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The Effect of Fermentation Bran and Chitosan in Ration to Percentage of Tegal Duck Digestive Tract Weight

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Abstract

Duck productivity is largely determined by the optimization of bodily functions. The food consumed greatly determines the development of digestive organs and internal organs of livestock. Digestive organs that are well developed and function optimally will be very decisive in turning feed into meat and eggs. The aim of the study is to look at the role of chitosan and bran fermented on the weight percentage of digestive organs of ducks. The treatment is R0 (45% corn + 35% concentrate + 20% bran without fermentation), R1 (45% corn + 35% concentrate + 20% fermented bran), R2 (45% corn + 35% concentrate + 19.5% fermented bran + 0.5% chitosan) and R3 (45% corn + 35% concentrate + 17.5% fermented + 2.5% chitosan bran). The variable measured is the weight percentage of the digestive organs (gizzard, small intestine and pancreas) in ducks. Data was processed using SAS Windows 16. The results showed that the treatment was not significantly different from gizzard weight. The average weight of the small intestine and pancreas at the R1 treatment was significantly higher than the control at 31.85% and 29.16%. It is can be concluded that fermentation of bran and chitosan in duck ration activates the work of the digestive organs of ducks in the segment of the small intestine and pancreas.

Keywords: Digestive organs, ducks, bran, chitosan, rations

Abstrak (Indonesian)

Produktivitas ternak itik sangat ditentukan oleh optimalisasi fungsi organ tubuh. Pakan yang dikonsumsi sangat menentukan perkembangan organ pencernaan dan organ dalam dari ternak. Organ pencernaan yang berkembang dengan baik dan berfungsi optimal akan sangat menentukan dalam merubah pakan menjadi daging dan telur. Tujuan penelitian adalah melihat peran kitosan dan bekatul fermentasi terhadap persentase bobot organ pencernaan ternak itik. Perlakuan adalah R0 = 45% jagung + 35% konsentrat + 20% bekatul tanpa fermentasi, R1 = 45% jagung + 35 % konsentrat + 20 % bekatul fermentasi, R2 = 45% jagung + 35% konsentrat + 19,5% bekatul fermentasi + 0,5% kitosan dan R3 = 45% jagung + 35% konsentrat + 17,5% bekatul fermentasi + 2,5% kitosan. Peubah yang diukur adalah persentase bobot organ pencernaan (rempela, usus halus dan pankreas) pada ternak itik. Data diolah menggunakan program SAS Windows 16. Hasil penelitian menunjukkan bahwa pemberian perlakuan tidak berbeda nyata terhadap bobot rempela. Rataan bobot usus halus dan pancreas pada perlakuan R1 nyata lebih tinggi dari kontrol sebesar 31,85% dan 29,16%. Kesimpulan penelitian adalah pemberian fermentasi bekatul dan kitosan dalam ransum itik mengaktifkan kerja organ pencernaan ternak itik pada segmen usus halus dan pancreas.

Kata Kunci: Organ pencernaan, itik, bekatul, kitosan, ransum

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INTRODUCTION

Poultry productivity is largely determined by the smoothness of metabolism and the optimization of organs role in carrying out its functions. The development of body organs is much influenced by the rations consumed. The functions of these organs are related to each other. The role of the body system begins with the growth and development of cells that

will develop to form tissues and organs of the body. Normal cell development is strongly supported by synthesis and protein content, both structural and functional proteins. The role of structural proteins will be seen in the development of tissues and organs, while the role of functional proteins is seen in enzyme activity.

The rations consumed greatly affect the size and development of organs. This means that the size and size of the organ is not static because it can increase in size or length depending on the type of ingredients consumed. Organ health is also very decisive for the smooth functioning of the organs in carrying out their respective functions. Foods that contain high crude fiber are predicted to cause some organs such as ventriculus, pancreas and small intestine to increase in size compared to rations that have low crude fiber. This indicates there is a relationship between the content of nutrient rations with the anatomy and physiology of organs.

Poultry rations with the addition of bran or bran fermented and the provision of chitosan, it is very important to learn about the condition of organs in the body, related to the nature and function that has been proven to reduce blood cholesterol and duck meat [1]. Other functions increase the unsaturated fatty acid content of eggs [2]. This is based on the high content of crude bran and animal fibers from chitosan from crustacean waste. Chitosan is a de-acetylation of isolated chitin from crustacean shells with demineralization and deproteination [3] consisting of poly (2-deoxy-2-acetylamine-2-glucose) and poly (2-deoxy-2-aminoglucose) which are bound in (1-4) β-glycosidic [4]. Based on the content of bran and the form of chitosan as animal fibers, it is necessary to know the effect on the weight and size of organs in livestock.

MATERIALS AND METHODS

Materials

Ration

The experiment used ration raw materials, namely corn, laying chicken concentrate (protein 32%), bran / bran fermented, chitosan and premix. Chitosan used is pure chitosan from the IPB Fisheries Processing Technology Laboratory.

Duck

The ducks used were Tegal ducks which were producing as many as 40, placed in cages that had been equipped with lights, places to eat and drink. Ducks are kept for 7 weeks. At the end of the study, 20 ducks were cut (5 tails/treatment) to sample internal organs such as gizzard (ventriculus), pancreas and small intestine. Before the duck is cut it is weighed first to determine the weight (gram). After being cut, the internal organs are separated and cleaned and then weighed.

Methods

The study used a completely randomized design (CRD) with 4 treatments and 5 replications, each replication consisting of 2 ducks. The treatments used are: R0 = 45% corn + 35% concentrate + 20% bran without fermentation, R1 = 45% corn + 35% concentrate + 20% fermented bran, R2 = 45% corn + 35% concentrate + 19.5 % fermented bran + 0.5% chitosan and R3 = 45% corn + 35% concentrate + 17.5% fermented + 2.5% chitosan bran. The treatment ration was made by mixing all the ingredients of each treatment based on their respective compositions homogeneously. The parameters measured are; weight percentage of digestive organs (weight percentage of gizzard, small intestine and pancreas) Percentage of gizzard weight obtained from the distribution of gizzard weight with final body weight of ducks multiplied by 100%. While the percentage of weight of the small intestine by dividing the weight of the small intestine with a life weight multiplied by 100%. To calculate the percentage of pancreatic weight by dividing the weight of the pancreas with a weight multiplied by 100%.

During maintenance, rations are given twice a day, morning and evening. Maintenance is carried out for 7 weeks, and drinking water is given ad libitum.

Data Analysis

The data obtained is processed by analysis of variance (ANOVA) using SAS Windows 16. If there is an effect of treatment, Duncan's multiple tests [5] is done. Especially for egg cholesterol, it is presented descriptively

RESULT AND DISCUSSION

Effect of chitosan and fermented bran treatment in rations on the percentage of Tegal duck gizzard weight

The administration of chitosan and fermented bran showed a balanced percentage of gizzard 4.84 weight ($P > 0.05$). The average weight of Tegal duck gizzard which was given a mixture of chitosan and fermented bran in rations ranged from 3.84% to 4.96%. The average percentage of gizzard weight for each treatment is presented in Table 1. Gizzard weight is influenced by age, food and body weight. Putnam reported that the percentage of gizzard weight ranges from 1.6 to 2.3% of body weight [6]. Balanced gizzard weight in the study indicates that the amount of rations consumed by ducks is also almost the same.

Table 1. The average percentage of Tegal duck gizzard weight by giving chitosan and fermented bran in rations

Parameters	Treatment (%)			
	R0	R1	R2	R3
Gizzard weight	3,84	4,96	4,74	4,84

Remarks:
R0 = 45% corn + 35% concentrate + 20% bran without fermentation,
R1 = 45% corn + 35% concentrate + 20% fermented bran,
R2 = 45% corn + 35% concentrate + 19.5% + 0.5% chitosan fermented rice bran
R3 = 45% corn + 35% concentrate + 17.5% fermented + 2.5% chitosan bran

The duck layer which is producing with the same amount of ration given per head per day will utilize the ration given entirely for basic living and production, so that the ration given daily to the duck will be completely spent. This causes normal ventricular work. Meanwhile changes in ventricular size will occur if poultry is given high coarse fibrous rations tend to have a larger digestive tract than grain-eating poultry [7]. In this study, chitosan given in the ration was thought to have solubility in the proventriculus before reaching ventriculus/gizzard. This is due to the low (acid) proventricular content of ducks, which is 3.4 [8] which is predicted to cause chitosan to expand and dissolve. This causes the bolus of food that moves into the ventriculus/gizzard to experience the same mechanical digestion so that it does not affect the size of the ventriculus.

Effect of chitosan and fermented rice bran treatment on rations on the weight percentage of Tegal duck's small intestine

The average weight percentage of the small intestine given the addition of chitosan and rice bran in the ration ranged from 4.49 to 5.92. The average percentage of gizzard weight for each treatment is presented in Table 2. . The treatment showed a significant effect (P <0.05) on the percentage of Tegal duck's small intestine weight.

Table 2. Average percentage of Tegal small intestine by giving chitosan and fermented bran in rations

Parameters	Treatment (%)			
	R0	R1	R2	R3
Small intestine	$4,49^{a}$	$5,92^{b}$	$4,64^{ab}$	$5,06^{ab}$

Remark:
R0 = 45% corn + 35% concentrate + 20% bran without fermentation,
R1 = 45% corn + 35% concentrate + 20% fermented bran,
R2 = 45% corn + 35% concentrate + 19.5% + 0.5% chitosan fermented rice bran
R3 = 45% corn + 35% concentrate + 17.5% fermented + 2.5% chitosan bran

Based on Table 2, it can be seen that the R1 treatment is real (P <0.05) higher than the control (R0). The increase in weight of small intestine R1 was 31.85% from the control (R0). While treatment of R1, R2 and R3 shows the average percentage of the weight of the small intestine (P> 0.05). The R2 and R3 treatments did not show significant differences in the control (R0). The size of the digestive tract weight is not a static magnitude. This means that the weight or length of the digestive tract will change according to the type of ration. The small intestine weight of the control treatment in this study was significantly lower than that of treatments R1 and R3. The reason for this is that crude fiber levels in the control are higher than other treatments. The higher levels of crude fiber in the ration will accelerate the digest rate, while the faster the digest rate, the shorter the digestive process in the digestive tract [9].

The shorter rate of feed digestion in the control is thought to be the cause of the low weight of the small intestine R0 treatment (control) from other treatments. While the treatment given by fermented rice bran has better feed digestion and absorption [10]. States that the slow flow of feed flow in the digestive tract increases nutrient absorption. This is because the intestinal mucous glands more actively excrete digestive enzymes so that the weight of the small intestine becomes larger. Chitosan on treatments R2 and R3 when passing through the segment of the digestive tract with a low pH (crop, pro ventriculus and ventriculus) becomes inflated and dissolves. pH crop, proventriculus and ventriculus are 4.9; 3,4 and 2,3 [11]. According to [12], chitosan can dissolve in weak acids because the acetyl group on glucosamine has been removed by the average weight percentage of Tegal duck pancreas by giving fermented chitosan and bran ranged from 0.26 - 0.34 (Table 3). In this study, giving treatment showed no significant difference in pancreatic weight (P> 0.05) de-acetylation process.

Effect of chitosan and bran fermentation treatment in rations on the weight percentage of Tegal duck pancreas

The average weight percentage of Tegal ducks pancreas by giving fermented chitosan and bran ranged from 0.26-0.34. The average percentage of gizzard weight for each treatment is presented in Table 3.

Based on Table 3, it can be seen that the weight of the pancreas gives an almost equal average. The pancreas is located in the duodenal fold. Its function is

to produce enzymes to help digestion. The pancreas functions to secrete pancreatic sap which contains a lot of amylase, trypsin and lipase to help digest carbohydrates, proteins and fats [13].

Table 3. Average weight percentage of Tegal duck pancreas by giving chitosan and fermented bran in rations

Parameters	Treatment (%)			
	R0	R1	R2	R3
pancreatic weight	0,26	0,34	0,31	0,29

Remark:
R0 = 45% corn + 35% concentrate + 20% bran without fermentation,
R1 = 45% corn + 35% concentrate + 20% fermented bran,
R2 = 45% corn + 35% concentrate + 19.5% + 0.5% chitosan fermented rice bran
R3 = 45% corn + 35% concentrate + 17.5% fermented + 2.5% chitosan bran

Amylase converts starch to glucose, maltose and dextrin. Lipase converts fat into fatty acids and mono glycerides while trypsin converts proteins into amino acids and simple peptides (small) [14]. The pancreas is an accessory organ which acts to secrete digestive enzymes. The weight of the pancreas which increases in size indicates the number of additional enzymes secreted to help digestion. In this study the weight percentage of the pancreas was the same. This indicates that the rations consumed can be degraded with endogenous digestive enzymes that are already available in the digestive tract.

CONCLUSION

The treatment of addition of fermented bran and chitosan in the ration showed the same percentage of weight of ventriculus (gizzard) and pancreatic weight in Tegal ducks (P> 0.05), while treatment R1 (45% corn + 35% concentrate + 20% fermented bran)) real (P <0.05) showed a higher average percentage of small intestine weight than control i.e. 31.85%.

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