Probiotics based on Local Microorganism as a subtitute of Antibiotic Growth Promotor (AGP) on Broiler productivity

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Abstract. This research aimed to determine the effectiveness of the addition of probiotics based on local microorganisms (MOL) of cattle's rumen and chicken intestines in feed as a substitute for Antibiotic Growth Promotor (AGP). 200 day old chicks were used in this research. The method used the Completely Randomized Design with four tratments and five replications, such as P0 (without probiotics), P1 ((Feed + probiotics with a dose of 5 ml/Kg), P2 (Feed + probiotics at a dose of 10 ml/Kg), P3 (Feed + probiotics at a dose of 15 ml/Kg). The parameters of this research are performance and carcass quality. The results of microbiological analysis showed that probiotics based on MOL contained a concentration of *Bifidobacterium* 3.5 x 10^7 cfu/ ml, *Bacillus* 0.9 x 10^6 cfu/ml, *Streptococcus* 1.06 x 10^6 cfu/ml, and *Lactobacillus* 12.5 x 10^7 cfu/ml. The research showed that the adding of Probiotic was not significant (P>0.05) on feed intake, body weight gain, and carcass percentage but significantly (P>0.05) on mortality and Feed Conversion Ratio. Treatment without probiotic has a higher mortality (8%) than with probiotics (0,67%). The Feed Conversion Ratio by given probiotics 5 ml and 10 ml/kg feed was lower than treatment without probiotics.

1. Introduction

The given of antibiotics to broiler aimed at suppressing disease progression was also used as an effort to increase livestock productivity which was called the Antibiotic Growth Promoter (AGP). Using of AGP causes *Salmonella* resistance and leaves harmful residues in people who consume broiler.

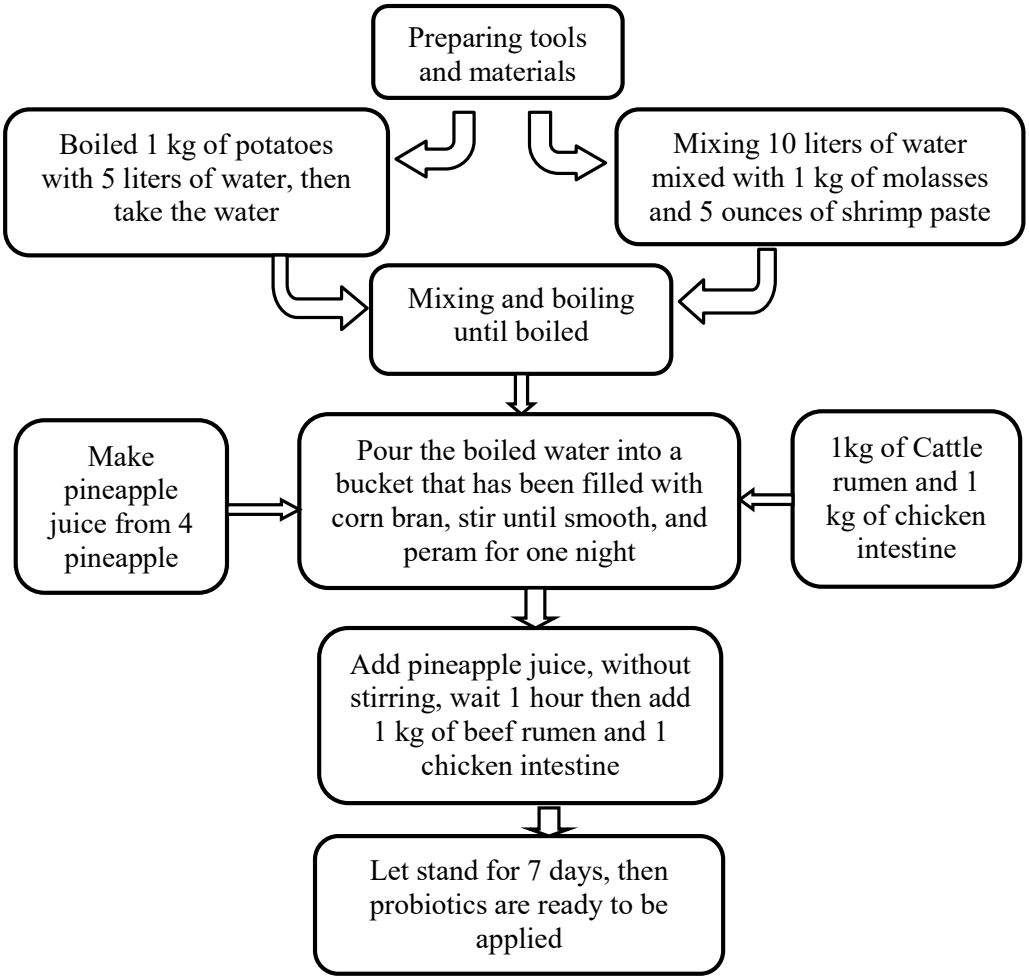
Using of AGP in poultry feed Indonesia, start from January 1, 2018 has been banned giving to chickens. The ban on the use of AGP has caused farmers in Blitar to suffer losses, because the weight of broiler bodies has decreased to 40% from their original weight and decreased egg production capacity from 90% to 40% [1]. Cases that occur in chicken farmers in Blitar require countermeasures so that farmers do not experience loss.

AGP can be replaced by organic acids, enzymes, probiotics, prebiotics, synbiotics, and herbs [2]. Probiotics are microorganisms that are beneficial and can give effect to performance and nutrient digestibility [3], pathogen inhibition [4], and to manage of intestinal microflora [5]. The most commonly used bacterial probiotics are the strains of *Bifidobacterium, Enterococcus, Lactobacillus, Bacillus, Pediococcus* and *Streptococcus.* Some products contain viable yeast and other fungi in addition to bacteria [6], the bacteria are found in the rumen of cattle and are also found in the crop, small intestine and chicken ceca, especially *Lactobacilli* producing lactic acid and acetic acid. The presence of microbes from the rumen of cattle and the digestion of native chickens can be used as an opportunity to use as probiotics based on MOL (Local Microorganisms). So that it is expected to be used as a substitute for AGP to increasing broiler productivity, however it needs to be studied how far the MOL-based probiotic concentration affects the performance of the broiler. This research needed to be done because it is expected to help increase broiler productivity after experiencing a decrease due to the cessation of AGP use.

2. Materials and Methods

This research carried out at the Politeknik Negeri Jember from July to September 2018. This research used COBB 500 broiler strains which were not differentiated sexes by 200 (unsexed), harvest to 35 days. The starter period in brooding was maintained on 20 plots with a litter floor measuring 52 x 38 x 37 cm, each plot was given a 15 watt incandescent lamp which functions as a heater and lighting, and contains 10 DOCs. Finisher period, the plot was widened to 1 M^2 for 10 broilers. The cage plot used for placement of each treatment was randomized.

This research has used equipment; 1. O'haus scales with a capacity of 1300 g with an accuracy of 0.05 g, 2. Digital weighing capacity of 5 kg, 3. The function of higrotermometer and humidity, 4. Place was used to food and drink 5. Plastic was used to store feed samples. 6. Cleaning equipment includes: brooms, wipes, buckets, disinfectant sprayers. Starter period until the finisher used BRI Patriot Feed with 20% crude protein content, crude fiber maximum 5%, maximum fat 6%, calcium 0.9-1.1%, and phosphorus 0.7 - 0.9%. Treatment was given was probiotics made by using rumen bacteria and chicken intestines as local micro organisms (MOL). The manufacturing method is listed in (**Figure 1**).



. **Figure 1.** Probiotic making scheme

Probiotic bacteria in MOL are identified by the method morphological and biochemical tests. The method morphological covering shape, colony color, and gram staining. Gram staining test was used to determine the bacterial class. Biochemical tests are was used to identify and detect a pure culture of bacterial isolation through its physiological properties with the method TSIA, MR-VP, citrate, motility and indole, catalase and urease.

Probiotic application, probiotics was given by 1th day until harvesting through feed with several stages. This research uses a completely randomized design method with four treatments and five replications. Each test contained ten broilers, the number of broilers used in this research were 200 heads.

Retrieval of data, the data taken for the first time was the concentration of probiotic micro organisms which include *Bifidobacterium, Bacillus, Streptococcus* and *Lactobacillus*. The second stage was observed the research parameters that include; Increased body weight, Feed consumption, Feed Conversion, and Percentage of carcass. Probiotic application through feeding according to treatment; P0 = Control Treatment (without probiotics), P1 = probiotics with a dose of 5 ml / Kg of feed, P2 = probiotics with a dose of 10 ml / Kg of feed, and P3 = probiotics with a dose of 15 ml / Kg of feed

3. Results and discussion

The probiotic microorganisms in the MOL of rumen cattle and chicken intestine given to broilers contained *Bifidobacterium* 3.5 x 10^7 cfu/ml concentrations, *Bacillus* concentrations 0.9 x 10^6 cfu/ml, *Streptococcus* concentrations 1.06 x 10^6 cfu/ml, and *Lactobacillus* concentrations 12.5 x 10^7 cfu/ml. Showed MOL made from cattle rumen and chicken intestines contain probiotic microorganisms so that they can be used as probiotics. The results showed parameters measured to determine the effect of adding probiotics based on local microorganisms (MOL) of rumen cattle and chicken intestine in feed as a substitute for Antibiotic Growth Promotor (AGP) in broilers listed in Table 1.

Table 1. Performance of broilers by given probiotics

Treatment	Parameter				
	Mortality (%)	Body Weight Gain (gr)	Consumption (gr)	FCR	Carcass (%)
P0	8,00[a]	1808.86	3283.55	1.82[a]	74.05
P1	0,00[b]	1858.40	3237.69	1.74[b]	72.02
P2	2,00[ab]	1817.80	3157.69	1.74[b]	73.63
P3	0,00[b]	1769.02	3139.57	1.77[ab]	73.48

The difference this letters superscripts showing a real differenced (P<0.05)

3.1. Effect of MOL addition to broiler mortality

In the **Table 1**. shows that the MOL based on the contents of cattle rumen and chicken intestine had a significant effect (P <0.05) on broiler mortality. Broilers given MOL were significantly lower in mortality than broiler mortality rates that were not given MOL, it is suspected that the MOL probiotic microorganisms given to broilers could live in the broiler digestive tract because the pH conditions were in accordance with the needs of the microorganisms. The measurement results showed pH in proventiculus 5, ventricular 3.6, intestine 5.5. Isolates of Lactic Acid Bacteria 9A had good growth in the range of pH 2 - pH 4 after incubated for 3 hours, according to the time needed for food to pass through the stomach [7]. The average absorbance value of resistance to pH 2.0, 3.0, 4.0 and 5.0, *L. acidophillus* and *L. fermentum* is almost the same at each hour of incubation, meaning that the bacteria *L.acidophillus* and *L. fermentum* can survive on the digestive tract pH of poultry in proventriculus and ventriculus which has a very low pH (pH 2.0–3.0). B. fibrosolvens is a rumen bacterium that can be tolerates pH < 6 but possesses lower cellulolytic activity [8]. Rumen cellulolytic bacteria to live and develop require optimum between 6 and 9 is best, while a pH less than 5.5 affects fiber digestibility [9].

The low rate of broiler mortality in chickens given MOL was thought to be probiotic bacteria inside MOL can live in the digestive tract of broilers, especially *Lactobacillus* bacteria which can produce lactic acid by fermenting the carbohydrate feed into organic acids. Lactic acid fermentation appears to be effective in reducing the number of bacterial pathogens [10]. *Bifdobacteria* and other probiotic

cultures that contribute to animal health through mechanisms such as competition with pathogenic bacteria, stimulate the immune system, increase production of short chain fatty acids, control intestinal function, prevent cancer and improve digestion and absorption of nutrients [11].

3.2. Effect of MOL addition to body weight increase

In this research probiotics on MOL did not has a significant effect (P> 0.05) on broiler body weight gain, this was presumably because the number of probiotic microbes contained in MOL was less than normal. Probiotic microorganisms given to livestock must be attached to the intestinal mucosa, and at least containing 3 x 10^{10} cfu/g [12], while microorganisms in MOL given to broilers contained *Bifidobacterium* 3.5 x 10^{7} cfu/ml concentrations, *Bacillus* concentrations 0.9 x 10^{6} cfu/ml, *Streptococcus* concentrations 1.06 x 10^{6} cfu/ml, and *Lactobacillus* concentrations 12.5 x 10^{7} cfu/ml. Probiotics do not give a significant effect on broiler body weight gain because the substrate in the feed given has a low crude fiber content that was a maximum of 5% so that the nutrients for probiotic microorganisms derived from the cattle rumen are less supportive for development. Body weight gain of broiler that given by feed with crude fiber 4.5% produced a weight gain of 1,737 grams significantly (P> 0.05) lower than the body weight gain that given by feed with crude fiber 6,0% is 1,814 grams. The adding of 0.25% starbio in broiler rations with 6% crude fiber produced the highest body weight gain compared to other treatments [13].

Another thing that causes the addition of probiotic MOL to body weight gain was not significantly, it was suspected that probiotic microorganisms were in a different environment from the previous environment such as pH conditions in the broiler digestive tract which are not in accordance with the pH in the rumen, namely pH in proventiculus 5, ventricular 3, 6, intestine 5.5. Food substrate was needed so that probiotic microbes can reproduce properly. Food substrate that supports the development of probiotic microbes in the digestive tract consists of ingredients that generally contain lots of fiber [14]. The impact of various probiotics in various locations or maintenance systems was possible because probiotics were a single factor, but many factors influence their performance. Factors that influence the performance of probiotics include (1) the composition of the host microbiota, (2) how to administer probiotics, (3) age and type of host, and (4) the quality and type of probiotics used [15].

3.3. Effect of MOL Addition to feed consumption

In this research probiotics on MOL did not has a significant effect (P> 0.05) on feed comsumption because probiotic can not develop well in broiler digestive tract because the substrate of feed contained low coarse fiber, so the micro organisms can not develop optimally so that the cellulase enzyme produced as a breaker of low crude fiber, this results in less digestion and absorption of feed in the small intestine.

3.4. Effect of MOL addition to feed conversion

Feed conversion is influenced by the ability to consume, metabolize nutrients in the ration and absorb these feed nutrients to increase body weight. The results of the research as listed in Table 2, showed that broiler feed conversion by given probiotics significantly (P <0.05) was lower than those not given probiotics, this can happen because the numbers in broilers given probiotics 5 ml/kg of feed show low consumption while the weight gain is high among treatments. Broilers by given MOL shows that the function of probiotics microorganisms had an effect on increasing feed digestibility. In microorganisms produce special enzymes that have the ability to break bonds. Breaking the bonds of complex molecules into simple molecules makes it easier to absorb feed in the digestive tract of living things.

3.5. Effect of MOL addition on carcass percentage

The addition of probiotics in the ration did not significant affect the percentage of broiler carcasses, this was due to the fact that broiler body weight at the end of maintenance showed unreal differences ($p > 0.05$). The addition of probiotics, prebiotics and a combination of both in the ration did not affect broiler meat formation, so it has not been able to significant increase the percentage of broiler carcasses between those added probiotics 68.04% and those without probiotics 66.56% [16].

4. Conclusions

MOL synthesized from cattle rumen and chicken intestine contains *Bifidobacterium* probiotic microorganisms with a concentration of 3.5×10^7 cfu/ml, *Bacillus* concentration 0.9×10^6 cfu/ml, *Streptococcus* concentration 1.06×10^6 cfu/ml, and concentration *Lactobacillus* 12.5×10^7 cfu/ml.

Probiotics based on local microorganisms from cattle rumen and chicken intestine affected gain significantly to the mortality and feed conversion ratio, but not significantly to the feed intake, body weight and percentage of broiler carcass.

5. Acknowledgements

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