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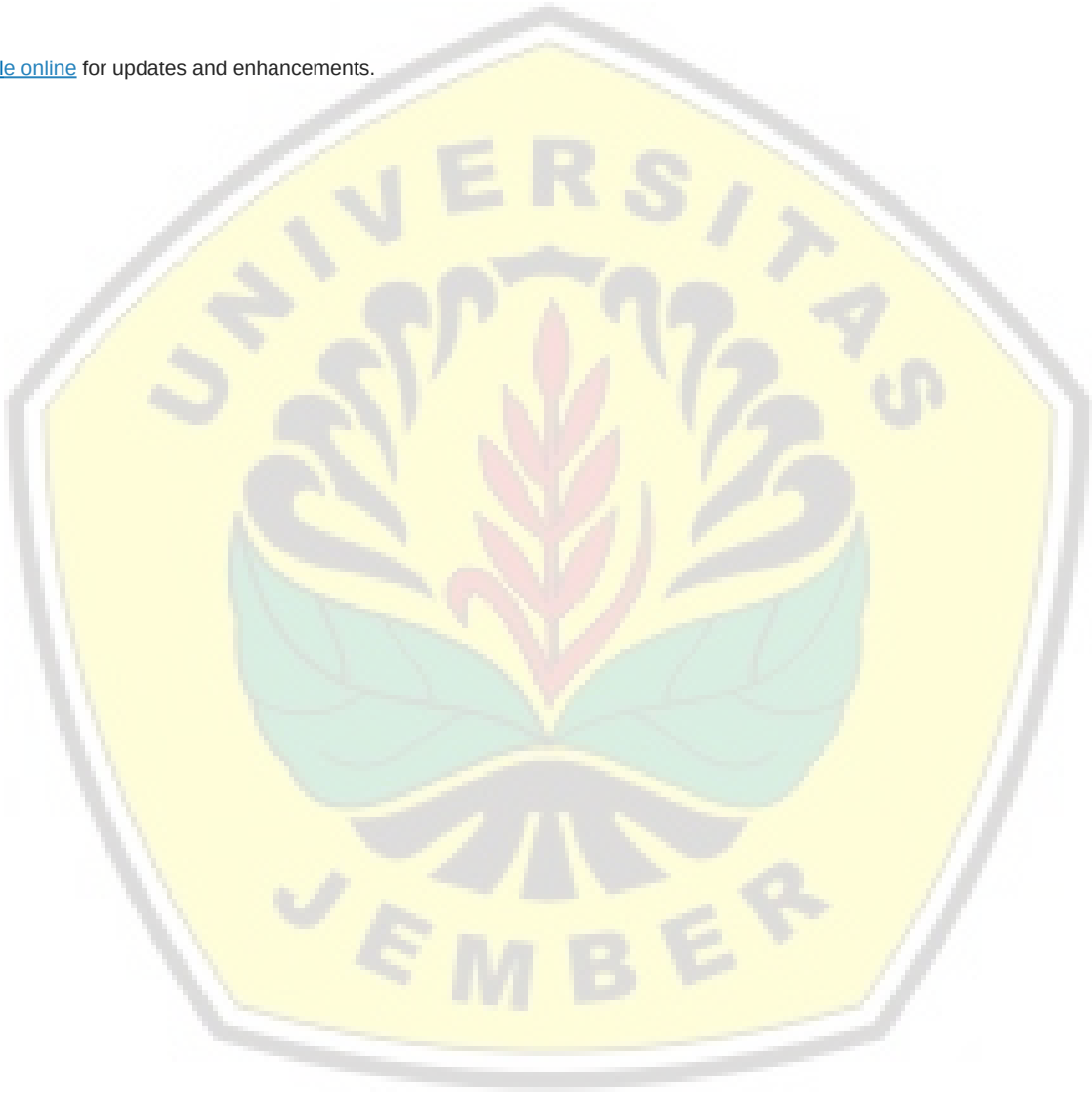
To cite this article: N Widodo and H Khasanah 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **759** 012024



The effect of binahong leaf meal (*Anredera cordifolia* (ten.) Steenis) as feed additive on digestive organs profile of broiler chickens

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Abstract. Binahong (*Anredera cordifolia* (Ten.) Steenis) is known as an herb plant that has a biofunctional compound and is used for medical treatment. This study aims to determine the effect of binahong leaf meal (BL) on the digestive organs' profile, namely intestinal length and weight (duodenum, jejunum, and ileum), and percentages of liver, heart, and bursal of broiler chickens. A total of one hundred and ninety-two male DOC of broiler were divided into six treatments with four replications, and each replication consisted of 8 birds. The treatment groups were: C (negative control), T: tetracycline 50 ppm (positive control), B1 (1% BLM), B2 (2% BL), B4 (4%), and B8 (8% BL). The data obtained were performed by analysis of variance and followed with Duncan's multiple range test. The results showed that BLM's addition increased to 8%, significantly different (P <0.01), to jejunum length, ileum length, liver and heart weight percentage. Based on our study, it can be concluded that the addition of BLM up to 4% produced the best performance on the broiler's digestive organ profile.

1. Introduction

Antibiotic Growth Promoter (AGP) are reported to transmit resistance to erythromycin, ciprofloxacin, tetracycline, and enrofloxacin [1]. It can also leave antibiotic residuals on poultry. The appearance of antibiotic cross-resistance in these pathogenic bacteria is also used with AGP in livestock [2]. The contradictory impact of AGP has become the interest of many countries globally, so that the use of AGP is no longer permitted in poultry production, including in Indonesia [3]. On the other hand, AGP's use has become a practice because it provides benefits in production and economy.

Feed additives originating as AGP obtained from herbal plants. One of them is Madeira vine (*Anredera cordifolia (*Ten.) Steenis), which is a plant that contains secondary metabolites which can be used as drugs comprising secondary metabolites, including phenols, flavonoids, alkaloids, terpenoids, saponins, which have a positive effect on intestinal bacteria, feed conversion and body weight of broilers [5]. An important factor that supports the development of chicken productivity is the health of the digestive tract. This indication is related to the digestion of food, food, and even livestock health [6] described that one of the advantages of using therapeutic ingredients is to thicken the digestive tract, promoting nutrient absorption. The digestive tract is an intense research area to encourage increased livestock production [7].

The gastrointestinal tract is an entry point for nutrients that can develop bird performance. Report on the results of morphometric studies of the digestive tract, at the time of hatching, the small intestine's weight was 1.2 to 2.6% of the chicken weight, and the maximum development was 6.2 to 6.6% [8]. In terms of chicken production, the central aspect of developing chicken intestine

performance is fundamental. This study aims to analyse the effect of Madeira vine (*Anredera cordifolia* (Ten.) Steenis) or binahong as feed additive on intestinal morphometry and the proportion of digestive organs.

2. Material and Methods

2.1 Material.

The material of this study using broiler chikens male DOC (Lohmann MB 202 strain). The feed ingredients used in this study were: yellow corn, rice bran, wheat pollard, soybean meal (SBM), meat bone meal (MBM), poultry meat meal (PMM), palm oil, (*Anredera cordifolia* (Ten.) Steenis) or binahong leaf flour, DL- Methionine, L-Lysine-HCL, calcium phosphate, and fillers. Binahong leaf meal (BL) preparation is done by drying leaves and stems using oven temperature at 55 ºC for 48 hours then grinding until smooth (60 mash).

2.2. Methods.

The design used was a completely randomized design (CRD), of one hundred ninty two male DOC (Lohmann MB 202 strain) were randomly divided into 6 treatment groups with 4 replications, maintaned for 35 days. The treatment groups were: C (negative control), T: tetracycline 50 ppm (positive control), B1 (1% BL), B2 (2% BL), B4 (4%), and B8 (8% BL). This study used a single feed and given ad libitum. The research feed formulation used is shown in Table 1.

Table 1. Composition and calculation of nutrient content of experimental ration

Feed ingredients	Weight (kg)					
	C	T	B1	B2	B4	B8
Yellow corn	54.50	54.50	54.50	54.50	54.50	53.50
Rice bran	3.00	3.00	3.00	3.00	3.00	2.00
White pollard	3.00	3.00	3.00	3.00	3.00	2.00
SBM	13.50	13.50	13.50	13.50	13.50	12.50
MBM	8.00	8.00	8.00	8.00	8.00	8.00
PMM	9.50	9.50	9.50	9.50	9.50	9.50
Palm oil	3.00	3.00	3.00	3.00	3.00	3.00
DL-Met	0.50	0.50	0.50	0.50	0.50	0.50
L-Lysin`HCl	0.50	0.50	0.50	0.50	0.50	0.50
Calcium Phosphate	0.50	0.50	0.50	0.50	0.50	0.50
NaCl	0.25	0.25	0.25	0.25	0.25	0.25
Binahong leaf meal	0.00	0.00	1.00	2.00	4.00	8.00
Tetrasiklin	0.00	++	0.00	0.00	0.00	0.00
Filler	4.00	4.00	3.00	2.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
Nutrient content (%)						
Metabolizable energy (kcal/kg)	3041.05	3041.05	3061.73	3082.40	3123.76	3091.87
Crude protein	21.24	21.24	21.39	21.54	21.83	21.63
Ether extract	7.60	7.60	7.65	7.70	7.81	7.83
Crude fiber	3.15	3.15	3.23	3.31	3.47	3.55
Calcium	1.48	1.48	1.50	1.51	1.53	1.58
P-available	0.53	0.53	0.53	0.54	0.55	0.56
L-Lysine	1.40	1.40	1.40	1.40	1.40	1.36
DL-Methionine	0.66	0.66	0.66	0.66	0.66	0.65

Note= C : Feed (negative control), T: feed + tetracycline 50 ppm (positive control); B1, B2, B4, and B4: Feed + 1, 2, 4, and 8% binahong leaf meal.

The observed variables were: length of the intestinal parts (duodenum, jejunum and ileum), weight of the parts of the intestine (duodenum, jejunum, and ileum), and weight percentage (liver, heart, and bursal). Determination of the percentage of internal organs is obtained from dividing the weight of internal organs (liver, heart, and bursal) with the live weight of broiler chickens multiplied by 100%.

$$\text{Percentage of internal organs} = \frac{\text{weight of organs in broiler live}}{\text{weight broiler}} \text{ X } 100\ \%$$

This study used a completely randomized design and the data obtained were analyzed of analysis of variance (ANOVA) and the different effects were testing by the Duncan's multiple range test [9].

3. Results and Discussion.

The intestinal morphometry performance and the percentage of digestive organ of chicken fed by the basal diet supplemented by BL indicate that all give the equivalent performance duodenum length, duodenum weight, jejunum weight, ileum weight, and bursal percentage. The jejunum length of treatment C, T, B1, B2, B4, and B8 were 72.00, 71.00; 70.63; 71.75; 76.63; and 80.38 cm, respectively; . While the length of the ileum is 69.13; 66.75; 64.25; 66.25; 76.88; and 82.25 cm. Moreover, 1% BL showed the lowest intestinal length and weight performance. The results showed that provision of BL up to a level of 2% had no effect on intestinal length, but at a higher level, at level 4 and 8%, provision of BL increased ($P < 0.05$) the length of the jejunum and ileum. The higher the concentration of BL, the longer and the weight of the jejunum, ileum, and the greater the percentage of liver and heart and percentage of digestive organ. This indicates that at a higher level (4 and 8%) it reduces the efficiency of the digestive tract because the longer the digestive tract will require more energy in maintenance. Changes in intestinal structure and function are very dynamic which is part of the adaptation to changes in feed, disease and damage [10]. In addition, various feed ingredients such as amino acids, amines, nucleic acids, butyrate, anti-nutritional and bioactive compounds which benefit from stimulating the development of the digestive tract [11]. According to Blakely & Bade [12], the small intestine is part of an essential digestive track and is closely related to livestock production because the small intestine is where nutrients are metabolized and absorbed. The length of the small intestine varies widely. The small intestine reaches 150 cm [12], and the large intestine (colon) length reaches 8-10 cm [13]. The morphometry and weight intestine, and percentage of digestive organ showed in Table 2.

Table 2. Profile digestive organs of broiler chickens with supplementation of binahong leaf meal

Variable	Treatment						Statistic	
	C	T	B1	B2	B4	B8	SEM	P-value
Length:								
Duodenum (cm)	31.19	32.94	32.94	31.25	31.50	33.67	0.76	0.954
Jejunum (cm)	72.00^{ab}	71.00^{ab}	70.63^{a}	71.75^{ab}	76.63^{bc}	80.38^{c}	0.99	0.005
Ileum (cm)	69.13^{ab}	66.75^{a}	64.25^{a}	66.25^{a}	76.88^{bc}	82.25^{c}	1.84	0.004
Weght:								
Duodenum (cm)	11.94	12.89	11.90	12.50	12.53	11.31	0.37	0.99
Jejunum (cm)	21.86	21.97	22.87	23.99	21.95	20.85	0.38	0.26
Ileum (cm)	16.87	18.97	16.42	18.38	17.36	16.11	0.36	0.12
Percentage:								
Liver (%)	2.85^{a}	2.89^{a}	2.85^{a}	2.73^{a}	3.00^{a}	3.32^{b}	0.05	0.005
Heart (%)	0.63^{a}	0.59^{a}	0.61^{a}	0.65^{a}	0.69^{ab}	0.77^{b}	0.01	0.028

Bursal (%)	0.32	0.27	0.38	0.32	0.32	0.39	0.01	0.091

Information: C: Feed (negative control), T: feed + tetracycline 50 ppm (positive control); B1, B2, B4, and B8: Feed + 1, 2, 4, and 8% binahong leaf meal.[abc]Different superscripts on the same line show different influences (P<0.05)

The provision of binahong leaf meal up to a level of 8% did not give a significant difference (P> 0.05) on the weight of the duodenum, jejunum, and ileum of broiler chickens. The duodenum weight in treatment C, T, B1, B2, B4, and B8 were 11.94 g; 12.89 g; 11.90 g; 12.50 g; 12.53 g; and 11.31 g. Jejunum weights are 21.86 g, 21.97 g, 22.87 g, 23.99 g, 21.95 g, and 20.85 g, respectively, while the ileum's weight is 16.87 g; 18.97 g; 16.42 g; 18.38 g; 17.36 g; and 16.11 g. Changes in intestinal conditions with the addition of an acidifier also did not have a significant effect on intestinal weight [15]. The duodenum, jejunum, and ileum weight is closely related to the length of the villi and the width of the villi. The longer and more extensive the intestinal villi, the wider the surface for nutrient absorption, and the absorption of nutrients is more optimal, causing the duodenum, jejunum, and ileum to become more massive. Following the opinion [16 and 15], which states that the small intestinal villi's high growth is closely related to the small intestine's potential to absorb nutrients, the higher the small intestine villi, the greater the effectiveness of nutrient absorption through the small epithelium intestine. [17] argue that a heavier small intestine is an indication of a greater area of digestion and nutrient absorption.

The average percentage of liver weight in the binahong leaf meal treatment was 2.85% (C), 2.89% (T), 2.85% (B1), 2.73% (B2), 3.00%, and 3.32% (B4), respectively. . Liver weight for each treatment was in the normal range except for P2, which was 3.2%. The analysis showed that providing BL up to a level of 4% did not affect liver weight. However, providing BL up to a level of 8% significantly (P <0.05) increased liver weight. This result shows that providing BL at the 8% level has disturbed the liver. BL contains secondary metabolites: total phenol 85.30 mg/kg, total flavonoids 47.40 mg/kg, saponins 66, 00 mg/kg, and alkaloids 2.60 mg/[17]. Sinurat et al.[18] states that increased liver weight is caused by disease or toxins carried with food. Thus, providing BL at a level of 8% makes the liver work extra to increase the production and secretion of bile to neutralize these toxins (secondary metabolite content of BL) as a consequence, the size of the liver increases.

4. Conclusion

We conclude that the Binahong leaf meal (BLM) supplementation up to 4% (1%, 2%, and 4%) in broiler chicken indicates the broiler's digestive organ profile's in an acceptable performance.

5. References

[1] Ma De Cesare, A, Manfreda G, Bondioli V, Pasquali F and Franchini A 2002 Antibiotic resistance and ribotyping profiles of campylobacter isolates from a poultry meat processing plan *Archivoes Geflugel* **66** 2 62

[2] Gibson GR and Roberfroid MB 1995 Dietary modulation of the human colonic microbiota: introducing the concept of prebiotics *J Nutr* **125** 1401-12

[3] Tehseen M, Tahir M, Khan RU, Jabbar A, Ahmad B, Ahsan T, Khan S and Abudabos M 2016 The Philippine Agricultural *Scientists* **9 9**408–13

[4] Tiwari R, Chakraborty S, Saminathan M, Dhama K and Singh SV 2014 Ashwagandha (*Withania somnifera*): role in safeguarding health, immunomodulatory effects, combating infections and herapeutic applications: a review *J Biol Sci* **14** 77–94

[5] Widodo N, Wihandoyo Z and Dono ND 2018 The effect of dietary binahong (*Anredera cordifolia* (Ten.) Steenis) leaf meal supplementation on total ileal bacteria and jejunal histomorphology in broiler chickens *International Journal of Poultry Science* **17** 473-78

[6] Rinttila T and Apajalahti J 2013 Intestinal microbiota and metabolites—implications for broiler chicken health and performance *J Appl Poult Res* 647–58

[7] Jensen M S, Jensen SK and Jakobsen K 1997 Development of digestive enzymes in pigs with emphasis on lipolytic activity in the stomach and pancreas *J Anim Sci* **75** 437-45
[8] Khan I, Zaneb H, Masood S, Yousaf MS, Rehman HF and Rehman H 2017 Effect of *Moringa oleifera* leaf powder supplementation on growth performance and intestinal morphology in broiler chickens *Journal of animal physiology and animal nutrition* **101** 114-21
[9] Weaver LT, Austin S and Cole TJ 1991 Small intestinal length: a factor essential for gut adaptation *Gut* **32** 1321-23
[10] Celi P, Cowieson AJ, Fru-Nji F, Steiner, RE, KluenterAM and Verlhac V2017 Gastrointestinal functionality in animal nutrition and health: new opportunities for sustainable animal production*Animal Feed Science and Technology* **234** 88-100
[11] Suprijatna EU and Atmomarsono RK 2005 *Ilmu dasar ternak unggas (Basic science of poultry*). (Jakarta: Penebar Swadaya)
[12] Blakely D and Bade DH 1991 *Ilmu peternakan (Animal Science)* Penerjemah : Bambang Srigandono (4th ed.) (Yogyakarta: Gadjah Mada University Press)
[13] Rimbawanto EA, Iriyanti N and Hartoyo B 2020 Weight and Length of Small Intestine and Weight of Broiler Chickens' Accessory Organs by Providing Various Types of Acidifier *Proc Sustainable development of rural resources and local wisdom.* 105-12
[14] Lenhardt L and Mozes S 2003Morphological and functional changes of the small intestine in growth-stunted broilers *Acta Vet Brno* **72** 353-358
[15] Widodo N, Wihandoyo Zuprizal and Dono ND 2018 The effect of dietary binahong [*Anredera cordifolia* (ten.) steenis] leaf meal supplementation on total ileal bacteria and jejunal histomorphology in broiler chickens *International Journal of Poultry Science* **17** 473-78
[16] Wang X, Farnell YZ, ED Peebles, AS Kiess, KGS Wamsley and W Zhai 2016 Effects of prebiotics, probiotics, and their combination on growth performance, small intestine morphology, and resident *Lactobacillus* of male broilers *Poultry Science* **95** 1332–40
[17] Widodo N, Wihandoyo, Dono NDand Zuprizal 2016 Potency of Binahong leave flour (*Anredera cordifolia* (Ten.) Steenis) as phytobiotics on broiler chicken *ProcOptimization of Animal Husbandry Technology and Agribusiness in the Context of Fulfillment of Animal-Originated Animal Protein* **42** 165 – 170
[18] Sinurat AP, T Purwadaria, MH Togatorop, T Pasaribu, IAK Bintang, Sitompul S and J Rosida 2002 Responses of broilers to Aloe vera bioactives as feed additive: The effect of different forms and levels of bioactives on performances of broilers *JITV* **7** 69-75