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Correlation of Body Weight and Spermatozoa Motility of Native Chickens with Feeding BSF Maggot

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Abstract

This study was conducted to evaluate the reproductive potential of native chickens by examining the correlation between body weight and spermatozoa motility. The correlation analysis results obtained a correlation coefficient (r) of 0.475. The results in this research was a significant value of 0.196>0.05 means that statistically, there is a relationship between body weight and spermatozoa motility. Still, the correlation between body weight and spermatozoa is weak. Bodyweight gain is one parameter that can be used as a production standard. Based on the results studied, it can be concluded that there is a relationship with the correlation value between body weight and spermatozoa motility of male cocks with BSF Magot feeding.

Keywords: native chickens, spermatozoa, Maggot BSF.

A. Introduction

For the general public, the existence of local chickens can meet the needs of meat and eggs. There is a tendency for local chickens in Indonesia to have slow growth, low egg production, and a smaller body proportion than purebred chickens, reducing their genetic quality (Dessie et al., 2011). Mating female cattle through AI technique with superior males in different lineages is an effort to improve genetic quality based on livestock reproduction aspects. Local chickens' ability to produce semen reaches 0.2 to 0.5 mL and a motility percentage of 60-80% with an ability to live between 85-90% (Getachew, 2016). One can be done to improve the genetic quality of livestock utilizing artificial insemination (AI). Insemination is a modern livestock technique that is efficiently applied to advanced farms. Insemination can also maximize male use and prevent disease transmission (Ax et al., 2000).

The feed is an important factor in getting quality spermatozoa production. Feed that contains adequate nutrient balance will greatly help livestock to continue to grow and produce normally. Beski et al. (2015) stated that protein components have an important role in an animal feed formula because they are involved in forming body tissues and are actively involved in vital metabolism such as enzymes, hormones, antibodies, etc. In developing countries, protein sources for feed formulas generally rely on animal and vegetable protein, such as soybean meal, fish meal, blood meal, or plant legumes. However, protein is the most expensive component of feed compared to others. As a result, economically, the fulfillment of protein sources is quite a burden on production costs.

The use of insects as a protein source has been widely discussed by researchers globally (Wang et al. 2005; Oyegoke et al. 2006). According to Van Huis (2013), protein sourced from insects is more economical, environmentally friendly, and has an important role naturally.

Black Soldier Fly (BSF), the black soldier fly (Hermetia *illucens* L), Diptera: Stratiomyidae), is one of the insects that has begun to be studied for its characteristics and nutrient content. These flies originated in America and then spread to subtropical and world tropical regions (Čičková et al., 2015).

Rambet et al. (2016) concluded that BSF flour has the potential as a substitute for a fish meal up to 100% for broiler feed mixtures without any negative effects on dry matter digestibility (57.96-60.42%), energy (62.03-64.77%) and protein (64.59-75.32%). A good male candidate requires to have good and healthy reproductive organs, and nutritional needs are met. A good reproductive tool will determine livestock productivity because it will determine the marriage's success and ultimately affect female livestock success. Correct selection of males plays an important role in determining the quality and quantity of spermatozoa. Based on this background, this study was conducted to evaluate the reproductive potential of native chickens by examining the correlation between body weight and spermatozoa motility.

B. Methodology

1. Materials of Research

The materials used in this study were 27 male native chickens, corn the village is eight months old. It has entered sexual maturity, BSF maggot, commercial feed, NaCl, drugs, cage disinfectants, and vitamins. Supporting equipment used were individual cages, syringes, digital scales, 10 mL tubes, objects glass, and light microscope. Hanging feed containers and hanging drinking water containers.

2. *Procedure of Research*

The research was conducted experimentally using a completely randomized design (CRD) 3 treatments, three times repetition (3 chickens each).
P0: 60% milled corn + 40% commercial feed
P1: 60% milled corn + 20% fermented maggot + 20% commercial feed
P2: 60% milled corn + 40% fermented maggot

3. *Parameters of Research*

The parameters measured in this study were the motility of spermatozoa. An individual motility assessment was performed on forward-moving spermatozoa (backward and circular movements excluded). Compared to stationary spermatozoa, the standard for assessing spermatozoa's movement (Feradis, 2010).

4. Data Analysis

All data obtained consisting of body weight, and motility will be presented descriptively in tabular form and an average form, then analyzed using correlation analysis and simple linear regression with software IBM SPSS Statistic.

C. Result and Discussion

The results of checking the quality of fresh semen during the study can be seen in Table 1.

Table 1. The relationship between body weight and spermatozoa motility of native chickens with maggot feed

Treatment	Average of body weight (kg)	Motility (%)	Correlation Value
P0	1.9	75	
P1	1.9	81.6	0.475
P2	1.9	86.6	

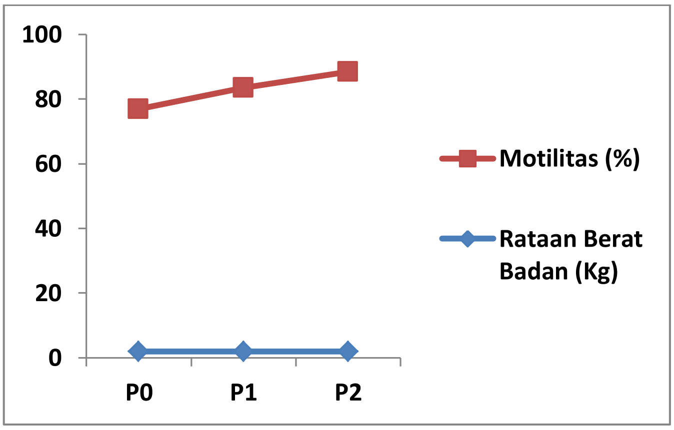

Figure 1. Graph of the correlation between body weight and spermatozoa motility.

The study results were that the average body weight for PO was 1.9 kg, with a motility rate of 75%, P1: 1.9 kg with a motility rate of 81.6%, and P2 1.9 kg with a motility rate of 86.6%. The correlation analysis results obtained a correlation coefficient (r) of 0.475 and obtained a significant value of 0.196>0.05, which means a statistical relationship between body weight and spermatozoa motility. Still, the correlation between body weight and spermatozoa is weak. It means that maggot feed's addition influences the decrease in spermatozoa motility while other factors influence the others.

Bodyweight gain is one of the parameters used as a production standard (Muharlien & Kurniawan, 2011). Bodyweight gain comes from the synthesis of body protein from dietary protein consumed (Mahfudz et al., 2010). Growth in Bangkok chicken offspring is relatively high compared to native chickens in general, which is the result of inheritance from both intensively and from one of the parents (Rahayu et al., 2011).

Galal (2007) reported a positive correlation between reproductive quality and body weight. In chickens, males are selected based on comb and wattle size, body weight, and body color. The quality of semen may vary with age, bodyweight of chickens, collection, and breed techniques. According to Udeh et al. (2011), if there are no facilities for semen evaluation of secondary sexual characteristics, it can be used to estimate male chickens' semen quality. Moreover, the reduction of native chicken genes continuously can cause high embryo mortality in birds. (Ajayi et al., 2011). It was concluded that the rooster's weight with black plumage contained more semen volume and sperm concentration and could be used for breeding purposes in the chicken breeding system.

Djermanovic et al. (2013) reported that weight management in roosters is very important for maintaining fertility, and weight management is often achieved by regulating crude protein content (PK) and feed restriction techniques. Soeparno et al. (2005) stated that body weight plays an important role as a determinant of cement production. Animals with a larger body size will have larger testicular tissue, producing a larger volume of semen.

Spermatozoa motility is one measure of the spermatozoa's ability to fertilize the ovum in the fertilization process. Spermatozoa motility progressive motility of spermatozoa. Spermatozoa's progressive motility is very important. It was because spermatozoa will not fertilize an egg without good motility. This study's spermatozoa motility results have an average of P0 75%, P1 81.6%, and P3 86.6%. Thus, spermatozoa motility in this study can still be said to be in a more or less normal range. It was the same Susilawati (2011) said that there are three spermatozoa movement groups. The hyperactivation group, the non-hyperactivation group, and the transition group.

According to Hafez (2000), individual spermatozoa motility in normal poultry semen ranges from 60-80%. According to Situmorang (2002), the decrease in spermatozoa motility after cooling is due to decreased phospholipids and cholesterol content in each nation. In males, both of these compounds are membrane components. Phospholipids function to protect spermatozoa cells from cold shock. At the same time, cholesterol plays an important role in maintaining spermatozoa cells' integrity from variations in the membrane system that increase during the cooling process. Motility has a positive correlation with fertility; the higher the number of motile spermatozoa, the higher the fertility (Salmin, 2000). It is further stated that at least 40% of motile sperm are needed in the IB dose. If it is less than that percentage, the potential to fertilize is very low.

The main characteristics of good quality spermatozoa are mass movement and motility with progressive motility. It has been signed that mass movement reflected the motility or movement of the individual spermatozoa. The more active and the more spermatozoa moving forward, the better the mass movement (thicker and faster).

According to Herdis (2005), sperm motility is influenced by differences in livestock breeds and examination time. Another factor that can affect motility is feed (Zulfan, 2008). It was also conveyed by (Dethan et al., 2010), which caused differences in the study results due to differences in the breed of experimental livestock, the study's length, the environmental temperature during the study, and the nutritional status of the livestock.

The maggot feed role as an alternative protein source for animal feed is under the opinion (Mahmud et al., 2020). The crude protein content in young larvae is higher than in older larvae, presumably because young larvae experience faster structural cell growth. The body needs protein to repair and replace damaged body cells and for production. Protein is the body is converted into energy when needed. Male livestock needs protein for spermatozoa protein synthesis (Piliang & Djojosoebagio, 2006).

Ghonim et al. (2010) stated that the metabolic-protein energy balance in feed plays an important role in male poultry's reproduction process. Male poultry fed with high metabolic energy content or PK resulted in higher ejaculation volume, and sperm motility was also increased by high metabolic energy. Total abnormal spermatozoa decrease with the increase in metabolic energy content and PK in the feed.

Salisbury & Van Demark (1985) stated that adequate rations of energy, protein, minerals, and vitamins are important for the growth and development of young male livestock because young males' function is more disturbed by feed deficiency than adult males.

D. Conclusion

Based on the results studied, it can be concluded that there is a relationship with the correlation value between body weight and spermatozoa motility of male cocks with BSF Magot feeding.

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