

# Efficacy of Lactic Acid Bacteria Probiotics on Feed Efficiency and Carcass Weight in Kampung Unggul Balitbangtan (KUB) Chicken

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## Abstract

This study aimed to determine the effect of lactic acid bacteria probiotics on the performance of Kampung Unggul Balitbangtan (KUB) chicken. A total of 48 KUB chickens aged 2 weeks were randomized into 4 treatments and each treatment consisted of 12 chickens. This study was conducted for 8 weeks. This study used 4 different treatments including (P0) not using probiotics, (P1) using probiotics of 1 mL/L drinking water, (P2) using probiotics of 2 mL/L drinking water, and (P3) using probiotics of 3 mL/L drinking water. The data were analyzed using ANOVA continued with Duncan's Multiple distance test. As a result, reported that the data had a significant difference in the increase in feed efficiency and carcass weight. In conclusion, the administration of probiotics of 3 mL/L of drinking water can increase feed efficiency and carcass weight in KUB chickens.

Keywords: carcass weight, feed efficiency, lactic acid bacteria, KUB chicken, probiotic

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## INTRODUCTION

Population growth in Indonesia is increasing, this is directly proportional to the increasing need for animal protein in the community. Kampung chicken meat is a source of protein which is increasing because it is in demand and has better taste than broiler chicken. The population of kampung chickens in 2019 reached 311,912,413 heads, higher than in 2018 which only had a population of 300,977,882 (Directorate General of Animal Husbandry and Animal Health, 2019).

Kampung chicken has low egg production and growth rates. This low egg production and growth makes it difficult to fulfill the Indonesian market. Kampung Unggul Balitbangtan (KUB) chicken is a study chicken from Badan Litbang that was selected to be a breeder that produces a lot of DOC to fulfill the needs of kampung chicken. The advantage of KUB chicken is that they produce a final weight of 800–900 g within

10 weeks or can reach 1 kg at the age of 70 days (Abdurrahman *et al.*, 2022).

The problems faced in raising kampung chicken are relatively more expensive feed prices, slower growth, and an imbalance of microflora in the digestive tract. One way that can be done to trigger growth and improve production performance is by giving probiotics mixed in feed or drinking. The use of this probiotic can be used as an alternative to antibiotic growth promoters (Agustono *et al.*, 2019).

Probiotic microorganisms can produce antimicrobials (bacteriocins) to inhibit the growth of pathogenic bacteria in the digestive tract. In addition, microorganisms can also produce organic acids that can lower the pH level in the digestive tract (Irawan *et al.*, 2020). This causes good bacteria to dominate the digestive tract and can maximize the nutrient absorption process because pathogenic bacteria will not grow well in

the acidic atmosphere of the digestive tract (Khemariya *et al.*, 2017).

Lactic acid bacteria from normal flora are often used as probiotics and can improve host health by improving microbial balance and intestine immunity (Shen *et al.*, 2014). According to Lokapirnasari (2018), giving probiotics to drinking water showed good results compared to feeding through feed because it is more effective in producing several microbes in the digestive tract. Based on the problem, it is necessary to investigate the use of lactic acid bacteria e.g. *Lactobacillus acidophilus*, *Lactobacillus plantarum*, and *Lactococcus lactis* in drinking water on feed efficiency and carcass weight in KUB chickens.

## MATERIALS AND METHODS

### Ethical Approval

This study has received ethical clearance from the Faculty of Veterinary Medicine and Ethics Committee Brawijaya University.

### Study Period and Location

This study was conducted for 3 months, in June–August 2022. The study was conducted at the KUB chicken farm in Tembokrejo village, Muncar, Banyuwangi, East Java.

### Experimental Design

The design used in this study was completely randomized. The materials used in this study were probiotics lactic acid bacteria, commercial broiler feed 511 (starter), and 512 (finisher) produced by PT. Charoen Pokphand, Husk as the base for the cage, and KUB chickens were obtained from BPTP East Java. The equipment used in this study included digital scales, cage cleaning equipment, masks, gloves, 5 mL syringes, label paper, markers, feed containers, drinking containers, and postal cages for fattening sites measuring 70 cm x 50 cm for 1 replication containing 2 KUB chickens.

The process of maintaining a 2-week-old DOC is carried out in a box cage commonly used by breeders. The vaccination program was carried out by farmers to prevent diseases. After reared

for 2 weeks old, the chicks were transferred to a postal cage for the study process and the sample selection process was carried out. A total of 48 healthy KUB chickens were selected from 100 chicks in the special box for growing KUB chickens. KUB chickens were randomized into four treatments (P0, P1, P2, and P3) in each group consisting of 12 replication. Experimental animals were divided into four groups i.e. (P0) commercial feed + drinking water without probiotics, (P1) commercial feed + probiotic drinking water of 1 mL/L, (P2) commercial feed + probiotic drinking water of 2 mL/L, and (P3) commercial feed + probiotic drinking water of 3 mL/L. Feed was given twice a day, at 7.00 am and 4.00 pm. The commercial feed used is 511 for 4 weeks from DOC after which the feed was gradually replaced with advanced feed of 512. Drinking water was provided ad libitum which has been mixed with probiotic lactic acid bacteria. The probiotics of lactic acid bacteria given had a concentration of  $1.2 \times 10^9$  CFU/mL in liquid dosage form. The probiotics used were in liquid form and mixed into the drinking water of KUB chickens. Data were collected every week for feed efficiency and at 10 week for final weight and carcass weight.

### Data Analysis

The data obtained were then processed in Microsoft Excel and statistically analyzed using ANOVA then continued with Duncan's multiple distance test at a significant level ( $p < 0.05$ ).

## RESULTS AND DISCUSSION

### Feed Efficiency

The results of statistical analysis showed  $p < 0.05$ , which means that it shows a significant difference. Because the results were significantly different, further tests were carried out, namely Duncan's test. It was found that there were significant differences in the treatment groups P0 with P1, P1 with P2, and P2 with P3, because superscripts that were not significantly different in the same column did not show a significant difference ( $p > 0.05$ ) (Table 1) The mean value in group P0 was 38.00%, group P1 was 38.66%,

group P2 was 39.83% g and group P3 was 41.00%. The highest average yield of feed efficiency was seen in the P3 treatment, which was 41.00%, while the lowest average feed efficiency was seen in the P0 treatment, which was 38.00%.

Feed efficiency is the result obtained from the comparison between body weight gain and feed consumption. Feed efficiency can be used to evaluate nutrient and energy metabolism processes. Increasing feed efficiency has a positive impact because it can reduce production costs for farmers.

Feed efficiency in this study is in line with the increase in carcass weight. This means that an increase in feed efficiency is followed by an increase in carcass weight. The administration of probiotics in drinking water affects the efficiency of feed use (Lokapirnasari *et al.*, 2022). Probiotics can increase the number and height of intestinal

villi, which indicates that there is a larger area of nutrient absorption supported by a large number of villi so that digestion can occur optimally (Andriani *et al.*, 2020).

Increased feed efficiency will result in increased consumption of nutrients, one of which is protein which plays a role in increasing the growth of chickens (Hamid *et al.*, 2022). Feed efficiency is influenced by several factors, not only by the physiological and genetic conditions of the animal but also by the microbes in the gut (Mas'ad *et al.*, 2020). Microbes in the intestinal tract can affect nutrient digestion and energy absorption (Lokapirnasari *et al.*, 2019). The results showed the highest results in the P3 treatment group, this was because the most effective dose was 3 mL/L of drinking water. If the dose is less than that, the probiotics will not have the maximum effect on the performance of KUB chickens.

**Table 1.** Feed efficiency and carcass weight in all treatments

Treatment	Feed Efficiency (%)	Carcass Weight (g)
P0	38.00 <sup>a</sup> ± 1.78	658.00 <sup>a</sup> ± 42.96
P1	38.66 <sup>ab</sup> ± 0.51	714.50 <sup>b</sup> ± 19.74
P2	39.83 <sup>bc</sup> ± 0.75	749.83 <sup>bc</sup> ± 28.96
P3	41.00 <sup>c</sup> ± 1.09	784.83 <sup>c</sup> ± 26.89

Different superscripts in the same column showed a significant difference ( $p < 0.05$ ).

The higher the concentration of probiotics, the higher the bacteria contained in it, so that livestock will be more efficient in consuming feed (Pratama *et al.*, 2021). This is because there is an increase in the number of beneficial table microbial populations for livestock, which can prevent the development of harmful microbes in the digestive tract to improve food digestion (Utomo *et al.*, 2022). Probiotics can streamline feed consumption and have a role in the digestive tract to improve and increase the digestibility of the feed consumed with the help of beneficial bacteria (Kompiang, 2002). This will result in a faster rate of the food movement in the digestive tract so that more food substances are absorbed and the efficiency of feed use and production rates increase (Suherman *et al.*, 2015).

### Carcass Weight

The results of statistical analysis showed  $p < 0.05$ , which means that it shows a significant difference. Because the results were significantly different, further tests were carried out, namely Duncan's test. It was found that there was a significant difference in the P0 group with all treatments, while P1 with P2 and P2 with P3 showed results that were not significantly different because the superscripts that were not significantly different in the same column did not show any significant difference ( $p > 0.05$ ) (Table 1) The average value in group P0 is 658.00 g, group P1 is 714.50 g, group P2 is 749.83 g and group P3 is 784.83 g. The highest average carcass weight was seen in treatment P3, which was 784.83 g, while the lowest average carcass weight was seen in the P0 treatment, which was 658.00 g.

Carcass weight is the result obtained from weighing the weight of the chicken after deducting feathers, blood, head, neck, viscera, and both legs. Carcass weight calculation was carried out in the last week of the 10th week of harvest time.

Administration of probiotics in drinking water can significantly change the carcass's weight. Treatment P0 had a lower carcass weight, lower than P1, P2, and P3. The low carcass weight in treatment P0 was thought to be due to the absence of probiotics so bacteria in the digestive tract in treatment P0 were inefficient in digesting and absorbing nutrients so that many nutrients were retained in the digestive tract and excreted with feces. The increase in carcass weight in treatments P1, P2, and P3 was thought to be closely related to the microbial composition in chicken intestines. The increase of *Lactobacillus spp.* bacteria in the intestines has a positive effect on the growth of chickens. *Lactobacillus spp.* produces lactic acid, lowering the pH of the environment so that other microbes do not grow. Probiotics can increase enzymatic activity in digestion will result in better nutrient absorption, faster livestock growth, and increased production. The weight of the carcass produced was influenced by several factors, namely age, sex, slaughter weight, body size and conformation, fatness, quality, and quantity of rations and strains being raised (Wardiana *et al.*, 2021). In this study, P0 was slower to develop due to high feed conversion. The quality of feed in this study used a fairly good feed which is commonly used in the fattening process.

Probiotics increase the activity of digestive enzymes so that the decomposition and absorption of food become more perfect so that the well-absorbed food can be utilized by chickens for tissue growth and increasing carcass weight (Astuti *et al.*, 2015). This is proven in this study that the administration of probiotics in each treatment showed good results compared to the treatment without using probiotics.

*L. acidophilus* and *L. plantarum* are known to act as probiotics and can increase carcass weight in chickens. *Lactobacillus spp.* produce cellulase enzymes that help the digestive process

(Chandra *et al.*, 2022). This enzyme can break down the crude fiber component which is a component that is difficult to digest in the poultry digestive tract. This helps the digestive process so that crude fiber can be used for tissue growth and carcass weight gain.

## CONCLUSION

The results showed that the administration of 3 mL/L of drinking water lactic acid bacteria probiotics can increase feed efficiency and increase carcass weight in KUB chickens.

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## AUTHORS' CONTRIBUTIONS

CRB and SH: Conceptualization and drafted the manuscript. MAA, EML, and WMY: Treated the animal laboratory. M: Validation, supervision, and formal analysis. M and SH: Performed the statistical analysis and the preparation of table. All authors have read, reviewed, and approved the final manuscript.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## REFERENCES

- Abdurrahman, F., Soeharsono, S., & Soepranianondo, K. (2022). Study of Performance Index and Business Analysis on Chicken Infected by *Escherichia coli* with Probiotic Provision of Lactic Acid Bacteria. *Jurnal Medik Veteriner*, 5(1), 74–80.

- Agustono, B., Al Arif, M. A., Yunita, M. N., Purnama, M. T. E., & Ulkhaq, F. (2019). Bioactivity of digestive enzymes and histological descriptions of jejunum of broilers supplemented with sunflower seed flour (*Helianthus Annuus L*). *Indian Veterinary Journal*, 96(8), 12–15.
- Andriani, A. D., Lokapirnasari, W. P., Karimah, B., Hidanah, S., Al-Arif, M. A., Soeharsono, N. H., & Harijani, N. (2020). Effectivity of Probiotic *Lactobacillus casei* and *Lactobacillus rhamnosus* as Alternate Antibiotic Growth Promoter on Cholesterol, Low Density Lipoprotein and High Density Lipoprotein of Broiler Chickens. *Jurnal Medik Veteriner*, 3(1), 114–122.
- Astuti, F. K., Busono, W., & Sjfofjan, O. (2015). Pengaruh Penambahan Probiotik Cair dalam Pakan Terhadap Produksi pada Ayam Pedaging. Fakultas Peternakan. Universitas Brawijaya. *Jurnal Ilmu Peternakan*, 6(2), 99–104.
- Chandra, E. H., Lokapirnasari, W. P., Hidanah, S., Al-Arif, M. A., Yuniarti, W. M., & Luqman, E. M. (2022). Probiotic Potential of Lactic Acid Bacteria on Feed Efficiency, Weight and Carcass Percentage in Ducks. *Jurnal Medik Veteriner*, 5(1), 69–73.
- Directorate General of Animal Husbandry and Animal Health. (2019). Statistik Peternakan dan Kesehatan Hewan. Penerbit Direktorat Jendral Peternakan dan Kesehatan Hewan. Jakarta.
- Hamid, I. S., Ekowati, J., Solfaine, R., Chhetri, S., & Purnama, M. T. E. (2022). Efficacy of probiotic on duodenal TNF- $\alpha$  expression and the histological findings in the liver and lung in animal model canine coronavirus. *Pharmacognosy Journal*, 14(3), 591–597.
- Irawan, P. I., Lokapirnasari, W. P., Al Arif, M. A., Harijani, N., Soeharsono, S., & Hidanah, S. (2020). Effect of Probiotics *Bifidobacterium sp.*, *Lactococcus lactis*, and *Lactobacillus sp.* on Growth Performance of Laying Hens. *Jurnal Medik Veteriner*, 3(2), 160–165.
- Khemariya, P., Singh S., Nath G., & Gulati A. K. (2017). Probiotic *Lactococcus lactis*: A Review. *Journal Agriculture Food Science and Technology Turkish*, 5(6), 556–562.
- Kompiang, I. P. (2002). Pengaruh ragi: *Saccharomyces cerevisiae* dan Ragi Laut sebagai Pakan Imbuhan Probiotik terhadap Kinerja Unggas. *JITV*, 7(1), 18–21.
- Lokapirnasari, W. P., Hidanah, S., Suharsono, Fathinah, A., Dewi, A. R., Adriani, A. D., Karimah, B., Nuhajati, T., Soepraniandono, K., & Lamid, M. (2018). Probiotics on HDL, LDL, cholesterol and total protein of egg's quail (*Coturnix coturnix japonica*). *Journal of Applied Environmenta and Biological Science*, 8(1), 65–69.
- Lokapirnasari, W. P., Pribadi, T. B., Arif, A. A., Soeharsono, Hidanah, S., Harijani, N., Najwan, R., Huda, K., Wardhani, H. C. P., Rahman, N. F. N., & Yulianto, A. B. (2019). Potency of probiotics *Bifidobacterium sp.* and *Lactobacillus casei* to improve growth performance and bussines analysis in organic laying hens. *Veterinay World*, 12(6), 860–867.
- Lokapirnasari, W. P., Al Arif, M. A., Maslachah, L., Chandra, E. H., Utomo, G. S. M., & Yulianto, A. B. (2022). Effect of Combination of Probiotics and *Moringa oleifera* Leaf Extract on Nutrients Intake in Ducks. *Jurnal Medik Veteriner*, 5(2), 241–246.
- Mas'ad, K., Lokapirnasari, W. P., Arif, M. A. A., Soeharsono, S., Kurnijasanti, R., & Harijani, N. (2020). Potency of Probiotics on Feed Efficiency and Egg Mass in Laying Hens. *Jurnal Medik Veteriner*, 3(2), 203–207.

- Pratama, H. S., Lokapirnasari, W. P., Soeharsono, S., Al-Arif, M. A., Harijani, N., & Hidanah, S. (2021). Effect of Probiotics *Bacillus subtilis* on Feed Efficiency and Egg Mass of Laying Hens. *Jurnal Medik Veteriner*, 4(1), 37–41.
- Shen, X., Yi, X. Ni., Zeng, D., Jing, B., Lei, M., Bian, Z., Zeng, T. L., & Xin, J. (2014). Effects of *Lactobacillus plantarum* on production performance, immune characteristic, antioxidant status and intestinal microflora or burden immunized broilers. *Canadian Journal of Microbiology*, 60(4), 192–202.
- Suherman, A. F., Natsir, M. H., & Sjojfan, O. (2015). Pengaruh Penambahan Probiotik Lactobacillus Plus Bentuk Tepung Sebagai Aditif Pakan Terhadap Penampilan Produksi Burung Puyuh. *JITV*, 11(1), 1–8.
- Utomo, G. S. M., Hidanah, S., Al Arif, M. A., Lokapirnasari, W. P., & Yuniarti, W. M. (2022). Business Analysis of Probiotic Administration of Lactic Acid Bacteria on The Performance of Kampung Super Chicken. *Jurnal Medik Veteriner*, 5(1), 87–93.
- Wardiana, N. I., Lokapirnasari, W. P., Harijani, N., Al-Arif, M. A., & Ardianto, A. (2021). *Bacillus subtilis* Probiotics in Chicken Feed Improve Egg Quality with Differences in Shelf Life. *Jurnal Medik Veteriner*, 4(1), 8–13.

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