

# In vitro evaluation of black potato tubers mixed with *Lactobacillus plantarum* as a synbiotics for duck

*by Eny Fuskhah*

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## In vitro evaluation of black potato tubers mixed with *Lactobacillus plantarum* as a synbiotics for duck

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**Abstract.** The objective of the study was to evaluated *in vitro* evaluation of black potato tubers mixed with *Lactobacillus plantarum* (*L. plantarum*) as a synbiotics for duck. The completely randomized design with 3 treatments and 15 replications was used in the research. The treatments were T0 = black potato flour, T1 = black potato flour + 5 % *L. plantarum*, T2 = black potato flour + 10 % *L. plantarum*. The parameters were LAB viability, pH and total acid of black potato tubers mixed with *L. plantarum* as a synbiotics. The Data were analyzed using analysis of variance ( $\alpha=5\%$ ) and Duncan multiple range test. Result showed that total LAB and total acid were significantly ( $p<0.05$ ) increased but the pH were significantly ( $p<0.05$ ) decreased. The black potato flour with added 5% *L. plantarum* T2 was the best treatment with LAB viability of  $6.8 \times 10^9$  CFU/g, pH of 4.68 and 0.85% total acid. The conclusion was the total LAB and total acid of black potato flour were increased but the pH were decreased with added 5% *L. plantarum*.

### 1. Introduction

Black potato tuber has the potential to be developed as prebiotics product. Black potato tuber contains dietary fiber and resistant starch. Those dietary fibers and resistant starch have potency as prebiotic and to be fermented by probiotic in colon to produce lactic acid and short chain fatty acid (SCFA) [1]. The main prebiotics used are fibers and carbohydrates, such as resistant starch have been demonstrated to selectively increase *Bifidobacteria* and *Lactobacilli* [2]. Probiotics and prebiotics have been demonstrated to positively modulate the intestinal microflora and could promote host health [3]. Synbiotics have been shown to be more effective than probiotics or prebiotics alone in improving general positive regulation of the microbiota [4].

An *invitro* study combines probiotics and prebiotics to obtain synergistic effects of the two compounds by an improvement of the probiotic colonization or metabolic effect are needed. Therefore, in the present study, we aimed to evaluated *in vitro* evaluation of black potato flour mixed *Lactobacillus 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 Potato black tubers and *L. plantarum* isolate from Feed Technology Laboratory, Animal and Agricultural Faculty, Diponegoro University.

### 2.2. The synbiotic production method

The synbiotic production method is through the prebiotic production of potato black tubers through several steps. The potato black tubers were washed, cleaned, peeled and dried until the moisture content was 12% then ground into flour. The symbiotic production was done by mixing the black potato flour with *L. plantarum* probiotic according to the treatment then incubated anaerobically at 37 °C for 4 x 24 hours.

### 2.3. Statistical Analysis

The research used the completely randomized design with 3 treatments and 15 replications. The treatments were T0 = Potato black Flour, T1 = Potato black Flour + 5% *L. plantarum*, T2 = potato black Flour + 10% *L. plantarum*. The parameters were LAB viability, pH and total acid of black potato tubers mixed *L. plantarum* as a Synbiotics based on [5] method. The Data were analyzed using analysis of variance ( $\alpha=5\%$ ) and Duncan multiple range test.

## 3. Results and Discussion

LAB viability, pH and total acid of black potato tubers mixed *L. plantarum* as a Synbiotics can be seen in Table 1.

**Table 1.** The LAB viability, pH and Total acid of black potato tubers mixed *L. plantarum* as a Synbiotics

Treatments	Total AB (cfu/g)	pH	Total Acid (%)
Black Potato Flour	0 <sup>b</sup>	6.15±0.02 <sup>a</sup>	0.26±0.01 <sup>b</sup>
Black Potato Flour + 5% <i>Lactobacillus plantarum</i>	6.8 x 10 <sup>9</sup> ±0.1 <sup>a</sup>	4.68±0.02 <sup>a</sup>	0.85±0.01 <sup>a</sup>
Black Potato Flour + 10% <i>Lactobacillus plantarum</i>	7.5 x 10 <sup>9</sup> ±0.1 <sup>a</sup>	4.72±0.02 <sup>a</sup>	0.85±0.01 <sup>a</sup>

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

The Result showed that total LAB and total acid were significantly ( $p<0.05$ ) increased but the pH were significantly ( $p<0.05$ ) decreased. This increase of Total LAB were due to LAB's ability utilize the nutrition of black potato flour during incubation. The nutrition acts as a source microbial energy for growth and cell biosynthesis [6]. The substrate will provide the nutrients needed by microbes for energy, growth, cell formation and the biosynthesis metabolic products. The fermentation process will affect the potential value of hydrogen and the total of lactic acid bacteria that develop in the substrate and total acid increase [7]. Non-pathogenic bacteria such as lactic acid bacteria were more resistant to organic acids than pathogenic bacteria and the cell membrane of pathogenic bacteria will be disturbed by the presence of organic acids by lowering the cytoplasmic pH [8]. Based on result showed that Black Potato Flour + 5% *L. plantarum* was the best treatment with LAB viability of 6.8 x 10<sup>9</sup> CFU/g, pH of 4.68 and 0.85% total acid.

## 4. Conclusion

The conclusion was the total LAB and total acid of black potato flour were increased but the pH were decreased with added 5% *L. plantarum*.

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