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The Effect of Commercial Feeding with Different Brands on Physical Quality Kampung Unggul Balitbangtan (KUB) Chicken Meat

Gayuh Syaikhullah[1*], Himmatul Khasanah[2], Nur Muhamad[3], Aan Awaludin[4], Satria Budi Kusuma[4]

[1]Department of Animal Science, Poultry Business Management Study Program
[2]Animal Science Study Program, Agriculture Faculty, Universitas Jember, St. Diponegoro, Bondowoso, East Java 68251
[3]Department of Animal Science, Livestock Feed Technology Study Program
[4]Department of Animal Science, Livestock Production Study Program
Politeknik Negeri Jember. Mastrip PO.Box 164. 68101. Jember. East Java. Indonesia
*Corresponding Author: gayuh_syaikhullah@polije.ac.id
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ABSTRACT

The purpose of this study is to ascertain how giving commercial feed of various brands affects the physical quality of meat obtained from Kampung Unggul Balitbangtan (KUB) chickens on pH values, cooking losses and water holding capacity. The Completely Randomized Design (RAL) and Analysis of Variance (ANOVA) techniques were used in this study. The Duncan Multiple Range Test (DMRT) was used to see if there were any notable changes. This research used 160 Day Old Chicks (DOC) with 4 commercial feed treatments with different brands, namely P1 (WK Feed). P2 (CPH Feed), P3 (PAT Feed) and P4 (CFD Feed) with the level of protein contains in each brand. The results of this study show that giving commercial feed with different brands can have a significant effect (P<0.05) on water holding capacity but has no effect on pH and cooking loss. CFD commercial feed can improve the quality of meat resulting from crossing selected local female chickens with selected local males which can increase water holding capacity.

Keywords: KUB chickens, meat, physical quality, commercial feed

INTRODUCTION

Free-range chicken is one of Indonesia's germplasms that has great potential to be developed (Makmur *et al*., 2018). Chicken is a popular source of animal protein among the public and plays a role in increasing national food security. The low productivity of free-range chickens is inversely proportional to the demand for free-range chicken meat consumption in society (Syaikhullah *et al*., 2017). According to Sariati *et al*. (2016), the productivity of local chickens is still relatively low compared to purebred chickens, due to hereditary adaptation to poor rearing environmental conditions and the quality of local chickens that are raised traditionally. Improving genetic quality needs to be done to increase the productivity of local chickens. One way that is implemented is by crossing selected local female chickens with selected local male chickens (Syaikhullah *et al*., 2023). In raising selected local hens with selected local roosters, feed plays an important role in improving meat quality.

Indonesia has at least 34 kinds of native chicken with different morphological characteristics. Native chicken is a potential resource as a provider of animal protein demand, approximately 12.33% of the total national consumption of chicken was contributed with native chickens. KUB (Kampung Unggul Balitbangtan) chicken is an improved Indonesia native chicken breed by the Indonesian Research Institute for Animal Production (IRIAP). KUB chicken has the potential genetic to produce meat and egg with a savory taste, delicious and in demand by the public. The KUB-1, the first generation of KUB produces eggs up to 50% hen day production (HDP) or about 180 eggs/hen/year (Ningsih *et al*., 2022).

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Feed quality influences feed consumption and can influence the characteristics of the meat produced. Local chicken farmers need appropriate and efficient feed in the process of raising local chickens, whose maintenance period is relatively longer than purebred chickens (Prasetyo *et al*., 2022). Providing rations with high protein content is an effort to increase livestock production. Increasing protein content can accelerate growth and body and carcass composition. The right protein and energy content can improve meat quality, because it can form new cell tissue which plays a role in the process of binding water in meat muscles which can cause high water holding capacity and low cooking losses so that meat quality is good. (Komariah, 2009) states that meat with low cooking loss has relatively better quality than meat with a high percentage of cooking loss, because there is less loss of nutrients during the cooking process.

Each feed company has different ration formulations and sources of feed ingredients which are company secrets, so there are differences in growth responses in chickens. Commercial feed with different brands is expected to improve the physical quality of meat resulting from crossing selected local female chickens with selected local male chickens.

MATERIALS AND METHOD

Research Materials

The material used for this research is DOC (Day Old Chick) of KUB chicken, WK commercial feed, CPH commercial feed, PAT commercial feed, and CFD commercial feed. The tools used in this maintenance are cages, thermometers, scales, feed containers, drinkers and writing utensils. The tools used in physical testing of chickens are a pH meter, pH 7 buffer solution, knife, filter paper, plastic clips, digital scales, oven, distilled water and gas stove.

Experimental Design

This research used a Completely Randomized Design (CRD) consisting of 4 treatments and 5 replications. Each replication contains 8 chickens, so the number of chickens needed is 160 chickens. The treatments tried were:

P1 : WK Commercial Feed
P2 : CPH Commercial Feed
P3 : PAT Commercial Feed
P4 : CFD Commercial Feed

Research Procedure

Maintenance Stage

The initial stage of maintenance includes cage preparation by cleaning the cage, making the cage, and sanitation by spraying the inside and outside areas of the cage. The cages used in this research used bamboo cages, with 20 partitions per plot measuring 100 cm, 80 cm wide and 7 cm high. The cage is made of bamboo and the partition is made of mesh with a bottom made of husks. During the brooding period, 20pcs 5-watt incandescent lamps were used. Each cage plot is occupied by 8 chickens and is equipped with chaff bedding. Treatment is given through feed starting from the 1st week until the end of maintenance, namely the 8th week. Drinking water is provided ad libitum.

Sampling

Chicken samples were taken randomly, 1 chicken was taken from each treatment and weighed before being slaughtered. The chicken is slaughtered according to halal procedures, then the carcass is cleaned. Meat samples were taken from the chest as much as 100 g.

Research Parameters

The parameters measured in this research are pH, water holding capacity, and cooking loss. Here is how to get results based on observed parameters:

Meat pH

The pH value was measured using a pH meter that had been calibrated using buffer solutions 4 and 7, as well as the electrode was rinsed with distilled water and dried. A meat sample weighing 25g was ground and mixed with 50 ml of distilled water, then shaken until homogeneous. The electrode is dipped into the

Table 1. Nutrient Content of Feed

Nutrients	Nutrient Content of Feed for Each Treatment			
	P1	P2	P3	P4
Crude protein (%)	15-16	15-17	17	16-17
Crude Fat (%)	4	3	5	5
Crude Fiber (%)	8	8	5	5
Ash (%)	22	8	8	7
Metabolic Energy (kcal/kg)	2.750	3.125	2.900	3.100

Source: PT. WK, PT. CPH, PT. PAT and PT. CFD

sample and the pH value can be read on the indicated scale.

Water Holding Capacity

Meat with low water holding capacity will lose a lot of fluid, resulting in weight loss. The smaller the value of the water holding capacity, the greater the cooking loss of the meat, so the quality of the meat is lower because many components are degraded.

Measurement of water holding capacity is calculated using the formula:

$$\text{Water Holding Capacity} = \text{\% water content} - \frac{\text{mg}H_2O}{300} \times 100\%$$

Cooking Loss

The Cooking Loss Test is carried out by weighing a meat sample, then placing it in a polythene plastic bag and closing it tightly so that when boiling water cannot enter the plastic bag, then the sample is boiled in a water bath at a temperature of 80ºC for one hour. After boiling, the meat sample is cooled by placing it in a glass containing cold water at a temperature of 10ºC for 15 minutes, then the sample is removed from the bag and dried with tissue paper, and weighed again (Suryani *et al*., 2022). Cooking loss (SM) is calculated using the formula:

$$\text{Cooking loss (\%)} = \frac{\text{Weight loss}}{\text{Sample Weight}} \times 100\%$$

Data Analysis

Data were analyzed using a Completely Randomized Design (CRD) with the help of the SPSS (Statistical Package for Social Science) application. Significantly different data were tested further using the DMRT test (Duncan Multiple Range Test).

RESULT AND DISCUSSION

Meat pH

The results of the study showed that the meat produced by KUB chicken given commercial feed with different brands did not show a statistically significant difference ($P>0.05$) in the pH value of the meat. The pH value of broiler chicken meat ranges from 5.96 to 6.07, while the pH value in this study ranged from 5.47 to 5.68. In this study, the highest pH was 5.68 from feed PAT and the lowest value was 5.47 from feed WK. The difference in pH values occurred due to differences in the protein content of each treatment feed. This is thought to be due to the protein content of commercial feed which can affect glycogen reserves which causes lactic acid to increase, so that the pH between treatments is relatively the same. The more glycogen available in the muscle, the more lactic acid is formed, so the pH of the meat is lower. The average pH value of meat can be seen in Table 2.

Glycogen levels in muscle tissue influence the accumulation of lactic acid (Wahyuda *et al.*, 2023). The accumulation of lactic acid stops when muscle glycogen reserves are depleted, that is, the pH is low enough to stop the activity of glycolytic enzymes in anaerobic glycolysis. The pH of meat is influenced by the glycogen and lactic

acid content of the meat (Prayitno *et al*., 2010). So if glycogen levels are high, lactic acid levels will also be high, so the final pH of the meat will be low. The decrease or increase in meat pH is determined by the levels of glycogen and lactic acid in the meat(Haq et al, 2015).

Water Holding Capacity

Water holding capacity is the ability of meat to bind water or the addition of external influences such as cutting meat, heating, grinding and pressure (Tirta *et al*., 2015). Based on the results of the analysis of commercial feed with different brands, it shows a significant difference in water holding capacity ($P<0.05$). The water holding capacity of broiler chicken meat ranges from 22-28.5%, while the water holding capacity of KUB chicken in this study ranges from 45-51%. In this study, the highest water holding capacity was 51.80 from CFD feed and the lowest water holding capacity was from WK feed. The difference in values is thought to be caused by the different protein content of commercial feed which increased the water holding capacity in each treatment. This is in accordance with opinion (Pratama *et al*., 2015). Increasing the protein content of meat can inhibit the ability of meat to absorb water. The higher the protein content of meat, the better the ability to bind water to the meat.The average water holding capacity can be seen in Table 3.

According to (Kartikasari *et al*., 2018) water holding capacity is influenced by the amount of feed consumed. The value of water holding capacity in meat is related to the protein content and is related to the fat in the meat. The lower the fat content in meat can increase the protein content in the meat and can increase the water holding capacity of the meat. According to (Ollong *et al.*, 2019). The ability of protein to bind water increases 17 so that the water binding capacity becomes higher because the low fat content in meat can increase the protein content in meat. The effect of providing feed or supplements rich in antioxidants can affect the quality of fat in chicken blood and meat (Ningsih *et al*., 2022).

Cooking Loss

The results of the analysis of the effect of feeding with different brands showed that there was no significant difference ($P>0.05$) on cooking losses. According to Soeparno (2005) in (Kartikasari et al,. 2018), the value of meat cooking loss ranges from 15-54.5% with a range of 15-40%. In this study, cooking losses ranged from 29.48 to 32.07%. The value with the highest cooking loss was found in the WK feed treatment while the lowest was in the CFD feed treatment. The difference in values is thought to be due to the protein content of commercial feed. Because the more water is retained by the protein, the less water comes out so cooking losses are low.The average cooking loss can be seen in Table 4.

Adhyatma *et al*. (2021) stated that the time of slaughter of livestock affects the body temperature and seedlings of slaughtered livestock. Slaughter weight influences cooking loss, especially if intramuscular deposition occurs. Slaughter weight also influences cooking loss. CFD feed treatment with a slaughter weight of 1000 grams has the lowest cooking loss, this is because the fat and protein content is higher than the W feed treatment with cutting weight is 800 grams, so the amount of water bound by fat and protein is higher and results in reduced cooking loss.

The physical character and quality of chicken meat is also influenced by the level of vitamins and supplements rich in antioxidants which affect cell membrane activity (Niati *et al*., 2022). The level of cooking loss is influenced by the amount of cell membrane damage, the amount of water released from the meat, the length of time the meat is stored, protein degradation and the meat's ability to retain water (Shank *et al.*, 2002). Meat that has low cooking loss is relatively better than meat that has higher cooking loss because meat that has low cooking loss is less likely to lose nutrients in the meat during the meat cooking process.

Table 2. Average pH of meat

Treatment	Test					Average[ns]
	1	2	3	4	5	
P1	5.62	5.63	5.64	5.41	5.60	5.47
P2	5.45	5.66	5.87	5.48	5.80	5.65
P3	5.71	5.86	5.60	5.48	5.76	5.68
P4	5.45	5.48	5.62	5.61	5.46	5.52

[ns] Not significantly different (P>0.05)

Table 3. Average water holding capacity

Treatment	Test					Average
	1	2	3	4	5	
P1	47.16	43.64	45.59	48.98	41.29	45.33[a]
P2	47.42	45.01	49.07	49.99	44.74	47.25[b]
P3	48.16	52.00	46.71	45.99	43.12	47.20[b]
P4	49.46	51.78	51.86	51.17	54.97	51.80[c]

[abc] Different superskip letters indicate a significant effect (P < 0.05)

Table 4. Average cooking loss

Treatment	Test					Average[ns]
	1	2	3	4	5	
P1	32.64	30.35	33.03	30.80	33.54	32.07
P2	28.94	27.75	32.40	33.56	27.91	30.11
P3	29.46	29.14	31.01	29.54	28.26	29.48
P4	30.34	31.35	27.81	27.91	28.44	29.18

[ns] Not significantly different (P>0.05)

CONCLUSION

Based on the research results, it can be concluded that giving commercial feed with different brands to KUB chickens has a significant effect on water holding capacity but has no significant effect on pH and cooking loss. Meat quality resulting from KUB chicken fed commercial WK feed can compete with CPH, PAT and CFD feeds in improving meat quality.

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