

# The effect of phytobiotics ginger (*Zingiber officinale* Rosc.) extract in drinking water on hematological characters of KUB chickens

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## The effect of phytobiotics ginger (*Zingiber officinale* Rosc.) extract in drinking water on hematological characters of KUB chickens

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**Abstract:** This study was carried out to investigate the effect of phytobiotics ginger (*Zingiber officinale* Rosc.) in drinking water on haematological characters of Kampung Unggul Balitbangtan (KUB) chickens. A total of one hundred KUB chickens fourteen days old were assigned into 4 treatments with 5 replicates (5 birds in each replicate). The experimental treatments were control without red ginger extract (T0), drinking water with 0.5% ginger extract (T1), 1.0 % ginger extract (T2), and 1.5 % ginger extract (T3). The basal diet was yellow corn, BR2 poultry concentrate produced by PT Wonokoyo, rice brand, and vitamin premix, which contains 17.07% CP, 3097.79 kcal/kg ME, 0.81% Ca, and 0.56% Pav. Variables evaluated were haematological character of KUB chicken. The results were analyzed using ANOVA in a completely randomized design using Statistical Package for Social Science or SPSS. Duncan multiple range test (DMRT) were used to separate mean of data when p-value differ significantly ( $P < 0.05$ ). Results showed that supplementation ginger extract in the drinking water did not significantly effect haematological character of KUB chicken..

**Keywords:** Haematological Character; KUB Chicken; Phytobiotics; Red Ginger;

### 1. Introduction

Indonesia has at least 34 kinds of native chicken with different morphological characteristics. Native chicken is a potential resource as a provider of animal protein demand, approximately 12.33% of the total national consumption of chicken was contributed with native chickens [1]. KUB (Kampung Unggul Balitbangtan) chicken is an improved Indonesia native chicken breed by the Indonesian Research Institute for Animal Production (IRIAP). KUB chicken was launched as a commercial chicken by Agricultural Minister No. 274/Kpts/SR.120/2/2014 (Direktorat Jenderal Peternakan dan Kesehatan Hewan 2014). KUB chicken has the potential genetic to produce meat and egg with savory taste, delicious and in demand by the public. The KUB-1, the first generation of KUB produces eggs up to 50% hen day production (HDP) or about 180 eggs/hen/year [2].

Extreme climate change in Indonesia directly affects the physiology, productivity, and healthy of KUB chicken. Phytobiotics are used for increased animal health during extreme climate change. Phytobiotics are secondary plant metabolites, they function as antioxidants, digestive enhancers, nutraceuticals, and health promoting substances. They are used as growth promoters in feed, especially for monogastric [3]. Phytobiotics have an activity to modify the gut microflora by reducing the number



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of pathogenic organisms. Phytobiotics lead to health benefits, promoting growth and improving meat and egg quality in poultry production [4]. One phytobiotic is ginger that can be used as a potential alternative for growth promotor. *Zingiber officinale* Rosc, the Zingiberaceae family, commonly recognized as ginger, is a monocotyledonous herb and popularly known as a feed additive that has various pharmacological characters [5]. Ginger has been used as an herbal medicine with zingerone, shogaol, and gingerol compounds [6]. The medicinal value of ginger is as antioxidant, antimicrobial, anti-inflammatory, anti-hypercholesterolemic, anti-hyperglycemic, and antispasmodic potential that arises from the oleoresins which are present in it [7].

Hematological characters are indicators of the physiological status of animals and are used in the diagnosis of animal health. Hematological studies are of ecological and physiological interest in helping to understand the relationship of blood characteristics to the environment. Animals with good blood composition are likely to show good performance. The examination of blood allows investigating the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition, and pathological status of an organism [8]. The purpose of this study was to evaluate the effect of phytobiotic ginger to improve physiological KUB chicken concerning hematological characters.

## 1 Material and Methode

### 2.1 Animal, Diets, and Experimental Design

The study was conducted at Bagorejo Village, Gumukmas District, Jember, while the hematological character analysis was carried out at the New Prosenda Jember Laboratory. The number of 100 fifteen days old KUB chickens were divided into four treatments and five replicates with 5 birds in each replicate pen. Each pen was equipped with a feeder and a water trough. The basal diets were formulated based on yellow corn, soybean meal, and poultry concentrate which contained 17,07% crude protein (CP), 3097,19 Kcal/kg metabolizable energy (ME), 0.81% Calcium (Ca), and 0.56% available Phosphorus (Pav). Formulation and chemical compositions for the basal diets are shown in Table 1. The experimental treatments were consisted of control without red ginger extract (T0), drinking water with 0.5% red ginger extract (T1), 1.0 % red ginger extract (T2), and 1.5 % red ginger extract (T3).

Table 1. Ingredients and nutrient composition of the basal diet

Ingredients	Chemical compositions				
	Proportion (%)	CP (%)	ME (Kcal/kg)	Ca (%)	Pav (%)
Yellow corn	56.57	5.03	1866.81	0.01	0.13
Rice brand	17.17	9.98	735.28	0.79	0.21
Poultry concentrate	26.26	2.06	495.70	0,01	0.22
Total	100.00	17.07	3097.79	.0,81	0.56

### 2.2 Blood collection

Each replicate of birds was reared in individual pens. A bird on day 35 of age was selected randomly from each replicate and around 2 ml blood samples were collected from each bird through the brachial vein, using sterile needles and syringes. The blood samples were put in properly labeled and sterilized anticoagulant (EDTA) tubes, then used for hematological analysis. The blood tubes were placed at room temperature for 6 h and incubated overnight in the refrigerator at 4°C to obtain serum. The serum samples were kept at -20°C before biochemical analysis.

### 2.3 Evaluation of hematological character

The hematological character evaluated were hemoglobin, erythrocytes, hematocrit, concentration, mean cell hemoglobin (MCH), mean cell volume (MCV), mean cell hemoglobin concentration (MCHC), leucocyte, and thrombosit of KUB chicken, using hematological Analyzer Sysmex XP- 100 (Japan).

### 2.4 Ginger extract

The ginger extract was produced by washing the ginger rhizome with sterile distilled water, then drying it. The dried ginger rhizome was cut into small pieces, then weighed as much as 100 grams, and mixed with 100 ml of sterile distilled water (weight/volume 1: 1), then blended. The filtrate was then filtered using sterile gauze to obtain ginger extract (Mujim, 2010).

### 2.5 Statistical Analysis

Data of hematological character of KUB chicken were expressed as mean  $\pm$  STdev. The data were statistically analyzed by one-way ANOVA with a completely randomized design, using Statistical Package for Social Science or SPSS (SPSS GmbH, Munich, Germany). Duncan's multiple range test (DMRT) was used to separate data with significant differences. All indication of significance was based on a probability of less than 5%.

## 3. Results and Discussion

The results for a hematological character with phytobiotics ginger (*Zingiber officinale* Rosc.) extract in drinking water are presented in Table 2. The data showed that treatment had no significant effect (P value  $>$  0.05) on hemoglobin, erythrocytes, hematocrit, MCV, MCH, MCHC, Leucocyte, and trombosite of KUB chicken. The results were similar to [9] that showed the blood profile had not been affected by heat pressure. The metabolic processes with heat stress in the body have not had an impact on the blood profile of Indonesia native chicken.

Table 2. The data of hematological character with phytobiotics ginger extract in drinking water

Item	P0	P1	P2	P3	P value
Hemoglobin (g/dl)	13,80 $\pm$ 2,55	11,64 $\pm$ 3,50	10,42 $\pm$ 3,96	11,38 $\pm$ 3,48	0,475
Erythrocytes (x 10 <sup>6</sup> )	2,39 $\pm$ 0,39	2,06 $\pm$ 0,29	1,86 $\pm$ 0,32	2,0 $\pm$ 0,26	0,537
Hematocrit (%)	29,72 $\pm$ 2,37	25,54 $\pm$ 3,27	22,26 $\pm$ 3,86	24,62 $\pm$ 3,22	0,448
MCV (fl)	122,62 $\pm$ 2,85	125,28 $\pm$ 2,31	118,32 $\pm$ 1,71	123,42 $\pm$ 2,64	0,200
MCH	56,84 $\pm$ 1,12	56,80 $\pm$ 0,55	55,62 $\pm$ 0,71	56,66 $\pm$ 1,06	0,743
MCHC (g/dl)	46,42 $\pm$ 0,35	45,40 $\pm$ 1,03	46,96 $\pm$ 0,44	45,94 $\pm$ 0,65	0,175
Leucocyt (x 10 <sup>3</sup> / $\mu$ l)	59,36 $\pm$ 4,14	50,74 $\pm$ 2,63	44,16 $\pm$ 1,02	48,65 $\pm$ 5,70	0,411
Thrombosit (Plt)	12,40 $\pm$ 2,93	7,40 $\pm$ 0,93	8,80 $\pm$ 0,86	5,80 $\pm$ 1,02	0,72

The results of the present research were not in agreement with [10] who reported that supplemented broiler feed with ginger powder improved blood chemistry and hematological parameters in birds. The hematological character was sensitive to ginger-based diets, and these values increased with increasing dietary ginger intake. The different results in this study were due to the process of extracting phytochemical components from ginger not optimally so a few bioactive were obtained that can be used as phytobiotic for KUB chicken.

No significant effect from this research was due to the chickens undergoing heat stress for a long time and leading to tolerating and adapting to the existing environmental temperature. The bird will maintain their homeostasis to regulate their physiological response to heat stress [11]. The physiological homeostasis of chicken will keep its body temperature within normal temperature with release excess body temperature into the environment [12]. An imbalance between metabolic heat production was causes changes in livestock behavior and the function of several body organs, besides that it will

indirectly affect the increased hormone corticosterone which has an impact on decreasing hemoglobin levels. Heat stress in poultry chickens will cause changes in hemoglobin concentration, erythrocyte count, and hematocrit levels in the body.

The hematological character with phytobiotics ginger (*Zingiber officinale* Rosc.) extract in drinking water blood acts as a pathological reflector of the status of animals exposed to xenobiotics and other extreme conditions [7]. Laboratory tests on the blood are vital tools that help detect any deviation from normal health status in animals. The examination of blood allows investigating the presence of several metabolites and other constituents in the body of animals and also play vital roles in the physiological, nutritional, and pathological status of an. Changes in hematological parameters are often used to determine the status of the body and stresses due to environmental, nutritional, and pathological factors. The normal values of hematological character obtained in the present study indicated that phytobiotics ginger extract added to chicken water had healthy blood composition are likely to show good performance [13].

#### 4. Conclusion

Supplementation ginger extract in the drinking water did not significantly effect haematological character of KUB chicken.

#### 5. Acknowledgment

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