EFFECT OF PROBIOTIC SUPPLEMENTATION ON LOW PROTEIN DIET ON BROILER PERFORMANCE

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ABSTRACT

This study was carried out to determine the effect of probiotics supplemented in low protein diets on performances of broiler aged 2-6 weeks. The design used was a completely randomized design (CRD) with three treatments and six replications. Each replication consisted of three broiler chickens aged two weeks with homogeneous body weight. The treatments were a standard ration containing 20% crude protein as a control diets (A), the ration with 18% crude protein content (B), and a diet with 18% crude protein content with a probiotic 0.20% *Saccharomyces spp* supplemented (C). Feed containing 2900kcal/kg metabolic energy and water were provided ad libitum. The results showed that the decrease of crude protein content rations of 2% units lower than the recommended standard rations (treatment B) were significantly reduced ($P<0.05$) on final body weight, body weight gains, and feed efficiency compared both with the control and treatmens C groups. In contrast, there were increased significantly different ($P<0.05$) on the amount of *abdominal-fat*. Supplementation of probiotic 0.20% *Saccharomyces spp* in the ration C were increased on body weight gains and feed efficiencies significantly different ($P<0.05$) compared with treatment B. In contrast, there were decreased significantly ($P<0.05$) different on abdominal-fat and blood serum cholesterol contents of chicken. It was concluded that supplementation of probiotic 0.20% *Saccharomyces spp* culture in ration with protein content 18 % resulting the same of broiler performance aged 2-6 weeks compared to the control. Supplementation of probiotic 0.20% *Saccharomyces spp* cultures in the ration can decrease abdominal fat and blood serum cholesterol contents of broiler aged 2-6 weeks.

Key words: *Saccharomyces sp., probiotics, performances, abdominal-fat, cholesterol*

INTRODUCTION

The high productivity of broiler can be achieved if they were given good quality feed. But, there was another problem to the quality of the improved diet need the high cost about 80% of farm operating expenses (Rasyaf, 2004). In broiler farming efficiency aspects must consider. Efficiency will be achieved to the maximum when feed were given carefully in accordance with the rules of the science of nutrition. This is the concept to formulates application, that farm performance is influenced by genetic and environmental factors, as well as their both interaction. The dominant environmental factor is the feed. The feed must meet the standards of adequate and balanced nutrition.

The high cost of the ration was being affected by several things, one of which is the high level of protein diets. High protein content in the diet causes to expensive price but protein is one of the factors that determine the level of quality and

productivity of livestock. Therefore the levels of protein was suggested at the minimum levels of other intake (Rasyaf, 2004).

The decrease of the protein content in the ration will be resulted accumulation increased of the fat. This is evident similar to the results of Retnowati (2004) research who found that the decrease of protein content of 1% units recommended standard increased the amount of subcutaneous fat including skin. The similar report was reported by Apni (2002) who obtain an increase in body fat accumulation in chickens fed diets with crude protein content of 2% units lower than the standard. On the other hand, consumers are demanding a better quality products (low-fat products). To overcome the above protein is by applying biotechnology probiotics through the given ration (Bidura, 2007).

Sjofjan (2008) reported that the addition of yeast culture of Saccharomyces sp. as the probiotic sources in broiler diets can increase weight of carcass significanly. Suciani et al. (2011) was reported that the addition of 0.20% yeast probiotic of tape as a source of fiber in the diet can decrease the amount of abdominal fat and cholesterol content of broiler meat significanly. Dewi (2009) reported that the decrease one percent of protein content that lower than the recommended can decrease body weight and increase the accumulation of 6-12 weeks of layer-type chicken fat. However, the presence of 0.20% probiotic supplementation of starbio in that low protein diet is able to provide the same results with the control. Probiotic supplementation in diet or through drinking water was increase growing and decrease serum lipids in chicken blood (Bidura et al., 2011 and Sutarpa et al., 2011), as well as decrease of body fat accumulation in broiler (Abdullah, 2004).

The purpose of this study was to assess the effect of supplementation of probiotic Saccharomyces sp. in the ratio lower protein than that recommended on the performances, abdominal fat, and chicken blood serum cholesterol levels.

RESEARCH METHODS

Location and Time Research

These research was conducted in the farmer research in Dajan Peken village, Subdistrict of Tabanan District of Tabanan . The study is finished for two months from preparation to data analysis from February to March 2013.

Cages and Equipment

The "battery colony" cage system used 18 pieces of bamboo slats. Each cage have 0.05 of length x0.04 of width x 0.04 of height. All of plots are in an indoor roof tile cage. Each plot is equipped with a swath of feed and water, during the night, the cage was given illumination

Rations and Drinking Water.

Ration used consisted of materials such as: yellow corn, rice bran, coconut meal, soybean, fish meal, coconut oil, pollard, NaCl and mineral mix. Ration and chemical composition as shown in Table l and 2. While drinking water sourced is from local PAM and provided ad libitum throughout the study. The additional of

rations is done 2-3 times daily and a ration trought was filled 3/4 part, to prevent the ration is not scattered.

Table 1 Feed composition rations in of 2-6 Weeks of Broiler Chickens

Feed Material (%)	Diets[1)] A	B	C
Yellow corn	44,56	53,60	53,60
Rice bran	10,49	8,50	8,50
Coconut Cake	4,20	4,00	4,00
Soybeans	10,05	7,80	7,80
Fish meal	14,11	11,48	11,49
Coconut oil	2,50	1,32	1,33
Pollard	13,50	12,70	12,49
Probiotics *S. cereviceaece*	-	-	0,20
Salt	0,35	0,36	0,35
Mineral mix	0,24	0,24	0,24
Total	100	100	100

Notice:

1). Ration with a protein content of 20% as a control (A), the ration with 18% protein content (B), and rations with protein content 18% + 0.20% supplementation of Saccharomyces cerevisiae (C)

Table 2 Composition of Broiler Diet Aged 2-6 Weeks [1)]

Diet Component (%)	Diets A	B	C	Standard [2)]
Termetabolis Energy (kcal/kg)	2900	2900	2900	2900
Crude Protein (%)	20,00	18,00	18,00	20,00
Crude fiber (%)	7,90	7,60	7,61	5-8
Ca (%)	1,16	1,05	1,05	1,00
Avalilable-P (%)	0,70	0,59	0,59	0,45
Arginine (%)	1,44	1,27	1,28	1,14
Histedin (%)	0,48	0,46	0,46	0,45
Isoleusine (%)	1,03	0,92	0,92	0,91
Leusine (%)	1,78	1,65	1,65	1,36
Lysine (%)	1,42	1,20	1,19	1,14
Methionin (%)	0,47	0,45	0,45	0,45
Phenilalanin (%)	0,94	0,85	0,85	0,73
Threonine (%)	0,84	0,76	0,76	0,73
Tryptopan (%)	0,24	0,22	0,22	0,20
Valine (%)	1,06	0,94	0,94	0,73

Notice :

1) Based on the calculation according to Scott et al. (1982)

2) Based on the standard Scott et al. (1982)

Research Design

This study used a completely randomized research design with three treatments and six replications. In each replication using two strains of broiler chickens CP 707 age two weeks with homogeneous weight. All three treatments

were: ration with CP: 20% as a control (A), with CP ration: 18% (B), ration with CP: 18% + 0.20% probiotic Saccharomyces sp (C). All termetabolisnya ration energy content is the same for 2900 kcal/kg and given in the form of flour

Observed Variables

The variables measured were feed intake, final body weight, weight gain, FCR, carcass, abdominal fat, and blood cholesterol levels.

Statistics Analysis.

Data were analyzed with analysis of variance, where among treatments showed significant differences (P <0.05) than the text different followed by Duncan's multiple range test (Steel and Torrie, l989).

RESULTS

Weight Sain

The results showed the final body weight of chickens fed the basal diet as a control (treatment A) was 1892.08 g / hea (Table 3). Mean of final weight chickens fed diets with protein content of 2% units lower than the basal ration was 6.62% (P <0.05) lower than controls. The supplementation of 0.20% in the probiotic Saccharomyces cereviciae to C ration treatment can increase 0,08% of average final of body weight of chicken significanly (P <0.05) higher than the chickens treatment B and 0.90% howefer was not significanly (> 0.05) higher than the control.

The mean weight gain of chicken feed control (treatment A) during the four weeks of observation was 1604.50 g/head/4 weeks (Table 3). The mean weight gain of chicken treatment B and C were: 7.81% (P <0.05) lower than treatment A and 1.08% respectively and that is not significant higher than control chickens. While the average weight gain of chicken treatment C was 9.65% (P <0.05) higher than the cock chicken treatment B.

Consumption of Rations

The average number of rations consumed for four weeks by the control chickens (treatment A) was 2431.50 g / head / 4 weeks (Table 3). The average number of rations consumed for four weeks by chicken treatment B and C respectively were: 2.21% (P <0.05) lower and 0.53% was not significant (P> 0.05) lower than control chickens. While the average number of rations were consumed for four weeks by chicken treatment C was 1.72% (P <0.05) higher than the chicken treatment B.

Table 3. Effect of Treatment Aged 2-6 Weeks Broiler Performance

Variabele	Treatment[1)]			SEM[2)]
	A	B	C	
Initial body weight (g/head)	287,58a	288,00a	287,33a	0,416
Final body weight (g/head)	1892,08a[3)]	1766,83b	1909,17a	8,622
Final body weight (g/head/4 weeks)	1604,50a	1479,17b	1621,83a	8,521
Feed intake (g/head/4 weeks)	2431,50a	2377,83b	2418,67a	12,473
Protein consumption (g/ekor/4 weeks)	486,30a	475,57b	483,73c	3,01
Confersion Feed Ratio *(FCR)*	1,52b	1,61b	1,49c	0,008
Abdominal fat (% body weight)	1,44a	2,26b	1,55a	0,071
Blood cholesterol (mg/%)	143,17a	142,83a	130,33b	3,071

Notice:

1) Ration with 20% protein content as a control (A), the ration with 18% protein content (B), and rations with protein content 18% + 0.20% supplementation of Saccharomyces cerevisiae (C)
2) SEM: Standard Error of the Means treatmens
3) Values with different letters in the same row indicate significantly different (P <0.05)

Feed Conversion Ratio (FCR)

The mean value FCR for the four-week observation in chickens controls (treatment A) was 1.52 (Table 3). The mean value FCR for the four-week observation in chickens treatment B and C were: 6.05% (P <0.05) higher and 1.64% (P <0.05) respectively lower than control chickens. While the value of FCR during the four weeks of observation on cock treatment C was 7.25% (P <0.05) lower than the chicken treatment B.

Fat Abdomen (Abdominal-Fat)

The average of abdominal fat (abdominal-fat) in chickens fed the basal diet as a control (treatment A) was 1.44% body weight (Table 3). The average amount of abdominal fat chickens treatment B and C respectively are: 56.53% (P <0.05) higher and 7.40% is not significant (P> 0.05) higher than controls. Supplementation of 0.20% in the probiotic Saccharomyces cereviciae to ration treatment C can decreased of the average of chicken abdominal fat 31.39% (P <0.05) lower than the cichken treatment B.

Blood Cholesterol

Mean serum cholesterol levels in the blood of chickens which fed the basal diet as a control (treatment A) was 143.17 mg/ dl of blood (Table 3). Mean serum cholesterol levels in the blood of chickens fed rations treatment B and C are,: 0.23% was not significant (P> 0.05) and 8.96% respectively lower (P <0.05) lower than control. Supplementation of 0.20% in the probiotic Saccharomyces cereviciae to ration treatment C turns the average cholesterol level in the blood serum of chickens decreased 8.75% (P <0.05) lower than the chicken treatment B.

DISCUSSION

Protein content in the diet affect the body weight and weight gain of chicken. Decrease in protein content of 2% units lower than the recommended standard (treatment B) turns out to lose weight and final weight gain of chicken. That is because of protein deficiency in chicken. Tillman et al. (l998) stated that the decrease in protein content in the diet of cattlel cause a lack of protein, so that the tendon synthesis and metabolism in the body is interrupted. The results of the study Bidura (l998) found a decrease in protein content in the ration isocalorific (2900 kcal ME / kg) of 17% to 16% significantly reduced nitrogen and energy termetabolis on Bali ducks. In contrast, the ration of 18% protein content, the metabolism of nitrogen is increased and metabolism energy is decreased.

The increase of final body weight and weight gain of chickens fed with probiotic supplementation Saccharomyces sp (treatment C), caused by yeasts Saccharomyces sp able to increase the final matabolism energy value of the feed (ME) and feed digestibility. According to Sabini et al. (2000), an increase of the metabolism energy content of the feed by T. reesei fungus due to the degradation of the polysaccharide mannan by the fungus T. reesei into simpler forms (monosaccharides), generating enough energy value compared in the form of polysaccharides mannan into mannotriosa, mannobiosa, and monnosa. The yeast Saccharomyces sp is working as a fermenter (fermenters) of organic materials in the gastrointestinal tract of chicken. The results of fermentation of the organic matter is in the form of acid release amino acids and saccharides in the form of dissolved organic compounds are readily absorbed (Bidura, 2007). It was also reported by Han et al. (l999) that Aspergillus oryzae and S. cereviseae can increase the activity of amylolytic and proteolytic enzymes in the digestive tract of chicken, so as to improve the digestibility of protein and metabolism energy. More detailed growth curve of 2-6 weeks age of broilers is presented in Figure 1.

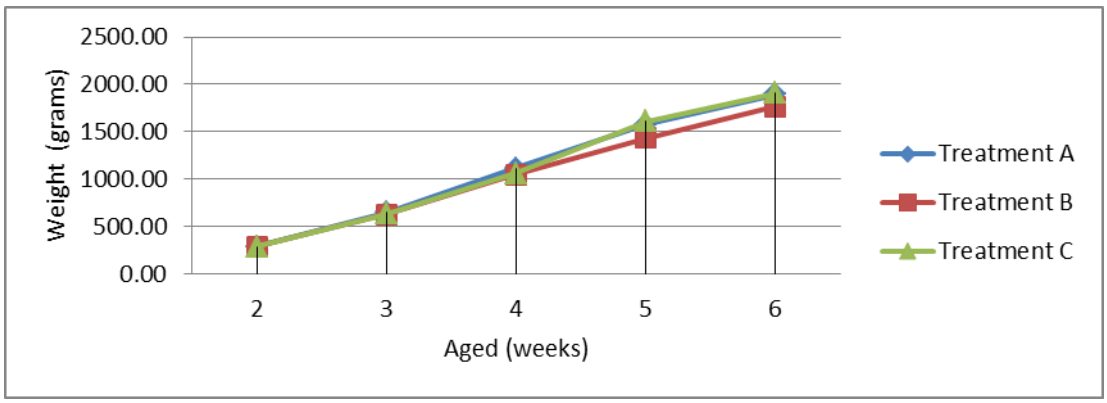

Figure 1 The growth curve of 2-6 weeks age broiler chickens on each treatment

Bidura et al. (2012), slated Saccharomyces cereviciae culture can markedly increase the final weight and weight gain of ducks. This is logically because since the Saccharomyces cereviciae cultures used in this study could serve a probiotic agent in the gastrointestinal tract of ducks, and also able to increase the digestibility of crude fiber.

Decrease of protein content in the diet of the recommended decrease the feed consumption. This is because the deficiency in chicken protein for the production process, so that growth is inhibited which causes chicken feed consumption decreased. As reported by Tillman et al. (1998), in addition to the energy content of the ration that affect feed intake, growth rate and the chicken body weight will also affect the level of feed intake

Supplementation with the probiotic yeast Saccharomyces sp inoculant can improve the efficiency of feed intake. This is because the presence of the yeast Saccharomyces sp in the chicken digestive tract may act as a probiotic agent, so as to assist in the enzymatic activity of the gastrointestinal tract of the chicken (Jin et al., 1997, and Piao et al., 1999). Probiotic microbes in the digestive tract may reduce the number of goblet cells (Bradly et al., 1994), reduced the number of goblet cells reduce mucus production , so that the absorption of food by the intestine increased. According to Bashir (1999), mucus produced by the goblet cells in the chicken digestive tract can inhibit the absorption of nutrients. The results of this study are supported by Madrigal et al. (1993), that the efficiency of broiler increased with the addition of probiotic (50-200g / ton of feed). It was also reported by Stanley et al. (l993), that broiler chickens fed Saccharomyces cerevisiae at the lumbal 0.10% increase in weight gain and feed efficiency significanly. The yeast of Saccharomyces cerevisiae will be able to work as a probiotic and can increase the digestibility of nutrients, increasing the content of crude protein, ADF, and NDF (Jilani et al., 2008). Nurhayati (2008), slated that the provision of rations supplemented by microbes that are probiotics can stimulate metabolism improved of poultry feed in the digestive process. The average amount of fat abdominal fat of the chicken treatment B was significantly higher than the control chickens and chickens treatment C. This is because an imbalance energy between content and protein in the ration, so that the can cause protein deficiency and excess energy. Excess energy is stored as fat. According to Scott et al. (l982), chicken protein deficiency will have increased fat deposition in the tissues caused by the inability of cattle in the use of energy for production, since diet does not contain enough protein and amino acids for growth. As reported by Zuprizal (1993) that fatty liver in the chicken's body can be suppressed by increasing the protein content in the ration.

Using probiotics in the lower protein ration (treatment C) reduced the accumulation of body fat significantly compared to chicken chicken B treatment, and did not show any difference with the control. This is because the presence of probiotics can improve the availability of the amino acid lysine (lysine analoque-S-2-Aminoethyl cysteine) in the digestive tract of poultry (Sand and Hankin, 1976). According Astuti (1996), the increased consumption of protein and amino acid lysine can decrease the body's fatty chicken significantly. It was also reported by Seaton et al. (1978) that the consumption of protein and amino acids lysine increased, resulting in low fat content in the body and increasing the amount of meat in the carcass, so as to increase the percentage of carcass meat. Consumption of protein and high lysine amino acid be able to increase the energy retention as protein and low energy retention as fat in the body. Reported by Al-Batshan and Hussein (1999) that increased protein consumption low fat in the abdomen ("abdominal-fat").

The decrease of fat amount and chol esterol levels of blood serum of chicken as a result of probiotic supplementation (yeast culture Saccharomyces sp). The using of Lactobacillus acidophilus, Lactobacillus casei, Bifidobacterium

bifidum, Torulopsis, and Aspergillus oryzae fermentation as an inoculant in the ration significantly increased the growth and lowering serum cholesterol chicken (Mohan et al., L996). The decrease was also due to the presence of compounds that result from the fermentation products can inhibit lipid synthesis in the liver (Tanaka et al., L992). Bidura et al. (2008) stated ducks fed rations with fermented mixture culture (containing microbes lignolitik, cellulolytic, hemiselulolitik, proteolytic, and lipolytic) significantly reduced the amount of abdominal fat and serum cholesterol levels in the blood. According Harmayani (2004), probiotic bacteria can assimilate or bind cholesterol from the small intestine during growth, so that cholesterol can not be absorbed into the bloodstream. Bacteria are able to grow and assimilate cholesterol in the small intestine has the potential as a controller host blood serum cholesterol levels, as occurs in the small intestine cholesterol absorption process. The ability of cholesterol assimilation by the probiotic bacteria varies between strains and requires anaerobic conditions and the presence of bile acids.

CONCLUSION

From these results of the study it can be concluded that the decrease in protein content in the ration of 2% units lower than the standard recommended lowering the performance of broiler chickens aged 2-6 weeks. However, the 0.20% supplementation of probiotic cultures of Saccharomyces sp can produce a performance of 2-6 weeks age of broiler chickens were similar compared to standard rations. Supplementation of 0.20% probiotic cultures of Saccharomyces cerevisiae in the diet can reduce body fat distribution in the chicken and reduce the content of cholesterol in the blood serum of broiler aged 2-6 weeks

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