THE LEVELS OF BLOOD GLUCOSE, TRIGLYCERIDE, FINAL BODY WEIGHT AND ABDOMINAL FAT PERCENTAGE OF BROILER UNDER SEX-SEPARATED AND STRAIGHT RUN REARING SYSTEM

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Abstract

One hundred and eighty of New Lohmann broilers were used to study the influence of sex-separated and straight run rearing systems on the levels of blood glucose, triglyceride, final body weight and abdominal fat. The experimental chickens were assigned into completely randomized design with three treatments and six replications. Treatments consisted of separated sex (males group and females group which were separately maintained) and straight run (male and female were maintained in a group). Measured variables included blood glucose and triglyceride levels, final body weight and abdominal fat percentage. The result showed that the levels of blood glucose and triglycerides were not significantly different among treatments, whereas final body weight and abdominal fat percentage were significantly affected by treatments. It can be concluded that rearing system does not affect the levels of metabolites; but male chickens produce the highest final body weight while the female chickens produce the highest percentage of abdominal fat.

Key words: glucose, triglyceride, abdominal fat, sex- separated, straight run

INTRODUCTION

Poultry meat presents the results of a rigorous selection continuous, have very specific characteristics. rapid growth rate, feed efficiency is high, and yields a relatively brief, lasting 5-6 weeks, but Broiler poultry present a rigorous result of very vulnerable to environmental changes in both nutritional, climatologically or managerial.

Maintenance management is the key to success in the business of broiler. Reality on system rearing system is generally performed in a flock with a high population regardless of sex or straight run while the biological sexes have different growth character, the rooster has a higher growth rate than females, which is caused by differences in morphology [12]

Since the beginning of hatching broiler males have a 1% body weight higher than females, but along with age, this difference becomes 17% at harvest [10]. It is caused by differences in growth curves between males and females, male's broiler grow faster and have a longer growth duration than females [11]. Pace of growth is a reflection of metabolic activity that is strongly influenced by sex, age, nutritional status, homogeneity [16]. The low homogeneity will lead to fierce competition between individuals which in turn will be manifested to the achievement of production. Better uniformity is owned by the maintenance of separate sex will facilitate the processing plant so as to accelerate the work and in terms of grouping body weight [15]. Glucose and triglycerides are the major metabolites that are closely related to the sustainability of energy supply for the implementation of the physiological and biochemical functions in the body [6]. Therefore, this study aims to compare the rearing system both sex-separated and straight run, which focused on the blood glucose and triglyceride levels are associated with energy supply and its role in the growth process, especially the achievements of the final weights and synthesis of abdominal fat.

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MATERIAL AND METHODS

A total bird of 180 day-old chick of New Lohmann strain with average body weight of 50.09 grams was used in this research. Complete randomized design used in this study with three treatment of rearing system consisting of separated male sex (SM), female (SF) and straight run that is kept together males and females (SR). The treatment was repeated 6 times. Chicken were fed ad libitum on broiler starter diet from PT Japfa Comfeed Indonesia with the nutrient content as shown in Table 1. Data collection at the end of experiment and variables measured glucose and triglycerides levels, Final body weight and abdominal fat percentage. Final body weight were measured at harvest time at the age of 35 days, the percentage of abdominal fat obtained from the sample (30%) are cut, the percentage of abdominal fat is fat that is collected from the abdominal cavity and surrounding internal organs. It was percentage according final body weight. Metabolite levels were measured from blood plasma, glucose and Triglyceride levels were measured by the method Tinder-GPO, Enzymatic.

Table 1 The Nutrient and Metabolizable Energy Content, commercial Ration

Nutrient	Level
Moisture (%)	9.94
Ash (%)	5.61
Crude Protein (%)	23.67
Crude Fiber (%)	5.59
Crude Fat (%)	7.69
Metabolize Energy (kcal/kg)	3130

RESULTS AND DISCUSSIONS

Table 2 shows the average blood glucose levels and triglycerides, Final body weight an abdominal fat percentage. Average glucose ranged from 166.46 to 173.32 mg/dL, the average triglyceride levels ranged from 77.45 -87.26 mg/dL. Average final body weight has a range between 1917.99 - 2160.82 grams, the average feed consumption ranged between 3240.74 -3593.40 gram, whereas the highest percentage of abdominal fat and a low of 2:03% 1:06%.

Table 2 Average Glucose, Triglyceride, Final Body Weight and Abdominal Fat

No	Variable	SM	SF	SR
1.	Glucose(mg/dL)	173.32^{a}	166.46^{a}	166.74^{a}
2.	Triglyceride (mg/dL)	87.26^{a}	82.16^{a}	77.45^{a}
3.	Final Body Weight(gram)	2160.82^{d}	1917.99^{c}	2047.22^{b}
4.	Abdominal Fat (%)	1.06^{c}	2.03^{a}	1.88^{b}
5.	Feed Consumption (gram)	3593.40^{a}	3240.74^{b}	3378.50^{c}

Note : a,b and c Rows means with different superscript were significantly different (P<0.05)

GLUCOSE LEVELS

The average glucose levels from SM chicken (173.32 mg / dL) and was followed successively by the SR (166.46 mg / dL) and SF (166.72 mg / dL.) And a picture can be seen in Figure 1. The results of statistical analysis showed that the rearing system had no effect (P>0.05) on glucose levels. Glucose is the main carbohydrate is needed as a precursor for the energy citric acid cycle [6] and is a substrate that is easily used by most of the body's cells for energy purposes [5].

Typically broiler glucose level is higher than mammals, ranging between 180-250 mg / dL [5, 14] and maintained in the range are relatively constant with glucoregulation controlled by a mechanism that involves several metabolic hormones such as insulin, glucagon, pancreatic polypeptide, corticosterone and thyroxin, [5].

The results of statistical analysis showed that the glucose levels of the three rearing system did not differ (P>0.05). When collecting samples of the observations made before morning feeding, therefore, glucose

levels were lower than normal levels. Domesticated chickens only get nutrients from the ration consumed and the amount depends on several factors such as sex, age and environmental temperature [3]. Rooster ration consumption is higher than the females, however, as it passes through the digestive tract in place mechanisms of homeostasis are played by the intestinal disorders, especially in the modulation caused by the consumption and absorption of carbohydrates.

During the meal, intestinal wall regulate glucose homeostasis by changing more than 30% carbohydrates to lactate via anaerobic metabolism. Lactate acts as a buffer during peak carbohydrate absorption process, but at the insufficient glucose lactate converted to glucose through gluconeogenesis. Therefore the level of glucose and body weight were not affected by energy intake [17] levels are not different between males and females however the average glucose level (Table 2 and Figure 1) roosters tend to be higher than females. While the rearing system of straight run, in which males and females kept together in glucose levels was demonstrated between glucose levels of male and female chickens. Oxidation of glucose produces a number of energy used for the synthesis of glycogen, fatty acids, amino acids, the carbon skeleton donor, vitamin C and other metabolites. While glucose is not oxidized within a few minutes will be converted into glycogen and stored in the liver and muscle. The glycogen content of the liver is usually less than 4% and is depleted within a few hours of fasting. Some form of triglycerides stored in fat or energy reserves stored in adipose tissue [4].

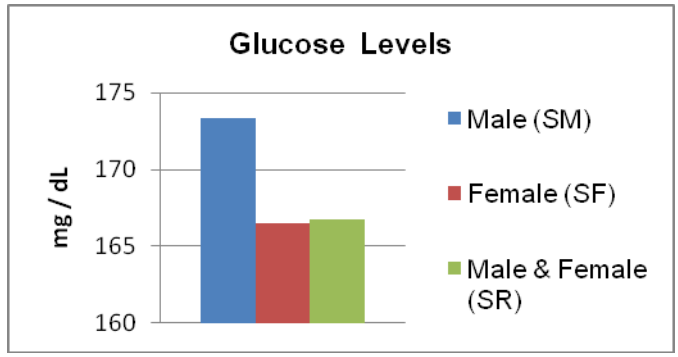

Figure 1. Average Glucose Levels

TRIGLYCERIDE LEVELS

Observation that the average triglyceride levels respectively chicken SM: 87.26 mg / dL, SF: 82.mg/dL; and SR 77.45mg/dL (Figure 2). The results of statistical analysis showed the average chicken blood plasma triglyceride levels of all three rearing system no significant (P>0.05). Averaging in separated male, female and straight runs separated to show the same value. Triglyceride levels range from 2-3 times (Table 2) than normal levels of triglycerides, 27mg/dL [1].

During the study of chicken consumed the same ration and collecting samples at the end of the study carried out before morning feeding. Average glucose levels obtained under the normal range (Table 2 and Figure 2), it will stimulate the lipolytic process through a series of hormone glucagon help to restore normal levels of glucose in the range. Lipolytic process leads to increased blood plasma triglyceride levels which in turn is converted in the liver to become glucose. Triglyceride levels are the result of the absorption rate of enzymatic hydrolysis of the triglyceride fats in the digestive tract into the bloodstream and the rate of utilization in the cells, before re synthesized and stored in the network.

Triglycerides are a form of energy savings the most efficient because it can be

stored in large quantities [7], Triglycerides are hydrophobic and can be stored in a very compact form [6]. Triglycerides derived from esters of glycerol and fatty acids or the conversion of glucose that is oxidized [4, 6] through hormone regulation [7]. In the chicken comes from exogenous triglycerides, the lipid from food and endogenous de novo or derived from the conversion of glucose into fat. In the chicken there is a tendency of most of the triglycerides are synthesized through de novo, considering one of those chicken granivorous birds [7].

Triglyceride levels to rise after feeding and 3 -4 hours after a meal to the top and return to normal levels 6-8 hours after eating.[4] A fasting triglyceride level rise caused by the absorbed chylomicrons. Triglyceride content is strongly influenced by the proportion of carbohydrates in the diet and species response to lipolytic hormones that affect the balance between lipolytic and estrification [4].

Feed intake data (Figure 4), SM consumes chicken rations (3593.40 grams) were significantly higher than SF chickens (3240.74 grams) and chicken SR (3378.50 grams). This is evidence that the growth rate is higher than a rooster in the hen [17]. In addition, factors that led to the sexual dimorphism of physiological time difference between male and female chickens [9] due to genetic selection, so that sexual dimorphism increases due to the evaluation conducted based on body weight at harvest [8], From the description above proved that between male and female chickens do not grow at the same level as the maintenance of male and female chickens together show a combination of growth characteristics between males and females.

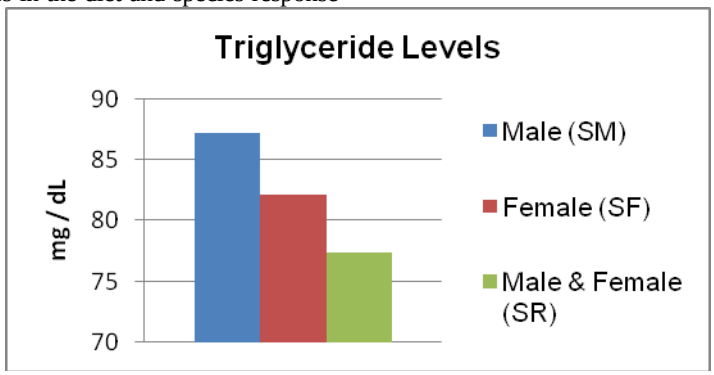

Figure 2. Average Triglyceride Levels

FINAL BODY WEIGHT

Chicken SM showed the highest final average body weight, which is 2160.82 grams in a row followed by the chicken SR, namely SF 2047.22 grams and chicken, which is 1917.99 grams as apparent in Figure 3. The results of various analyzes suggest that rearing system shows the difference in final body weight outcomes ($P<0.05$), the rooster has a live weight and body weight gain were markedly higher than hens [2, 11]. Achievement final weight is a manifestation of growth, which is strongly influenced by nutrient intake [13].

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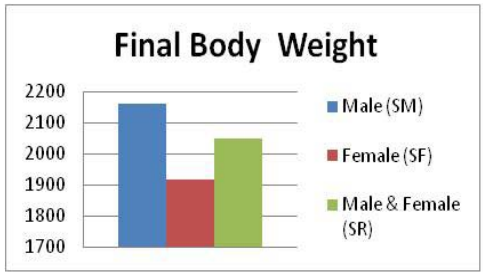

Figure 3 Average Final Body Weight

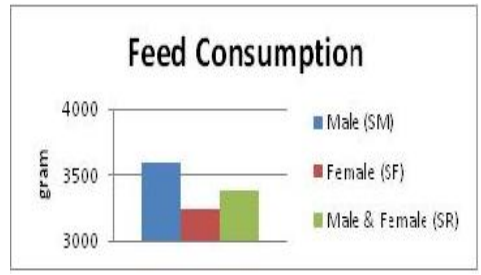

Figure 4 Average Feed Consumption

ABDOMINAL FAT PERCENTAGE

Table 2 shows that the maintenance system affect significantly (P<0.05) against the percentage of abdominal fat. Abdominal Fat of chicken SF (2:03%) was significantly higher than that of the chicken SM (1:06%) and SR (1.88%). The data show that abdominal fat hens have higher than the rooster straight run while system maintenance have abdominal fat between the sexes. Fat tissue is the accumulation of triglycerides stored in fat depots, which are sequentially stored in the subcutaneous, facular region, then the abdominal cavity and thorax, in the framework, tied to the mesentery of the intestine and stored in the connective tissue of other organs [6].

From the observation appear hen have abdominal fat percentage is higher, because females tend to have high ability to fatten in its infancy, so that the energy equivalent of body weight gain varies with fat content [17]. Another case in roosters more abdominal fat percentage seems low, given that energy is widely used for the activity and growth rate [13, 17] so that the energy savings in the form of triglycerides or fat tissue to be lower than the female. Abdominal fat in chickens that are kept in straight run has a value between the male and female chickens as an expression of the characteristics of both sexes.

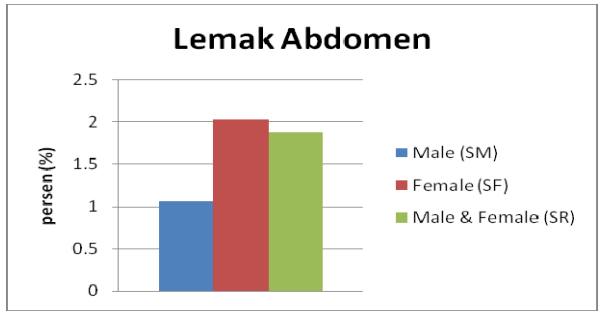

Figure 5. Average Abdominal Fat

CONCLUSIONS

It can be concluded that does not rearing systems affect the levels of metabolites; but male chickens produce the highest final body weight while the female chickens produce the highest percentage of abdominal fat.

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