Organoleptic and chemical characteristic of garut flour (Maranta arundinacea l) mixed with Lactobacillus plantarum as a synbiotics for duck

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Abstract. The objective of the study was to evaluated organoleptic and chemical Characteristic of garut flour (*Maranta arundinacea L)* mixed *Lactobacillus plantarum (L. plantarum*) as a Synbiotics for duck. The completely randomized design with 3 treaments and 15 replications were used in the research. The treatments were G0 = Garut flour, G1 = Garut flour + 5 % *L. plantarum*, G2 = garut flour + 10 % *L. plantarum*. The parameters were organoleptic quality (color, smell and texture) and chemical quality of Garut flour mixed *L. plantarum* as a Synbiotics. The Result showed that there are no significant the organoleptic quality of garut flour mixed *L. plantarum* as a Synbiotics. The resistant starch content were significantly ($p<0.05$) increased but the crude protein, crude fat and amylose were the same. The conclusion was the The resistant starch content of Garut Flour with added 5% *L. plantarum* were increased and potential as a synbiotic.

1. Introduction

Ducks have the potential to be developed as meat-producing livestock to support national food security in Indonesia. Problems of quality, quantity and continuity of feed often become obstacles to duck farming. On the other hand, in intensive maintenance of broiler ducks, antibiotic growth promoter (AGP) feed additives are used to increase productivity, reduce mortality and improve the efficiency of feed use. The use of AGP causes detrimental effects because it is absorbed by nutrients and accumulates in duck meat so that consumers also indirectly receive antibiotics [1]. The use of antibiotics has led to a growing population of bacteria resistant to antibiotics so that it requires a continuous increase in doses to get the expected effect so that in Indonesia the use of AGP has been banned since 2018. An alternative to AGP in rising ducks using synbiotics, which is a synergistic combination of probiotics and prebiotics [2].

Synbiotics are a combination of prebiotics and probiotics that can work synergistically so as to benefit the host by increasing the survival of probiotic microorganisms [3]. Probiotics are living microbes that benefit their hosts by balancing the composition and ecosystem of the micro flora in the digestive tract. *L. plantarum* is a type of probiotic lactic acid bacteria that is homofermentative which produces lactic acid [4].

Prebiotics are defined as carbohydrates that are not digested by the host but are selectively fermented by some of the intestinal microflora [5] Prebiotics stimulate the growth and activity of bacteria that benefit the health of the host. Oligosaccharide compounds can be used as prebiotics because they are

components of soluble food fiber that cannot be digested by digestive enzymes but can be fermented by intestinal microorganisms so that they can improve intestinal health [6].

The use of prebiotics combined with probiotics into synbiotics functions to stimulate and increase the population of lactic acid bacteria which will reduce intestinal pH which has the effect of suppressing the growth of pathogenic bacteria so that intestinal health increases [7]. Research about the use of prebiotics combined with probiotics to become natural synbiotics to support the productivity and health of local ducks needs to be further developed. The objective of the study was to evaluated organoleptic and chemical characteristic of Garut flour (*Maranta arundinacea L)* mixed *L. plantarum* as a synbiotics for duck.

2. Materials and Methods

2.1. Materials

Research was done on Feed Technology Laboratory, Faculty of Animal and Agricultural Sciences, Diponegoro University. Materials research were Garut Flour and *Lactobacillus plantarum* isolate from Feed Technology Laboratory collection.

2.2. The symbiotic production method

The symbiotic production method is through the prebiotic production of Garut Flour through several stages. The Garut tubers were washed, cleaned, peeled, drained and dried until the moisture content was 12% then ground into flour. The symbiotic production was done by mixing the Garut flour with *L. plantarum* probiotic according to the treatment. This symbiotic product was incubated anaerobically for 4 x 24 hours at 37 ^{0}C.

2.3. Statistical Analysis

The completely randomized design with 3 treaments and 6 replications was used in the research. The treatments were G0 = Garut Flour, G1 = Garut Flour + 5% *L. plantarum*, G2 = Garut Flour + 10 % *L. plantarum*. The parameters were organoleptic physical qualities (color, smell and texture) and chemical qualities of Garut Flour mixed *L. plantarum* as a Synbiotics. The organoleptic physical qualities using a panel of experts as many as 25 people. The Organoleptic quality assessment standards can be seen in Table 1.

Table 1. The Organoleptic quality assessment standards of Garut Flour mixed *L. plantarum* as a Synbiotics

Scale	Color	Smell	Texture
1	Black	Stink	Very rough
2	Brown	Sour	Rough
3	Brownish white	Arrowroot tubers	Rather rough
4	Yellow	Odorless	Fine

The chemical Quality were analysed for moisture, ash, protein and lipid contents according to methods described in American Association of Cereal Chemists [8]. The data was analyzed by analysis of variance and Duncan Multiple Range Test [9].

3. Results and Discussion

The parameters were organoleptic physical qualities (color, smell and texture) and chemical qualities of Garut Flour mixed *Lactobacillus plantarum* as a Synbiotics showed in Tabel 2 and Tabel 3.

Table 2. The organoleptic physical qualities of Garut Flour mixed *L. plantarum* as a Synbiotics

Treatments	Color	Smell	Texture
Garut Flour	3.14±0.01	3.48±0.01	3.11±0.02
Garut Flour + 5% *Lactobacillus plantarum*	3.24±0.01	3.35±0.01	3.10±0.02
Garut Flour + 10 % *Lactobacillus plantarum*	3.26±0.01	3.25±0.01	3.11±0.02

Table 2. showed that The Result showed that there are no significant the organoleptic physical quality of Garut Flour mixed *Lactobacillus plantarum* as a Synbiotics. The scale of organoleptic quality were 3,11 – 3,48. The Organoleptic Quality of synbiotics product for duck have brownish beige color, Arrowroot tubers smell and rather rough texture. The characteristic product of arrowroot tubers are dependent of botanical source and determine the quality of product [10].

Table 3. The Chemical qualities of Garut Flour mixed *L. plantarum* as a Synbiotics

Treatments	Crude Proteins	Crude Fat	Amylose	Resistant Starch (%)
Garut Flour + 0 % *Lactobacillus plantarum*	0.16 ±0.03	0.19±0.01	20.5±0.23	4.10 ± 0.01^{b}
Garut Flour + 5% *Lactobacillus plantarum*	0.17±0.01	0.18±0.02	20.7±023	5.17 ± 0.01^{a}
Garut Flour+ 10 % *Lactobacillus plantarum*	0.17±0.02	0.19±0.02	20.8±0.22	5.20 ± 0.01^{a}

Different superscripts showed significant ($p<0.05$) differences among treatments

Table 3 showed that the resistant starch content were significantly ($p<0.05$) increased but the crude protein, crude fat and amylose were the same. The main prebiotics used are fibers and carbohydrates, such as resistant starch to selectively effective synbiotics [11]. Some works have previously demonstrated resistant starch fermentability characteristics with an induction of *Bifidobacteria* and *Lactobacilli* populations [12]. Synbiotics have been shown to be more effective than probiotics or prebiotics alone in improving the quality of general positive regulation of the micro biota [13]. Based on result, Garut Flour + 5% *L. plantarum* can be used for synbiotics for duck.

4. Conclusion

The conclusion was the the resistant starch content of Garut Flour with added 5% *L. plantarum* were increased and potential as a symbiotic.

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