THE EFFECT OF FERMENTED PALM CERNEL CAKE LEVEL IN THE RATION ON CARCASS AND CHOLESTEROL OF DUCK MEAT

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Absbtract- The experiment was conducted in Yogyakarta and aims to study the effect of the level of use of Fermented Palm Kernel Cake (PKCF) with *Candida utilis* in the rations on the carcass and cholesterol levels of ducks meat aged 6-9 weeks. Completely randomized design (CRD) was used in this study using five PKCF treatment and five replications. Each replications using four ducks Magelang age of 6 weeks with a homogeneous body weight (785+ 26.75 g). Rations given to the ducks during the study period compiled isoprotein (CP: 17%) and isoenergi (3000 kcal ME / kg). Five treatments were tested, namely ducks by basal ration without the use of Palm Kernel Cake (PKC) as control (P1); ration with the use of Fermented Palm Kernel Cake (FPKC) 5% (P2); ration with the use FPKC 10% (P3), with the use of ration FPKC 15% (P4) and ration the use FPKC 20% (P5). Rations and water were given ad libitum. The variables measured, were the weight cut, carcass weight, carcass percentage, percentage of abdominal fat, cholesterol levels breast meat, thigh and liver. The results showed that the use of FPKC up to the level of 20% was not significant (P> 0.05) against the Final weight t, carcass weight, breast meat cholesterol levels and cholesterol levels of duck thigh meat when compared to controls (P1). However, the use of FPKC 20% in the diet significantly (P <0.05) reduced the percentage of carcasses and increase levels of cholesterol the liver. From these results it can be concluded that the use of 15% FPKC can be recommended as a mixture of feed ingredients in feed ducks.

Keywords: Candida utilis, Fermentd palm kernel cake, carcass, cholesterol

1 INTRODUCTION

In poultry industry, feed cost component is the largest component of production costs that can reach 70-75%. Fodder as one production facilities makes farmers feel its quite expensive. This situation is caused by the availability of quality feed ingredients such as fish meal, corn and soybean meal insufficient and mostly still imported. On the other hand, various industrial wastes that may be used as animal feed ingredients such as palm kernel cake is pretty much produced in Indonesia [19] ; [10]. Palm Kernel Potential for animal feed refined palm kernel. Palm kernel cake consisting of palm kernel meat and shell. BIS output reached 45-46% of palm kernel, or 2,0-2,5% of the weight of oil palm bunches. BIS production in 2007 reached 2,14 million tons. BIS as an alternative feed material million tons. BIS as an alternative feed material contains a huge potential both as a source of energy, crude fiber source, or sources other macro nutrients [5] *cit* [18]. BIS generally contain less than 10% water, protein 14-17%, fat 9,5- 10,5%, and crude fiber 12-18%. Such materials are inexpensive feed ingredients, nutritious, doesn't compete with human needs. The limiting factor its use in rations is the high content of crude fiber, because poultry can't digest fiber. However, crude fiber in rations is essential because its coarse fiber has physiological functions and functions of nutrients for poultry [16] *cit* [19];.[26.] This statement is supported by [28] *cit* [19] stating that the growth of colon and cecum may be induced by fiber. Besides potential as a source of energy, BIS also has advantages in reducing cholesterol and body fat accumulation in cattle [13]. In addition, fiber can reduce the absorption of fat so that deposition of fat and cholesterol levels products can be suppressed, fiber can improve the retention of mineral Co and Fe **[2]** and can increase the density volume epithelium and villi in jejunum, ileum and small intestine [14]. Efforts

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to improve value of BIS can be done by utilizing the ability of the yeast *Candida utilis* were able to improve digestibility of feed high in fiber and produce ribovlavin [31] *cit* [19], could serve as a probiotic in poultry, and to prevent poisoning caused by aflatoxin or *aflatoxicosis* [22]. *Candida utilis* can be used to control bacteria in the intestines, so it can maintain the population balance of bacteria in intestine, improve feed efficiency, spur growth and increase productivity of livestock [8]. Results of recent studies indicate that BIS fermentation using *Candida utilis* able to improve nutritional value of improving crude protein and extract materials without N and lower in fiber [18]. At this fermentation decreased levels of crude fat, it also causes a decrease in the gross energy value of BIS (4733,5) while FPKC (4245,5 kcal/kg), as well as the metabolic energy in BIS (2672,54) and FPKC (1807,76 kcal/kg [25]. Results of similar research showed that BIS fermentation with *candida utilis* can increase availability of nutrients include water content, crude protein, soluble protein, undigested protein and increased hemicellulose and mannose, as well as the improvement of metabolic energy and increase digestibility of crude fat [16]. The use of other microbes such as *Lactobacillus acidophilus, L. casei, Bifidobacterium bifidum, Torulopsis, danAspergilus oryzae* as inoculum in fermentation ration can improve growth and lowering serum cholesterol chicken [8]. and can improve carcass quality [26]. Other uses of fermented products such as reported by Tanaka *et al*. (l992 cit [31]), that the use of feed ingredients fermentation products can suppress activity of enzyme *3-hydroxy-3-methylglutaryl Co-A reductase* which serves to synthesize cholesterol in liver. Fermentation process is influenced by involvement of enzyme produced by microbes. Some recent research shows, the addition of Allzyme®SSF 200 g/ tonne broiler feed based oil palm cake can improve digestibility, performance, income over feed cost (revenue / profit), uniformity of growth and can reduce water content of feces. Use of yeast in the ration can improve performance, digestibility of feed fiber, and decrease the body fatty poultry The use of fermentation products in rations can reduce the amount of body fat of broiler chickens [9]. The yeast supplementation on rations containing sawdust can reduce the amount of subcutaneous fat, including skin carcass [1]. He also reported that the use of probiotics in rations may reduce cholesterol of eggs. Other benefits of probiotics in poultry were reported by addition of enzyme production of Balitnak or multi commercial enzyme in BIS already filtered it, can increase metabolic energy into 2317 kcal/kg and protein digestibility to 51,3% [17]. The addition of a single enzyme mananase or commercial multi enzyme (cellulose, glucanase, xylanase and phytase) in rations containing BIS was found to increase digestibility of protein, fat, ash and metabolic energy ration **([16];[7];[9]**. With the addition of enzyme, BIS can be used in feed ducks up to 30% to match the performance of chickens fed a standard ration (corn-soybean meal), provided that the formulation of ration is based on amino acids digested [19]. Thus, benefits of probiotics such as increasing activity of digestive enzymes and decrease enzyme activity of harmful bacteria, improve digestion, and stimulate body's defense system.

From the description above, it would need to do research about effects of the use of palm kernel cake fermented with *Candida utilis* against the carcass and cholesterol levels duck meat.

2 Materials and Methode

Place and Time for Research

Field research was conducted in a cage belonging to UPT Gardens and Livestock Mercu Buana University Faculty of Agro-Industry and Laboratory Sciences Faculty of Agro-industry Mercu Buana University, Yogyakarta. This research lasted for three weeks.

Cages and Ducks

Cage is used with the system battery cages colony of bamboo as many as 25 pieces. Each plot cage measuring 0.80 m long, 0.50 m wide and 0.40 m high. All plots cage

located in a building with a tile roof. Each plot cage is equipped with a feed and drinking water. Ducks used are Magelang's drakes derived from local duck farmers in Mungkid Magelang age of 6 weeks and body weight is relatively same. (785+ 26,75 g).

Rations and Drinking water

Rations were used in this research was calculated based on food table composition according [14], by using materials such as yellow corn, fish meal, soybean meal, rice bran, palm kernel cake fermented (obtained from Belitung), palm oil and premix Table 1 and Table 2 , All treatments are prepared rations isocalorific (ME : 3000 kcal/kg) and isoprotein (CP : 17 %). Drinking water comes from local wells.

Candida utilis

Culture Candida utilis was obtained from PAU UGM and replanted at Faculty of Agro-Industry Science Laboratory Mercu Buana University, Yogyakarta.

Fermented palm kernel cake

Pure culture *Candida utilis* R-24 replanted into a culture medium so that a new slant, cold and sterile, then incubated aerobically for 24-48 hours at a pH 6,8-7,0 and a temperature of 30 ^{o}C. Culture medium that consists of extract taoge ,glkosa 2,1 g bacto agar 1.5 g. NaCL 0.5 g and demineralized water 100 ml. Sterilization by autoclaving at 121 ^{0}C for 15 minutes (glucose separated with other materials). Furthermore, from first test tube so that the tilt added as a starter using pumpkin, based on volume of 250 ml. By adding medium nurseries into 1 liter of water with composition, $KH_2PO_4$12H2O 1.3 g, $MgSO_4$7H2O 1 g, $FeSO_4$7H2O 0,01 g, $CaCl_2$2H2O 0,01 g, $MnSO_4$H2O 0,01g and NH_4NO3 5 g mixed with aquades sufficiently, pH was adjusted 4 by adding HCl, drops 50 g as a carbon source. To obtain the volume of medium nurseries more, simply by adding a starter previous nursery into medium as much as 3-10% (v/v).

Next phase of inoculation starter (10%) in the medium of palm kernel cake enriched with drops as much as 25, water content of the medium isn't more than 60%.

Table 1. Feed Ingredients in Ration Composition Research (Magelang's Drakes 6-9 Weeks)

				The content of nutrients				
Feed Ingredients	CP	ME	CF	FAT	Calcium	P	lys	met
Corn	8,3	3350	2,2	3,8	0,02	0,08	0,26	0,18
Soybean Meal	44	2446	7	0,8	0,29	0,27	2,69	0,62
Rice bran	12,9	2980	11,4	13	1,6	0,2	0,59	0,26
Fish Meal	60,87	2487,05	1,06	6,85	27,31	0,77	4,51	1,61
CPO Oil	-	7356	-	-	-	-	-	-
FPKC	19,292	3443,11	20,833	1,698	0,45	2,61	1,218	0,045
premix	-	-	-	-	-	-	0,3	0,3
Salt	-	-	-	-	-	-	-	-
Filler	-	-	-	-	-	-	-	-

Source : 1) Hartadi et al (1997)

CP : Crude Protein ME : Metabolizable Energi CF : Crude Fiber

1) Results of analysis of Chemistry Laboratorium UMBY (2014)

Table 2. Composition Substance Food in rations Research (Bali's Drakes Age 3-9 weeks)

INGREDIENTS	P1(%)	P2(%)	P3(%)	P4(%)	P5(%)
Yellow Corn	60	55	50	44	43
Soybean Meal	20	20	18,5	17,5	15
Rice bran	15	13	13	13	15
Fish Meal	3	3	3	3	3
Palm Oil	1	1	2	2	0
FPKC	0	5	10	15	20
premix	0,3	0,3	0,3	0,3	0,3
Salt	0,15	0,15	0,15	0,15	0,15
filler	0,55	2,55	3,05	5,05	3,55
TOTAL	100	100	100	100	100
CP	17,54	17,83	17,72	17,75	17,79
ME	3094,37	3039,43	3080,95	3027,65	3017,63
CF	3,49	5,17	5,99	6,83	7,9
FAT	3,78	5,52	4,11	3,96	4,25
Ca	1,13	1,12	1,14	1,15	1,2
P	0,16	0,28	0,4	0,79	0,4
Lysin	1,05	0,89	0,96	0,98	0,74
Methionin	0,32	0,31	0,29	0,27	0,26

Incubation was carried out in a laminar (sterile cabinets) with aeration for 48 hours. Then harvested and stored in a freezer, partially drained as needed within cabinet dryer with a temperature of 50^0C for 6-8 hours until dry (Picture 1)

Then fermented palm kernel cake is used as feed material constituent rations ducks at various levels.

Ration treatment and drinking water were given *ad libitum* along study period. Addition of rations 2-3 times a day and this will be a place filled 3/4 rations, to prevent rations are not scattered.

Design of Experiments

Design used in this research is completely randomized design (CRD) with five treatments and five replications. Each repetition (experimental unit) using 4 Magelang's Drakes aged six weeks with a homogeneous body weight.

Five treatments were tested are ducks given basal rations without use of fermented palm kernel cake (FPKC) as control (P1)); rations by using FPKC 5 % (P2); rations by using FPKC 10 % (P3), rations by using FPKC 15 % (P4), and rations by using 20 % (P5).

Observed Variables

Variables observed or measured in this research :

- Weight of piece: Weight of ducks at the end of study and had fasted for 12 hours
- Weight of carcasses: live weight reduced by blood, feathers, heads, feet, and viscera (USDA., l977).
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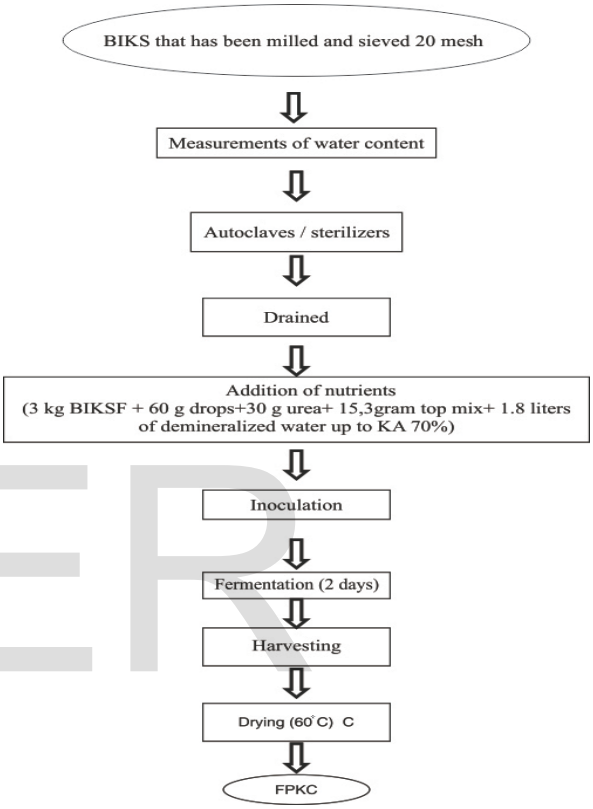
- The percentage of carcasses: a comparison between carcass weight with the weight of pieces x 100%.
- Abdominal Fat : a combination of *pad fat, mecenteric fat, and fat gizzard.* (Kubena *et al.,* 1974)..



Picture 1. BIS fermentation process flow diagram with *Candida utilis.*

- Cholesterol meat : chemical analysis by taking duck's breast meat, thigh and liver on each repetition. Analysis cholesterol was measured by using a kit method CHOD-PAP (Cholesterol Oxidase-Peroxidase Aminoantipyrine Phenol), enzymatic, photometric test (Diasys Diagnostic systems GmBH, 2005).

Statistics analysis

Data were analyzed by analysis of variance, if there are significant differences (P< 0,05) followed by Duncan test (Subali, 2010) with aid of computer SPSS-16., and different ANOVA followed by LSD test using *SPSS versi 16 for Windows*.

3 Result And Discussion

Results showed that the average Final Body Weight Magelang's drakes aged 9 weeks were given a basal rations as control was 1189,33 g/head (Table 3). The average final body weight s of ducks were given in the rations by FPKC 5 % (P2); FPKC 10% (P3), FPKC 15% (P4), FPKC 20% in succession is : 2,15 % was significantly higher (P>0,05); 7,67 % was significantly higher (P>0,05); 7,03 % was significantly higher (P>0,05); 0,36 % lower unreal (P<0,05) when compared with control (P1). These results indicate there is a declining trend in slaughter weight at the level use of FPKC 20% in ration, but this reduction wasn't significantly different. This condition means that level of use FPKC to 20% in the ration doesn't have a negative effect in live weight broiler chickens. It also indicated that palm kernel cake before fermentation process has a low nutritional quality, and turns through fermentation process can be improved.

Inclusion FPKC to 20% with fiber content at P1(3,4%) to P5 (7,9%) didn't affect on the final body weight , and even inclusion of FPKC to 15 % tends to increase the final body weight . This condition is suspected that palm kernel cake fermented by the yeast *Candida utilis* can increase fiber digestibility. This is consistent with results reported that, in ducks found cellulolytic bacterial population of $3,1x10^5$ in ileum, $2,1x10^5$ in cecum and $4,0x10^4$CFU/g [29]. , Then explained that ducks tolerant of crude fiber rations up to 20% because fiber acts as a nutrient and substrate. yeast in rations can increase digestibility of crude fiber rations in ceccum into volatile fatty acid product (acetic acid propionic, and butyric) [4]. Volatile fatty acids), an additional energy source for ducks and microorganisms in intestine [27]. In digestive tract of ducks, yeast can serve as a source of probiotics and can improve the retention of minerals calcium, phosphorus, and manganese [12], and be able to improve digestibility of protein [16] and microorganisms in intestine [27].

Table 3. Influence of Palm Kernel Cake Fermented with *Candida utilis* on Carcass and Meat Cholesterol Levels Ducks.

Variable	Treatments				
	P1	P2	P3	P4	P5
Final Body Weight (g)	1189,33 ^{a}	1214,85 ^{b}	1280,92 ^{b}	1259,65 b	1185 ^{a}
Weight of Carcass (g)	673,2 ^{a}	651,4 ^{a}	680,6 ^{a}	680,4 a	564,4 ^{b}
The percentage of carcass (%)	57,07 ^{a}	57,69 ^{a}	52,11 ^{b}	55,49 b	48,48 ^{c}
Abdominal Fat (%)	0,066 ^{a}	0,187 ^{abc}	0,233 ^{c}	0,163 bc	0,094 ^{ab}
Cholesterol of breast meat (mg/ g) ^{ns}	1.65	2.29	1.11	1.68	1.37
Cholesterol of thigh meat (mg/ g) ^{ns}	1.04	1.1	1.02	1.06	1.01
Cholesterol of liver	3,32 ^{ab}	3,44 ^{ab}	3,06 ^{a}	3,06 a	3,91 ^{b}

Description :
1. Ration control (P1), rations with use of FPKC 5 % (P2); rations with use of FPKC 10%
   (P3) rations with use of FPKC 15 % (P4), rations with use of FPKC 20% (P5),
2. Values with different letters in the same row indicate significantly different (P<0,05)

In digestive tract of ducks, yeast can serve as a source of probiotics and can improve the retention of minerals calcium, phosphorus, and manganese [12], and be able to improve digestibility of protein [16] that are closely related in the growth process. In addition, probiotics itself acts as a provider of single cell protein which has a high

nutritional value, especially as a provider of essential amino acids that are necessary in the synthesis of tendon [24].

Weight of Carcass and The Percentage of Carcasses

The average weight of carcass ducks treated control was 673,2 g/head and didn't show any significant difference (P>0,05) with the weight of carcass ducks in P2 , P3, and P4 treatment. However ducks in P5 treatment, weight of the carcass 6,16 % real (P>0,05) lower than control.

Duck carcass percentage who received control treatment was 57,07 %/ (Table 3) and indicate differences are not real (P<0,05) with duck carcass percentage P2 treatment. Duck carcass percentage P4 treatment markedly lower 16,6%(P>0,05) compared to control and significantly lower than other treatments. P3 and P4 treatments significantly lower than treatment P1, P2 but significantly higher than P5. That is an increase FPKC in the ration give effect to weight of carcass and carcass percentage. The carcass percentage is a ratio of carcass weight with final weight of ducks, so if final a great weight followed by the greater carcass weight and vice versa. According **[6] ; [8[** reported that weight of carcass is affected final body weight, and fatty body at time reaches the market conditions, if the lower the weight, the lower end of carcass weight.

Abdominal Fat

The average amount of abdominal fat in the duck's body control is 0.66% of body weight (Table 3) and had no significant (P>0,05) with treatment ducks P2 and P5. However, in the treatment ducks P3 and P4, percentage of abdominal fat increased significantly (P>0,05) respectively : 71,87 % and 59,5 % higher than control. Abdominal fat percentage using FPKC to 20 % in ration (P5) resulted in abdominal fat weren't significant with P1, P2. Abdominal fat were given FPKC 20 % in the ration proved to be no different from that consume chicken control diet (FPKC 0%). This fact give a clarity that existence FPKC up to 20 % in the ration isn't a negative influence on abdominal fat. On the other hand, metabolizable energy content in each rations P1, P2 and P4 are iso calories is about 3000 kcal/kg of rations. According to [27[that the content of metabolizable energy in ration give a positive influence on abdominal fat content, with increasing metabolizable energy content will increase abdominal fat content of ducks.

Total Cholesterol Levels Breast and Thigh Meat.

Total cholesterol levels in ducks breast meat which received the control treatment (P1) was 1,65 mg/g (Table 3) indicate a difference that was not significant (P<0,05) with all other treatments, as well as cholesterol levels thigh meat indicate differences among the five treatments were not real (P<0,05). This condition indicate that cholesterol meat using FPKC up to 20% in ration (P5) produces cholesterol of meat which isn't significantly different from P1, P2, P3 and P4. The use of used vegetable oil in ration of broiler chickens will give cholesterol content of meat ranges from 129.48 – 182.02 mg/100 g [21], while [17] cholesterol content of chicken broiler by 110 mg/100 g and for chicken of 116 mg/100g. Research results cholesterol broiler meat were conducted ranged from 100.0 – 105.8 mg/100 g, this range is lower than [31] research. The use of fiber feed with and without tape fermentation process with yeast was able to reduce the amount of abdominal fat and cholesterol levels duck meat. This is because in the tape contained the yeast *Saccharomyces serevisiae* which according to [32]) can improve the digestibility of crude fiber rations in the cecum into volatile fatty acid product (acetic acid, propionate, and butyric). [1]

Increased fiber consumption caused rations flow rate increases and as a result, cholesterol in rations will come out through the intestine movements, whereas bile salts to be absorbed back into blood to be circulated back as cholesterol [31] This opinion is supported by [22]) which says that the other fractions of crude fiber, pectin, it can bind to bile acids and cholesterol. Thus increasing the

excretion of bile acids and cholesterol in feces. In addition, the ability of coarse fraction of cellulose fiber to bind cholesterol in the digestive tract of four times the molecular weight than cellulose it self [31[. According to [22] a decrease in cholesterol meat due to the rough fiber binds cholesterol directly, also binds bile acids and inhibiting intraluminal enterohepatic circulation of bile acids. It was also reported that main action which led to a decrease in absorption of cholesterol in high-fiber rations is as a result of increased fat excretion, bile acids, and cholesterol from duck's body. Some research that supports this research is the use soybean coat in the ration was able to reduce blood triglyceride levels ([2]) and reduce levels of cholesterol, triglycerides, and blood [15]). It was also reported by Bidura and Suwidjayana (2000), use of cocoa pod 20% in the ration may reduce cholesterol content in chicken eggs.

Liver Total Cholesterol Levels.

Total cholesterol levels in the liver of ducks that received control treatment (P1) is 3,32mg/g in Magelang's Drakes age 9 weeks (Table 3), showed no real difference (P<0,05) by treatment with P2, P3 and P4 while P5 significantly different (P>0,05) **17,77**% higher than control. In this study has been calculated that the consumption of crude fiber in each consecutive ducks from P1, P2, P3, P4, and P5 are 4,22, 6,68, 7,28l., 9,45, 9,79%. Ducks on treatment P5 highest fiber consumption so that P5 liver cholesterol levels are also highest. Crude fiber can increase production of bile and eliminate N to be excreted with feces [3], so liver trying to excrete bile salts. In producing bile salts liver requires cholesterol and if reserves of cholesterol in the liver is insufficient, then liver will send messages to brain and brain will respond by sending signals to HDL in liver to be picked up cholesterol in form of LDL (low density lipoprotein), which is a carrier of cholesterol most, 60%, from total plasma cholesterol to be transported from liver to body cells that need it. Excess cholesterol will be transported back to liver by HDL (high density lipoprotein), a particulate solid and a little later will be described and thrown into gallbladder as bile acids unused and covered in blood vessel tissue to be taken to liver and used in metabolic processes that occur in the liver[2]. By exploited LDL in blood vessel tissue, then there will be a buildup of cholesterol in the blood vessel capillaries, consequently there will be no accumulation of plaque in blood vessels that can lead to atherosclerosis.

Re-absorption of bile salts and cholesterol in digestive tract, partly depending on the increase in fiber in the diet. Because process of re-absorption of cholesterol and bile salts interfere with fiber [22], then excretion of feces that carry elements of bile (cholesterol) so increased. More feces out easily and regularly, then cholesterol is synthesized mainly by liver cells, small intestine, adrenal gland and other cells that have the ability to produce cholesterol in body will also be reduced.

4 Conclusion

The use of palm kernel cake up to level of 20% isn't significant (P<0,05) to Final Body Weight , carcass weight, breast meat cholesterol levels and cholesterol levels duck thigh meat when compared to control (P1). However, the use of FPKC 20 % in ration significantly (P>0,05) reduced the percentage of carcass and improve liver cholesterol levels. From these results it can be concluded that the use of 15 % FPKC can be recommended as a mixture of feed ingredients in the rations ducks.

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