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Technology on Biosciences and Social

“Industry based on Knowledges”

17th-19th November 2016, Convention Hall, Andalas University

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Animal Science Faculty of Andalas University
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17th – 19th November 2016, Convention Hall, Andalas
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Organized by:

Animal Science Faculty of Andalas University
and
Alumbi Center of Universiti Putra Malaysia

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Physical and Chemical Characteristic of Chicken Meat from Kampung x Meat Type Crossbred Chicken

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Abstract

The improvement of genetic quality of Kampung chicken as meat type production could be conducted through crossbreeding with broiler. Quality of meat is one of the parameters for the consumer to choose meat. The aim of this study was to investigate physical and chemical characteristics of the kampung x meat type crossbred chicken. A total of 30 chickens 12 weeks aged were divided into five groups including: meat type chicken, Kampung chicken, F2 Kampung-meat type crossbred chicken faster growing, F2 Kampung-meat type crossbred chicken medium growing, F2 Kampung-meat type crossbred chicken slower growing. Chicken rearing in five groups was uniform. Samples used were meat from breast (*Pectoralis superficialis*) muscle without skin. Each group contained 3 heads of rooster and 3 heads of hen. Physical characteristics of meat were focused on pH, cooking loss, tenderness and water holding capacity. While the chemicals were water, fat and protein content. The data were analyzed using GLM (General Linear Model) to observe the effect of different groups associated with physical and chemical characteristics. The results showed that cooking loss, water holding capacity affected significantly ($P < 0.05$) in chicken groups, except tenderness and pH. In case of chemical characteristics the protein content was found significantly higher in meat type. The present study demonstrated the differences in physical and chemical characteristics of meat existing between kampung x broiler crossbred chicken.

Keywords: meat quality, physical, chemical, crossbred chicken

1. Introduction

In Indonesia, the consumption of animal protein origin dominated by the meat type chicken. The average of meat type production in 2007 until 2015 to around 1.254.848 tons per year, while the production of kampung chicken is 283.471 tons per year, or about 18% [1]. Kampung chicken have been raised by most of the rural population of Indonesia and they represent an important source of meat. Kampung chickens are not able to provide consumption on a daily basis because kampung chickens have low production. In addition, the local chicken nations also

contribute to the conservation of poultry genetic resources [2].

Contrast with the conditions, the broiler breeding industry in Indonesia was growing rapidly. However, it is still highly dependent on the supply of seeds and feed raw materials from abroad, are less able to keep people's food sovereignty Indonesia [3]. Dependence on imported raw materials can be pressed with local resources, one of which is the Kampung chicken. Production performance and quality of Kampung chicken meat can be increased by carried crosses with commercial broiler.

Quality of meat is one of the parameters for the consumer to choose meat. According [4] the chemical composition has a close relationship with physical meat quality of the meat. It was argued further that the variation of the largest meat component is the amount of fat. Fat in meat has been recognized as the physical component of meat quality so much determined by fat content. In addition, the protein in meat tissue arrangement has a very large role to change meat characteristics value.

The aim of this study was to investigate physical and chemical characteristics of the kampung x broiler crossbred chicken. A total of 30 chickens 12 weeks aged were divided into five groups including meat type chicken, Kampung chicken, F2 Kampung-meat type crossbred chicken faster growing, F2 Kampung-meat type crossbred chicken medium growing, F2 Kampung-meat type crossbred chicken slower growing.

2. Material and Methods

2.1. Material

A total of 30 chickens 12 weeks aged were divided into five groups including meat type chicken, Kampung chicken, F2 Kampung-meat type crossbred chicken faster growing, F2 Kampung-meat type crossbred chicken medium growing, F2 Kampung-meat type crossbred chicken slower growing. Chicken rearing in five groups was uniform. Samples used were meat from breast (*Pectoralis superficialis*) muscle without skin. Each group contained 3 heads of rooster and 3 heads of hen chickens. Physical characteristics of meat were focused on pH, cooking loss, tenderness and water holding capacity. While the chemicals were measured on water, fat and protein content.

2.2. Physical Analysis

Physical analysis was done at the Laboratory of the Faculty of Ruminant

Animal Husbandry, Bogor Agricultural University. Analysis of the physical quality of chicken used meat from breast (*Pectoralis superficialis*).

Physical characteristics of meat were focused on pH, cooking loss, tenderness and water holding capacity. Meat pH, measurement of pH value were followed [5] method by inserting a pH meter that has been calibrated into the meat, and then wait until the value showed on pH meter screen.

Tenderness, The degree of meat tenderness was indicated by the amount of force (kg/cm²) that required to cut the meat and indicated by the pointer tool Warner Bratzler device meat cutter which moves on a scale with the measurement sensitivity of 0.1 kg/cm² [6].

Water Holding Capacity was ability of protein to hold the water in the meat. Value was measured by using planimeter with finding out the amount of water (mg) [7].

2.3. Chemical Analysis

Water, fat and protein content in 5 groups of chicken was analysed according to the method described by AOAC [8] All content was expressed as percentage.

3. Result and Discussion

Physical analysis was conducted to determine quality of chicken carcass. Analysis were conducted on four parameters such as pH, cooking loss, tenderness and water holding capacity. The results of physical analysis of chicken meat in 5 groups could be observed in Table 1 and Table 2. *pH value and tenderness*, The results of physical analysis showed that the mean pH value and tenderness did not significant among the five groups of chickens. But the result showed that the pH value in five groups still in normal like the pH of other livestock.

Table 1. Physical Characteristic of male chicken

Chicken type	pH	Cooking Loss (%)	Tenderness (Kgcm ⁻²)	Water holding Capacity (%)
Meat-Type	5.51±0.06	36.41±3.44 ^a	2.35±0.31	28.32±1.51 ^c
Kampong chicken	5.52±0.09	29.62±4.00 ^b	2.11±0.28	31.46±1.05 ^a
Kampong- meat type crossbreed faster growing	5.40±0.1	37.26±2.34 ^a	2.41±0.65	29.11±0.45 ^{bc}
Kampong- meat type crossbreed medium growing	5.44±0.03	35.26±3.54 ^{ab}	2.36±0.09	30.74±0.96 ^{ab}
Kampong- meat type crossbreed slower growing	5.45±0.09	32.05±2.43 ^{ab}	2.03±0.20	29.91±0.57 ^{abc}

Note: Different superscripts in the same column mean significant different (p<0.05).

Table 2. Physical Characteristic of female chicken

Chicken type	pH	Cooking Loss (%)	Tenderness (Kgcm ⁻²)	Water holding Capacity (%)
Meat-Type	5.48±0.19	36.29±3.00	2.29±1.19	30.82±2.38
Kampong chicken	5.37±0.36	31.77±1.80	2.14±0.48	30.67±1.20
Kampong- meat type crossbreed faster growing	5.35±0.06	33.90±0.35	2.50±0.20	30.58±0.11
Kampong- meat type crossbreed medium growing	5.46±0.03	31.02±5.78	2.44±0.24	29.62±0.59
Kampong- meat type crossbreed slower growing	5.39±0.12	35.50±0.54	2.49±0.42	30.18±1.93

Note: Different superscripts in the same column mean significant different (p<0.05)

The mean pH value highest in Kampung chicken meat (5.52±0.09) and the mean pH value was lowest for the meat Kampong-crossbreed type of fast growth (5.40±0.11). Janisch et al. [9] reported a pH value in broiler chicken breast with three different strains ranged from 5.91 to 5.93. Chicken meat the village has a pH value of 5.10 to 5.40 [10]. This difference allegedly as a result of crossbreeding and genetic differences in chicken and broiler. Stress before cutting, species, individual animals and the type of muscle, which affect glycolysis are factors that can produce variations in pH meat.

Cooking Loss, the results physical analysis showed that the mean cooking loss value of meat rooster has been significant among the five groups of chickens, where the mean

cooking loss value highest in Kampung- meat type crossbreed fast growth (37.26±2.34) and the mean cooking loss value was lowest for the meat Kampong chicken (29.62±4.00). while the mean cooking loss values in the hens did not occur significantly from the chickens to the five groups. According Dilaga and Soeparno[11] a good quality meat has shrunk cook low due to loss of nutrients during cooking would be less. Reduction cooking shrinkage in food after boiling caused by reduced or loss of water content in food due to heating. The greater the heat given and the longer the heating will result in reduced water content in foodstuffs in large quantities. The use of heat in the cooking process is very influential on the nutritional value of foodstuffs [12].

Table 3. Chemical Characteristic of male chicken in five groups

Chicken type	Water (%)	Fat (%)	Protein (%)
Meat-Type	72.33±0.84 ^{ab}	0.21±0.08	25.26±0.42 ^a
Kampong chicken	71.87±0.49 ^{ab}	0.14±0.03	23.81±1.23 ^{ab}
Kampong- meat type crossbreed faster growing	71.28±0.82 ^b	0.19±0.09	24.08±0.75 ^{ab}
Kampong- meat type crossbreed medium growing	72.35±0.87 ^{ab}	0.24±0.22	22.13±1.48 ^b
Kampong- meat type crossbreed slower growing	73.38±1.40 ^a	0.27±0.04	22.89±0.95 ^b

Table 4. Chemical Characteristic of female chicken in five groups

Chicken type	Water (%)	Fat (%)	Protein (%)
Meat-Type	72.06±0.80	0.15±0.05	25.93±0.72 ^a
Kampong chicken	71.77±0.57	0.37±0.185	22.99±0.546 ^{bc}
Kampong- meat type crossbreed faster growing	71.56±0.64	0.35±0.307	24.12±1.04 ^b
Kampong- meat type crossbreed medium growing	71.70±1.52	0.22±0.187	23.57±0.40 ^{bc}
Kampong- meat type crossbreed slower growing	72.08±1.02	0.46±0.118	22.37±0.93 ^c

Water holding Capacity, the results physical analysis showed that the mean Water holding Capacity value of meat rooster has been significant among the five groups of chickens, where the mean Water holding Capacity value highest in meat Kampong chicken (31.46±1.05) and the mean Water holding Capacity value was lowest for the Meat-Type chickens (28.32±1.51). while the mean Water holding Capacity values in the hens did not occur significantly from the chickens to the five groups. Water holding capacity is the ability of meat proteins bind or hold the water content of the application as a response to external forces such as cutting, the cooking, and grinding the meat [13]. The mean protein value of meat roosters and hens meat quality can be determined by the size of the water holding capacity, both technical and economical, both for industry or consumers highest rooster contained in Meat-Type chickens directly as one important component in the

storage of meat. High value of water holding capacity was mean that the cooking loss was not too high. Value HWC have negative correlated with the amount of free water that comes out.

Water and fat content, the results chemical analysis showed that the mean fat value of meat roosters and hens did not occur significantly among the five groups of chickens. The mean water value highest in Kampong- meat type crossbreed low growth (73.38±1.40) and the mean water value was lowest for the Kampong- meat type crossbreed fast growth (71.28±0.82).

The results chemical analysis showed that the mean protein value of meat roosters and hens has been significant among the five groups of chickens, where the mean protein value of the highest rooster contained in Meat-Type chickens (25.26±0.42) and the mean protein value was

lowest for the Kampong- meat type crossbreed medium growth (22.13 ± 1.48). while the hens mean value of the highest protein contained in Meat-Type chickens (25.93 ± 0.72) and the mean protein value was lowest for the Kampong- meat type crossbreed medium growth (22.37 ± 0.93).

Conclusion

The conclusion of this research that cooking loss, water holding capacity affected significantly ($P < 0.05$) in chicken groups, except the tenderness and pH. In case of chemical characteristic the protein content were found significantly higher in meat type.

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