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The Effect of Using *Organik Protein* in Feed on Abdominal Fat and Internal Organs of Broiler

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ABSTRACT

The purpose of this research was to determine the effect of *organik protein* in feed on the quality of abdominal fat and internal organs in broilers. The material used 500 broilers. Levels of *organik protein* in feed P0 (0% *organik protein*); P1 (1.5% *organik protein*); P2 (3.0% *organik protein*); P3 (4.5% *organik protein*) and P4 (6.0% *organik protein*). The variables measured were abdominal fat and internal organs weight of broiler (heart, liver, gizzard, pancreas and spleen). The data were analyzed by using ANOVA and if it shoes significant different among treatment continued by using Duncan's Multiple Range Test. The result showed that the treatment gave no significant effect ($P>0.05$) on abdominal fat and weight of heart, liver and spleen. The use of *organik protein* in feed can reduce `abdominal fat and improve the performance of internal organs such as the gizzard, liver, spleen, pancreas and heart of broilers.

Keywords: Abdominal fat, Broilers, Internal organs, *Organik protein*

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Introduction

Broilers have advantages in relatively short maintenance phase, fast growth and high demand. Feed becomes one of the important factors in the successful management of broiler maintenance, so it is necessary to pay attention to quality and quantity provided (Anggitasari *et al.*, 2016). Feed becomes the most important thing in the maintenance of broilers, so it requires 60-70% of total production cost. The composition of broiler feed needs to be considered the nutritional content and auxiliary substances in the feed such as protein, energy, fat, crude fiber, vitamins, minerals, and amino acids as nutritional needs in broilers (Anggitasari *et al.*, 2016). The increase in public demand for animal protein led to an increase in the price of broiler feed ingredients. One of the feed ingredients that become an important component in the formation of the body in broilers is protein.

Protein is the main component of the body's cell formation that plays an important role in cell development. The protein needs in broilers are about 18-24% which is used for the formation and growth of the body in broilers (Salauhiang *et al.*, 2019). The higher demand for animal protein, especially broilers, makes the development of livestock business so that the source of protein earlier in the near term is increasingly expensive and rare. Feed ingredients that have a high protein content have a relatively expensive price so that in increasing the protein content in feed

required balance and composition of amino acids that can increase efficiency in the use of feed.

The development of feed ingredients that have protein content used as a substitute alternative has several conditions such as not competing to meet basic human needs, having continuous availability, appropriate nutritional content and has an affordable price of single cell protein (SCP). Single cell proteins are microbial biomass or protein extracts that are used as an alternative feed or additional feed consisting of algae, fungi, and bacteria whose availability is continuous. Single cell protein is a protein from microorganism cells that can be used as a source of protein for food and feed (Hidayati *et al.*, 2011). According to Samadi *et al.* (2012) several studies in the use of single cell protein in feed have a positive correlation to the growth of living things so that they have good potential as animal feed additives. The single cell protein given is organic waste from Monosodium Glutamate (MSG) obtained from PT. Miwon Indonesia. Monosodium Glutamate (MSG) which has a high protein content so that it can be an alternative source of high protein raw materials for broilers. Organic waste from MSG food can be an alternative source of protein because it has a sustainable availability because it is not dependent on the season and does not compete with human food needs. Therefore, this study aims to find out the effect of organic use of protein on abdominal fat and organ weight in broilers that include the gizzard, spleen, liver, pancreas, and heart.

Materials and Methods

Materials

The research using organic protein from by product of industrial waste Monosodium Glutamate (MSG) produced by PT. Miwon Indonesi as an additional feed ingredient. The livestock used were 480 broilers (unisex) of daily age that will be kept for 35 days. The average weight of DOC was 47.48 ± 1.87 g/head, and the coefficient of variation was 3.92%. The basal feed used was commercial feed and added organic protein according to the level of use as a treatment. The treatment feed was given starting from DOC until 35 days of sampling. The nutritional content of BR1 and BR2 and drinking water is provided *ad libitum*. The content of *Organik protein* can be seen in Table 1.

Methods

The method that will be used in this research was a field experimental method using a Completely Randomized Design (CRD) with the addition of organic protein to chicken feed. The study consisted of 5 treatments with each treatment consisting of 6 replications so that there were 30 experimental units. Each replication consisted of 16 broilers. Feed and drink for broilers is provided on an *ad libitum* basis. The treatment in this experiment is giving different levels of organic protein in each treatment with details:

- T0 = Basal feed (without treatment)
- T1 = 98.5% basal feed + 1.5% *organik protein*
- T2 = 97% basal feed + 3.0% *organik protein*
- T3 = 95.5% basal feed + 4.5% *organik protein*
- T4 = 94.0% basal feed + 6.0% *organik protein*

Statistic analysis

The data obtained in this study will be analyzed using Analysis of Variance (ANOVA) on Completely Randomized Design (CRD) by Microsoft Excel. If these results of the analysis obtained data that are different or significantly

different, it will be continued with Duncan's Multiple Distance Test (DMRT).

Results and Discussion

Research data regarding the effect of adding organic protein in feed to abdominal fat and internal organs such as gizzard, liver, spleen, pancreas and heart in broilers during the study are presented in Table 2.

Effect of treatment on abdominal fat

Abdominal fat is one part of the fat in the body that is found in the abdominal cavity. Abdominal fat contained in the body indicates that there is a waste of feeding because abdominal fat is the part that cannot be utilized. Abdominal fat in this study was obtained from taking part of the fat in the abdominal cavity of broilers in each replication. Accumulation of abdominal fat in the body of broilers is influenced by several factors such as genetics, nutrition provided, sex, age of chickens and environmental factors. The feed consumed by female broilers in the finisher phase is converted into fat because meat growth has stopped, but male broilers are still able to grow beyond the standard. Gender in broilers is also known to affect the deposition of abdominal fat on the body of broilers where female chickens are known to deposit body fat more easily than males (Hidayat, 2015).

Table 2 shows the results of the average percentage of abdominal fat in broilers for each treatment. Based on the results of the analysis showed that the addition of organic protein in the feed had no significant effect ($P > 0.05$) on the percentage of abdominal fat. According to the results of the data in Table 2 it is known that P2 has the highest average percentage of abdominal fat which is 1.005 and P1 has the lowest average percentage of 0.76%. The average percentage of abdominal fat in this study is still within the standard limits because it ranges from 0.76-1.005%. According to Pudjiastuti and Hernawan (2012), the percentage of abdominal fat in broilers

Table 1. Content of *organik protein*

Parameter	Unit	Result	Method
Moisture	%	44.94	SNI 01-2891-1992 point 5.1
Ash	%	4.80	SNI 01-2891-1992 point 6.1
Crude protein (nx6,25)	%	40.10	SNI 01-2891-1992 point 7.1
Fat	%	0.30	SNI 01-2891-1992 point 8.1
Raw fiber	%	0.07	SNI 01-2891-1992 point 11
Carbohydrate	%	9.79	by different
Calorific value	Kcal/100 g	202.26	by calculation

Table 2. Effect of addition of *organik protein* in feed to abdominal and organ fat in the broiler

Variables observed	Treatments				
	P0	P1	P2	P3	P4
Abdominal fat (%)	0.79±0.22	0.76±0.20	1.00±0.27	0.98±0.25	0.89±0.33
Gizzard (%)	1.16±0.30 ^b	1.31±0.19 ^{ab}	1.20±0.10 ^b	1.37±0.33 ^{ab}	1.45±0.15 ^a
Liver (%)	1.91±0.86	2.03±0.29	1.95±0.35	2.10±0.40	1.78±0.32
Spleen (%)	0.102±0.039	0.081±0.039	0.090±0.029	0.118±0.088	0.087±0.074
Pancreas (%)	0.19±0.023 ^{BC}	0.04±0.198 ^C	0.03±0.132 ^C	0.19±0.060 ^{AB}	0.22±0.025 ^A
Heart (%)	0.37±0.08	0.38±0.11	0.38±0.06	0.42±0.08	0.39±0.05

^{a,b,c} Different superscript at the column ($P < 0.05$).

^{A,B,C} Values bearing superscript within row show a significantly different effect ($P < 0.01$).

P0: 0% *organik protein*; P1: 1.5% *organik protein*; P2: 3.0% *organik protein*; P3: 4.5% *organik protein*; and P4: 6.0% *organik protein*.

ranges from 0.73 to 3.78% of live weight. The organic protein used has a crude protein of 40.10% according to Darsi *et al.* (2012) the use of feed with high protein content 21; 19.5; and 18% resulted in a decrease in abdominal fat PK of 18% and 21% (1.98 and 1.83%).

Effect of treatment on gizzard weight

According to Sjojfan *et al.* (2021) gizzard is included in the largest digestive organ in poultry. Gizzard has a function like teeth in mammals which is to reduce the particles of feed given to a smaller size. The factor that has an influence on the increase in gizzard is the crude fiber of the feed, the higher the crude fiber, the more work intensity is needed for the gizzard to digest the feed. Gizzards are arranged in the form of thick, strong, red muscular horns and are lined on the inside by a thick epithelium consisting of horny substance (Kurniawan *et al.*, 2021).

Table 2 shows the results of the average gizzard weight in broilers for each treatment. Based on the results of the analysis showed that the use of organic protein in broiler feed had a significantly different effect ($P>0.05$) on gizzard weight. The P4 treatment had a significantly different effect on the addition of organic protein on the percentage of gizzard weight. However, it was not significantly different in the P0, P1, P2 and P3 treatments. According to table 2, the average weight of gizzards, respectively, P0-P4 is 1.16 g/100g; 1.31 g/100g; 1.20 g/100g; 1.37 g/9.63 and 1.45 g/100g. P4 shows the largest average with 1.45 g/100g and P0 shows the smallest average with 1.16 g/100g. According to Palapa *et al.* (2020) in general the percentage of broiler gizzard weight is between 2.07-2.31 grams of live weight. Based on this statement, it can be seen that the average broiler gizzard in this study was not normal or low, which only ranged from 1.16 to 1.45% live weight. Significantly different results on gizzard caused by crude fiber and texture. According to SNI crude fiber for broiler feed is 5% for the starter phase and 6% for finisher, while the crude fiber in organic protein used is below 5% which if the crude fiber content in the feed is high it can increase the weight of the gizzard. This can be influenced by crude fiber and the texture of the feed given if the high crude fiber content can improve the performance of the gizzard because the organ is stimulated to work more physiologically in processing digestion both mechanically and enzymatically so that an increase in gizzard weight can occur.

Effect of treatment on liver weight

The liver is the largest gland in the body and an excretory organ that helps the kidneys play a role in the body. The liver in broilers is quite large and occupies the abdominal area. The liver has the function of storing sugar in the form of glycogen and producing bile which functions as an emulsifier of fat in feed. According to Listiani *et al.* (2019) The liver has a function as a place for the exchange of substances from protein, fat, bile

secretion, detoxification of metabolites that are not useful. Liver weight can increase if there are bioactive compounds in feed that will improve liver function to secrete bile, thereby increasing the mass of the liver (Mistiani *et al.*, 2020).

Table 2 shows the results of the average liver weight in broilers for each treatment. Based on the results of the analysis showed that the use of organic protein in broiler feed did not have a significantly different effect ($P>0.05$) on liver weight. The lowest average liver weight was at P4 which was 1.78 g/100g and the largest average weight was P3 which was 2.10 g/100g. Normal liver weight ranges from 2-5% of live weight (Pangesti *et al.*, 2016). Based on this statement, the liver weight in the treatment was classified as abnormal or low because it ranged from 1.78 to 2.10% of the live weight. Factors that have an influence on liver weight are body weight, genetics, species, sex, age, and pathogenic bacteria. Liver that has a normal condition that has a smooth surface condition, and no liver damage was found. According to Tahalele *et al.* (2018) The low liver weight in chickens can be caused by reduced blood fat levels so that the liver function in excreting blood fat is not too high. The reduction in body fat deposits in chickens including abdominal fat occurs due to a decrease in fatty acid synthesis in the liver so that the fat formed and stored in the form of glycogen in the liver is reduced.

Effect of treatment on spleen weight

The spleen is one of the lymphoid organs that has a function as a place for maturation and the formation of antibody cells where these antibody cells can protect and fight foreign antigenic cells or toxins that attack chickens (Sjojfan *et al.*, 2021). In accordance with the opinion of Dorisandi *et al.* (2018) the spleen is a secondary defense organ that has a function to produce lymphocyte cells and plays an important role in resisting agents that successfully reach the blood circulation to resist invading organisms or toxins. The spleen has a function as a storage place for red and white blood cells in normal circulation, storing blood with the liver and spinal cord which has a role in reducing old erythrocytes, Table 2 shows that the average weight of the spleen in each treatment. Based on the results of the analysis showed that the use of organic protein in broiler feed did not have a significantly different effect ($P>0.05$) on the weight of the spleen. The lowest average spleen weight was at P1 with 0.081 g/100g and the highest weight was P3 with 0.118 g/100g. The percentage of relative weight of the spleen in broilers is around 0.12-0.14% of live weight (Arifa *et al.*, 2021). Based on this statement, the weight of the spleen in the treatment was classified as abnormal or low because it ranged from 0.081-0.118%. The low weight of the spleen can be influenced by the number of Coliform bacteria in the digestive tract. The more Coliform bacteria in the digestive tract it

will increase the role of the spleen so that the size of the spleen will shrink (Amini *et al.*, 2020).

Effect of treatment on pancreas weight

The pancreas is a gland that has a function as an endocrine gland and an exocrine gland. The sap produced by the pancreas contains amylase, protease and lipolytic enzymes which have the function of hydrolyzing starch, peptone and fat which are then secreted into the duodenum (Septinar *et al.*, 2021). The pancreas has a function in secreting the enzyme amylase which helps in the digestion of carbohydrates and the enzyme trypsin which helps in the process of digesting protein (Ananda *et al.*, 2020).

Based on Table 2 has shown the average weight of the pancreas in each treatment. Based on the analysis that the use of organic protein in feed had a significant effect ($P>0.05$) on P1 and P2 treatments on the weight of the pancreas of broilers. However, in treatment P0, P3 and P4 did not have a significantly different effect on the treatment carried out. The lowest average pancreatic weight was P2 with 0.03 g/100g and the highest was 0.22 g/100g. According to Aqsa *et al.* (2016) in general the weight of the pancreas is around 0.25%-0.40% live weight or 2.5-4.0 g. Based on this statement, the weight of the pancreas in the treatment carried out was classified as abnormal or low because it was in the range of 0.03-0.22 g. Several factors that affect the percentage of pancreatic weight include genetics, behavior, and the environment (Aqsa *et al.*, 2016).

Effect of treatment on heart weight

The heart is a vital organ in the body which has a role as a blood pumping device that regulates circulation throughout the body. According to Dorisando *et al.* (2018) stated that the function of the heart is as a blood pump in the circulatory system or transportation of the body, enlargement of the heart can occur when there is an accumulation of toxins in the muscles. Table 2 shows the average heart weight in each treatment. Based on the results of the analysis showed that the use of organic protein in broiler feed had a significantly different effect ($P>0.05$) on heart weight. The average weight of broiler heart was lowest at P0 with 0.37 g/100g and the highest at P3 with 0.42 g/100g. In general, broiler heart weight is around 0.42-0.7% of live weight (Timur *et al.*, 2020). According to Aqsa *et al.* (2016) factors that affect heart size such as sex, age, body weight and livestock activity.

Conclusions

The use of organic protein in feed can reduce abdominal fat and improve the performance of internal organs such as the gizzard and pancreas. The best organic protein can be given up to a level of 1.5% *organik protein* in feed.

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