cooked after drying jerky (T3, T4) was significantly higher (*P*<0.05). The water activity of semi-dried jerky was within the range of 0.88–0.91. The shear force value of the cooked after drying jerky was significantly higher (*P*<0.05). The semi-dried pork jerky that was prepared with T4 had the highest overall acceptability score (*P*<0.05).

Key Words – restructured meat, laying hen, jerky, drying methods

I. INTRODUCTION

Restructured meat products are made from minced and/or chopped muscles which are used to produce products with a consistent appearance and texture. There are various methods used to improve the quality of restructured meat products. Important factors include the raw material [1], processing conditions [2], and additives [3].

Jerky is one of the oldest meat products that is preserved by salting and drying. It is relatively simple to process, has a typical flavor, and needs no refrigeration during commercial distribution due to its low water activity (a_w) [4]. Jerky has traditionally been made from sliced whole muscle of large animal which have been marinated and dried. But [5] processed restructured pork jerky with added meat emulsion to improve the binding ability. Restructured jerky can be made with muscles of poorer quality and trimmings including meats of small size relative to sliced jerky, manufacturers are saving production expenses, making possible the mass production of standardized products due to control of the product size and shape.

The aim of this study was to investigate the effect of different drying methods on the quality properties of laying hen semi-dried jerky.

II. MATERIALS AND METHODS

Spent laying hen breast and leg were obtained from a commercial slaughter house. The manufacturing process of semi-dried jerky is shown in Fig. 1. The composition (w/w) of jerky

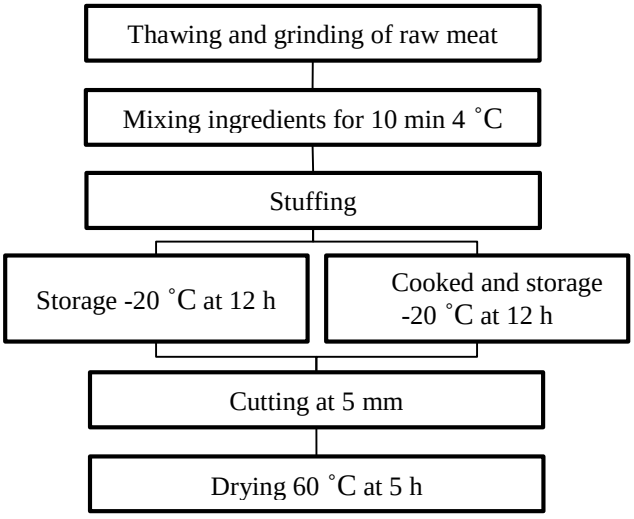

Fig. 1. The diagram of semi-dried jerky manufacturing.

curing solution was water (4%), anchovy sauce (5%), sugar (3%), starch syrup (2.5%), hot pepper (0.2%), black pepper (0.2%) were incorporated into the raw meat. The ground meat (Ø 8 mm plate) were cured by tumbling with curing solution, and stuffed into cellulose casing (Ø 50 mm). Each preparation was cut to 15 cm-lengths. T3 and T4 were cooked 90 ˚C at 30 min. All semi-dried jerky dried for 300 min at 60 ˚C in a hot air drier (DS80-1, Dasol Scientific Co. Ltd, Korea).

Compositional properties of the semi-dried jerky were performed using AOAC [6]. The pH was measured in triplicate using a digital pH meter (MP230, Mettler-Toledo, Greifensee, Switzerland). The water activity of each sample was determined in duplicate with a hygrometer (AQS-2, Nagy mess system, Germany). The surface Color [CIE L* (lightness), a* (redness), b* (yellowness)] was measured using a Minolta colorimeter (CR-300, Tokyo, Japan), with measurements standardized with respect to the white calibration plate. Shear force (kg/cm^2) was measured using the Instron Universal Testing Machine (Model 3343, Instron, Norwood, MA, USA). The beef jerky samples were placed at right angles to the blade. The crosshead speed was 100 mm/min and the full scale load was 20kg.

The statistical analysis was performed by SAS program [7]. The data were subjected to analysis of variance (ANOVA) and Duncan's test to compare the sample means. The significance level was $P>0.05$.

III. RESULTS AND DISCUSSION

Table 1 shows the proximate analysis of semi-dried laying hen jerky. The differences in the moisture, fat, and protein contents of the semi-dried jerky formulations were statistically significant ($P<0.05$). The moisture content of the T2 was higher than those of the other treatments ($P<0.05$). Water content has a decisive effect on the stability of intermediate-moisture (IM) foods [8]. In general, commercial IM-foods have moisture contents of 20–40% [9] and the semi-dried products prepared for this study ranged from 34 to 37%. The semi-dried jerky processed with laying hen leg showed higher fat contents compared to jerky prepared with laying hen breast ($P<0.05$). The protein content was significantly higher in the T3 than the other treatments ($P<0.05$). The pH, color, water activity and shear force of semi-dried jerky with difference drying methods are shown in table 2. The pH values of jerky generally ranged from 5.87 to 6.50. The pH of the laying hen leg jerky was higher than laying hen breast jerky. Jose et al. [9] reported that the average pH for IM-meat products was in the broad range of 4.72–6.73. The lightness, redness, and yellowness of the cooked after drying jerky (T3, T4) was significantly higher ($P<0.05$). The lightness and yellowness jerky prepared with laying hen breast was significantly higher than that of jerky made with laying hen leg ($P<0.05$). The water activity of semi-dried jerky was within the range of 0.88–0.91. Water activity is useful to describe the thermodynamic equilibrium state of jerky [10], and foods such as jerky must have a stable water activity to avoid changes in quality during storage. The shear force value of the cooked after drying jerky was significantly higher ($P<0.05$).

The sensory properties of semi-dried jerky prepared with laying hen breast or leg and difference drying methods are shown in Table 3. The semi-dried pork jerky that was prepared with laying hen leg (T2, T4) scored significantly higher in color than with laying hen breast ($P<0.05$), although there was no significant difference in their flavor, juiciness, and texture ($P>0.05$). The semi-dried pork jerky that was prepared with T4 had the highest overall acceptability score

Table 1. Chemical composition of semi-dried jerky

	Treatments[1)]			
	T1	T2	T3	T4
Moisture (%)	44.50±0.22^{B}	47.06±0.67^{A}	38.30±0.41^{C}	44.54±0.17^{B}
Fat (%)	1.65±0.10^{B}	4.34±0.21^{A}	1.79±0.15^{B}	4.16±0.09^{A}
Protein (%)	45.95±0.40^{B}	38.35±1.40^{D}	47.90±1.72^{A}	40.35±0.51^{C}
Ash (%)	4.23±0.21	4.23±0.67	4.73±0.17	4.57±0.23

$^{A, B}$ Means with different superscript in the same row significantly differ at $P<0.05$.

[1)] T1, semi-dried laying hens breast jerky; T2, cooked after semi-dried laying hens leg jerky; T3, semi-dried laying hens breast jerky; T4, cooked after semi-dried laying hens leg jerky

Table 2. Comparison of physicochemical properties, color and shear force of semi-dried jerky

	Treatments[1)]			
	T1	T2	T3	T4
pH	5.87±0.02^{D}	6.19±0.01^{B}	6.00±0.01^{C}	6.50±0.02^{A}
L*	37.34±0.49^{B}	28.31±1.08^{D}	40.51±0.86^{A}	35.48±1.49^{C}
a*	10.50±1.03^{B}	8.14±1.11^{C}	10.48±0.37^{B}	13.27±0.91^{A}
b*	10.72±0.47^{B}	7.94±0.38^{C}	14.92±1.54^{A}	10.91±1.52^{B}
Water activity	0.90±0.00^{B}	0.91±0.00^{A}	0.88±0.00^{C}	0.91±0.00^{A}
Shear force (kg/cm^2)	0.90±0.00^{B}	0.91±0.00^{A}	0.88±0.00^{C}	0.91±0.00^{A}

$^{A, B}$ Means with different superscript in the same row significantly differ at $P<0.05$.

[1)] Treatments are the same as in Table 1.

Table 3. Sensorial properties of semi-dried jerky

	Treatments[1)]			
	T1	T2	T3	T4
Color	3.17±0.75^{B}	6.67±0.82^{A}	3.33±0.52^{B}	6.67±1.03^{A}
Flavor	6.17±1.17	5.67±1.86	5.17±1.47	5.33±1.21
Juiciness	4.67±1.86	4.17±1.60	3.33±1.75	5.00±0.63
Texture	5.00±1.79	4.33±0.82	4.33±2.50	5.67±1.37
Overall acceptability	4.17±1.17^{B}	4.17±0.75^{B}	3.83±1.72^{B}	5.67±1.03^{A}

$^{A, B}$ Means with different superscript in the same row significantly differ at $P<0.05$.

[1)] Treatments are the same as in Table 1.

($P<0.05$).

IV. CONCLUSION

In conclusion, the results of the present study indicated that the properties of semi-dried jerky are influenced by the cooked or raw drying. That is, when the semi-dried jerky was processed with leg and with cooked after drying, we obtained a jerky of good quality that improved the texture and sensorial properties.

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