

Inclusion Effect of Teak Leaf Extract (*Tectona grandis* Linn.f) on The Laying Quail Feed to The Intestinal Characteristics

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ABSTRACT : This research aims to determine the impact of infusing feed with teak leaf extract (*Tectona grandis* linn.f.) on the intestines of egg-laying quails. The teak leaf extract (*Tectona grandis* linn. f.) is homogenized in the basal feed according to the predetermined level. The total of 240 quails were used starting at the age of 28 and reared for 4 days. The research used a completely randomized design (CRD) with 4 treatments 6 groups, where the treatment consisted of P0 as a control feed without the addition of teak leaf extract, P1 addition of 0.8 % teak leaf extract to the feed, P2 with 1.2% addition of teak leaf extract in the feed and P3 addition of 1.6 % teak leaf extract in laying quail feed. The results showed that giving teak leaf extract in the feed had no significant effect intestinal characteristics ($P < 0.05$). The number of intestinal villi in a row is P0 (46,50±5,86), P1 (48,17±3,92), P2 (52,00±6,90), P3 (51,67±7,84). The villi heights were P0 (123.31 ± 14.16), P1 (113.91 ± 27.68), P2 (126.45 ± 30.11), P3 (117.36 ± 19.38), respectively. The villi widths were P0 (271.20 ± 79.41), P1 (291.10 ± 26.36), 321.99 ± 65.53), P3 (291.58 ± 54.63), respectively. The depths of crypt were respectively P0 (28.83 ± 4.72), P1 (29.95 ± 8.35), P2 (29.71 ± 5.53), P3 (28.63 ± 6.61).

KEYWORDS Quail, Intestinal Characteristics, Teak Leaf.

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I. INTRODUCTION

The quail is a type of poultry from the Phasianidae family and the genus *coturnix*. Japanese quail (*Coturnix coturnix japonica*) was first discovered in the United State in 1870. The quail can be used as a livestock business which is easy to cultivate and increase income. The population of quail in east java in 2016 was 3.281.998, 2017 as many as 3.684.999, and in 2018 as many as 3.688.687 tails. The national quail population in 2017 compared to 2016 increase by around 3,42% according to the Directorate General of Animal Husbandry and Animal Health [1].

Feed is the largest component issued by livestock businesses with the largest percentage reaching 60-70% of production costs. The use of antibiotic additives in the form of feed additives to feed in poultry farming has been widely used for the purpose of increasing livestock productivity, health and increasing production efficiency. Antibiotics have been banned since 2017 and it is feared that they will cause antibiotic-resistant microorganisms such as *Escherchia coli*, *Salmonella* sp, and *Camphylobacter* sp., which is formed in the digestive tract of livestock, can move or infect humans through physical contact or through food.

The teak leaf has natural pigments consisting of β -carotene, pheophiptin, pelargonidin 3-glucoside, pelargonidin 3, 7-diglucoside, chlorophyll, and anthocyanone [2]. The active compound content of teak leaves is in the form of flavonoids, saponins, tannins, phenolics, alkaloids, triterpenoids, glycosides [3]. Phenolics or flavonoids are secondary metabolites which are scattered in plants and have a function of antioxidant activity, the greater content of phenol group compounds, the greater antioxidant activity [4]. [5] That the addition of teak leaf extract with a percentage of 9% can reduce the total bacterial colonies of *E. coli* and *S. typhimurium*. The bioactive content contained in teak leaf extract in the form of flavonoids with a moderate percentage can inhibit the growth of pathogenic bacteria. The research about using of teak leaf extract as a phytobiotic in feed is to reduce the use of antibiotics and then biologically evaluated the feed characteristics of laying quail intestines.

II. MATERIALS AND METHODS

A. Materials

This research used 24 battery cages with wire bases equipped with an excreta holder. Each unit measures 30 x 46 x 25 cm per unit. The teak leaf extract has been processed in Materia Medica Batu. Other ingredients were used during the study include sugar water, vaccines, vitamins and disinfectants.

B. Methods

The total of 240 quail aged 28 days were randomly divided into 4 treatments with 6 replications. Each replication consisted of 10 quail. The treatment groups in this research were as follows:

P0: Basal Feed (Without Additional Treatment)

P1: Basal Feed + 0,8% Teak Leaf Extract

P2: Basal Feed + 1,2% Teak Leaf Extract

P3: Basal Feed + 1,6% Teak Leaf Extract

During 43 days of rearing, quails are fed accordingly. Provision of food and drinking water on an ad libitum basis. The one quail was cut at each replication on the 43rd day then a sample of the small intestine of the ileum was taken for histology. Making histological preparations from the small intestine according to the haematoxylin-eosin method. Observation of histological preparations use an Olympus BX 51 microscope with 10x and 4x magnifications. Intestinal crypt depth was measured using image raster opti lab software.

C. Data Analysis

The data has been obtained, were analyzed using analysis of variance (ANOVA). If there is a significant effect, it is followed by Duncan's multiple distance test.

III. RESULT AND DISCUSSION

The results of the research on the impact of adding teak leaf extract in the feed to intestinal characteristics are presented in Table 1.

Table 1. The characteristics of the small intestine of the ileum with teak leaf extract.

Treatment	Number of Villi (Number)	Height (μm)	Surface Area (μm^2)	Depth Crypt (μm)
P0	46,50 \pm 5,86	123,31 \pm 14,16	273,20 \pm 79,41	28,83 \pm 4,72
P1	48,17 \pm 3,92	113,91 \pm 27,68	291,10 \pm 126,36	29,95 \pm 8,35
P2	52,00 \pm 6,90	126,45 \pm 30,11	321,99 \pm 65,53	29,71 \pm 5,53
P3	51,67 \pm 7,84	117,36 \pm 19,38	292,58 \pm 54,63	28,63 \pm 6,61

The Impact of Teak Leaf Extract of Villi, Height of Villi, Surface Area of Villi, and Depth of Crypt.

The results of the research on the characteristics of the small intestine villi in the ileum of laying quails that were given teak leaf extract into the feed at different levels were presented in Table 1. The small intestine as a place for absorption of food substances occurs in the ileum. The ileum serves as a place to absorb food substances that are played by the intestinal villi. The ileum has many folds or indentations called intestinal protrusions or villi. Villi function to expand the absorption surface, so that food can be completely absorbed. The large number of villi and wide size will expand the surface of the small intestine [6].

Table 1. This shows that the number of small intestinal villi tends to increase with increasing levels of teak leaf extract. The results of the average number of villi from the highest to the lowest P2 (52,00 \pm 6,90), P3 (51,67 \pm 7,84), P1 (48,17 \pm 3,92), and P0 (46,50 \pm 5,86) which means that the number of villi (P2, P3, P1) is higher than (P0). It shows that the F count is smaller than the F table that the administration of teak leaf extract in the feed has no significant effect ($P < 0.05$) on the number of intestinal villi. This may be because the viscosity of the ileum is not too different so that there is no significant effect on the number of villi [7].

The height and surface area of the intestinal villi have a correlation with the capacity of the intestines of quail to absorb feed, where the higher and the width of the intestinal villi, the surface area of the villi and the higher the absorption of food. The results of the average height of villi range from the highest to the lowest P2 (126,45 \pm 30,11), P0 (123,31 \pm 14,16), P3 (117,36 \pm 19,38), and P1 (113,91 \pm 27,68). This is slightly lower than the research [8] that the effect of probiotic supplementation with level 109 in feed gives the highest average (390,80 \pm 13,24). This is due to the presence of active compounds in feed which can suppress the growth of pathogenic microbes so that villi growth in the small intestine grows optimally. The increase in the surface area of the intestinal villi has average from the highest to the lowest P2 (321,99 \pm 65,53), P3 (292,58 \pm 54,63), P1 (291,10 \pm 126,36), and P0 (273,20 \pm 79,41). The increase in the surface area of the villi implies that the active substance contained in the teak leaf extract is in the form of flavonoids, where these active substances will affect the microflora of the small intestine. According to [9], the height and surface area of the villi are good indices

for understanding intestinal status related to absorption. Nutrient absorption will be more efficient if the absorption area is wider and wider. In addition, the structure of the villi in the intestine also affects the rate of feed. The zigzag villi structure will be better because the feed rate is longer so the absorption of feed nutrients is maximized [10].

The depth of crypt can be used as a parameter in nutrient absorption. Crypt is used to indicate a wider area of nutrient absorption. The higher the crypt depth in the villi, it means that the more nutrients are absorbed and the stronger the villi are. The results of the average crypt depth from the highest to the lowest P1 (29.95 ± 8.35), P2 (29.71 ± 5.53), P0 (28.83 ± 4.72), and P3 (28.63 ± 6.61). The results of this research were slightly lower than the research by [8] that the effect of probiotic supplementation with level 107 in feed gave the highest average (72.50 ± 6.25) in crypt depth. The difference in the mean crypt depth may be caused by the digesta which moves along the small intestine following peristaltic movements, and during this movement absorption takes place. [11] stated that the shorter the small intestine villi will decrease the active absorption area in the small intestine and the increase in the crypt depth will decrease the activity of the enzymes secreted by the villi tips.

IV. CONCLUSION

The teak leaf extract has an active compound in the form of flavonoid that have the greatest antibacterial activity in inhibiting bacterial growth. Teak leaf extract has the potential to improve the characteristics of the small intestine of laying quails with an extract level of 1.2%.

REFERENCES

- [1]. Direktorat Jenderal Peternakan Dan Kesehatan Hewan. 2018. *Statistic Peternakan Dan Kesehatan Hewan 2018*. Direktorat Jenderal Peternakan Dan Kesehatan Hewan Kementerian Pertanian, Jakarta.
- [2]. Ati, N.H., Puji R., Soenarto N. dan Leenawati L. 2006. *The Composition and The Content of Pigment Some Dyeing Plant for Ikat Weaving in Timorrese Regency, East Nusa Tenggara*. Indo. J. Chem. 6(3): 325 – 331.
- [3]. Afyah, D., N. 2013. *Sifat Mikrobiologis Sosis Daging Sapi Dengan Penambahan Ekstrak Daun Jati (Tectona grandis) Selama Penyimpanan Dingin*. Skripsi. Bogor: Institut Pertanian Bogor.
- [4]. Konaté, K., Souza, A., Roland, M., Coulibaly, A., Kiendrebeogo, M., Lamien-Meda, A., Lamidi, M., Millogo-Rasolodimby, J. & Nacoulma, O. G. 2010. *Polyphenol Contents, Antioxidant and Anti-Inflammatory Activities of Six Malvaceae Species Traditionally Used to Treat Hepatitis B in Burkina Faso*. European Journal of Scientific Research, 44, 570-580.
- [5]. Ahmadi, S. E. T., 2015. *Penambahan Tepung & Ekstrak Daun Jati (Tectona grandis Linn. F) Pada Puyuh Coturnix japonica*. Tesis. Institut
- [6]. Utama, F., H. Kamil, K., A. Latipudin, D. 2014. *Sekret Mucus Sel Goblet Ileum Dan Ukuran Usus Halus Puyuh (Coturnix coturnix japonica) Yang Diberi Bawang Putih (Allium sativum)*. Junal Academia. 1-6.
- [7]. Oliveira, M.C., E.A. Rodrigueus, R.H. Marques, and R.A Gravena. 2008. *Performance and Morphology of Intestinal Mucosa of Broiler Fed Mannan-Oligosaccharides and Enzymes*. Zootec. 60:442-448.
- [8]. Hidayat, S.C.M., S. Harimurti., L.M. Yusiati. 2016. *Pengaruh suplementasi bakteri asam laktat terhadap histomorfologi usus dan performa puyuh jantan*. Bulletin peternakan. 40(2): 101-106.
- [9]. Inchaeron, T. 2013. *Histological Adaptation of The Gastrointestinal Tractor Broilers Fed Diets Containing Insoluble Fiber Fromrice Hull Meal*. American Journal of Animal and Veterinary Science. 8(2):79-88.
- [10]. Pelicano, E. R. L., P. A. Souza, H. B. A. Souza, D. F. Figueiredo, M. M. Boiago, S. R. Carvalho, and V. F. Bordon. 2005. *Intestinal Mucosa Development in Broiler Chickens Fed Natural Growth Promoters*. Braz. J. Poult. Sci. 7: 221-229.
- [11]. Hampson, D.J. 1986. *Alteration in Piglet Small Intestinal Structure at Weaning*, Res. Vet. Sci. 40:32-40.

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