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Impact of Liquid Fermeherbafit as Feed Additive to the Blood Hematological Profile and Lymphoid Organ of Broiler Chickens

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Abstract. The objective of this research was to evaluate the administration time of liquid fermeherbafit used in drinking water on blood hematological profiles and lymphoid organ of broiler chickens. 1,000 heads of broiler chicks 1-14 days old with prelium treatment, and 14 - 34 day-old as research treatment. Fed by BR 1 and BR2 feed of CP production. Fermeherbafit material consists of: 100% *Curcuma domestica* (turmeric), 100% *Curcuma Xanthorrhiza* R (*Curcuma*), 25% *Allium sativum* L (garlic), 50% *Morinda citrifolia* (Noni), 10% *Moringa oleifera* (Moringa leaf), 10% sugar, 8% (w/v) Probiotic LAB (Lactic acid bacteria). used complete random design (RAL), with 4 treatments with 50 chickens each of 5 replicates, the liquid Fermeherbafit as much as 4% (v/w) of the feed given to the four groups: R0 = as control, R1 = daily, R2 = every two days; R3 = every Monday and Thursday. The results of Blood haematological profiles and the lymphoid organ of broiler chickens showed no significance differences ($P > 0.05$). The average of blood haematological profile is leukocytes were $8,830 \pm 2.01$ until 8.70 ± 1.87 ($\times 10^3/\mu\text{L}$); Monocytes of 4.60 ± 1.82 to $7.00 \pm 2.45\%$; Lymphocytes of 53.00 ± 11.92 to $57.20 \pm 9.73\%$; Hb of 6.36 ± 0.37 to 7.38 ± 0.40 G/dL; Fabricius of 0.81 ± 0.06 to $1.00 \pm 0.12\%$; Lymph of 0.12 ± 0.03 to $0.24 \pm 0.16\%$; Thymus of 0.17 ± 0.05 to 0.20 ± 0.05 . it can be concluded that liquid fermeherbafit through drinking water at exact time daily, every two days and every Mondays-Thursdays are reviewed in the results of blood haematological profiles as well as Lymphoid organ of broiler chickens.

Keywords: broiler, blood profile, organ lymphoid

1. Introduction

Broiler chickens are susceptible to disease and stress. It is reflected from the blood profile (leukocyte, monocyte, lymphocyte and Hb) and organ immunity that includes bursa of fabricius, lymph and thymus. Blood profile is one of the perimeters of animal health status because blood plays an important role in organizing body physiology.

Leukocyte is white blood cells involved in immunity system. The depleting amount of leukocyte and its types (eosinophil, monocyte, and lymphocyte) results in the decreasing antibody and phagocyte against bacteria, virus and germs [1]. The main function of lymphocyte is to responds to antigens (foreign materials) that forms antibody in blood circulation or immunity cellular. Broiler chickens are susceptible to disease and stress. It is reflected from the blood profile (leukocyte, monocyte, lymphocyte, and Hb) and organ immunity that includes bursa of Fabricius, lymph, and thymus. Blood profile is one of the perimeters of animal health status because blood plays a vital role in organizing body physiology.

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Lymphoid organs that include primary lymphoid organs (*bursa Fabricius* and thymus) and secondary lymphoid organ (lymph) are involved in the body immune system of poultry [2]. Bursa of Fabricius and lymph are highly susceptible to several diseases that decrease the immune system. One preventive action is by increasing the number of B lymphocyte through a treatment called immunomodulator [3]. Immunomodulator could improve the immune system, prevent infection carried by [4], and stimulate the immune system to produce more antibody to eradicate the disease agent [5]. Feed additive is an example of immunomodulator. The common feed additive for chickens is medicine, antibiotic, enzyme, vitamin, probiotic, prebiotic, and herbal potion. [6] reported that herbal potion for chicken is given in the drinking water or mixed with feed as “feed additive” or “feed supplement” that positively improve cattle health and stamina (as immunomodulator).

A natural feed additive “fermeherbafit” is a herbal potion fermented with Lactic Acid Bacteria (LAB) [7]. Fermeherbafit contains turmeric (*Curcuma domestica*), Curcuma (*Curcuma xanthorrhiza* R), noni (*Morinda citrifolia*), garlic (*Allium sativum* L) and moringa leaf.

The active substances in turmeric and Curcuma are curcumin and essential oil that function as calagoga, while garlic that contains bioactive substance (Allycin) exhibits antibacterial and antioxidant properties. Moringa leaves contain active compounds, i.e., saponin, tannin, flavonoid, alkaloid, and terpenoid [8, 9, 10]. Probiotic in fermeherbafit maintains balanced microflora in the digestive tract, produces an anti-microbial substance (bacteriocin), and improve competitive exclusion (CE) in colony-forming or nutrient use.

2. Methodology

The research used a Completely Randomized Design (CRD), with 4 treatments and 5 replications, with 50 chickens per repetition. Provision of liquid fermeherbafit as much as 4% (v / w). This research used 1000 broiler chickens strain *Cobb* from PT. Charoen Pokphand Indonesia reared from 1 to 14 days old fed with control feed, and from 14-34 days were offered with treatment feed. Fermeherbafit consisted of 100% *Curcuma domestica* (*turmeri*), 100% *Curcuma xanthorrhiza* R (curcuma), 25% *Allium sativum* L (garlic), 50% *SMorinda citrifolia* (*noni*), 10% *Moringa oleifera* (moringa leaves), 10% palm sugar, and 8% (w/v) LAB probiotic (Lactic Acid Bacteria). The offered finished feed was BR 1 with nutrient content of 23-24% CP and 2950-3050 kcal/kg ME, and BR2 with 18-20% CP and 2850-2950 kcal/kg ME. The measured variables were 1) relative weight of lymphoid organ (*bursa of fabricius*, lymph, and thymus) and 2) blood profile (Leukocyte, Monocyte, Lymphocyte and Hb).

The study was conducted in a Completely Randomized Design (CRD) with four treatments and five replicates using 50 chickens each. Liquid fermeherbafit was supplemented 4% (v/w) of the feed offered. The treatments were R_0 = zero fermeherbafit supplement; R_1 = fermeherbafit supplement every day; R_2 = fermeherbafit supplement every two days; R_3 = fermeherbafit supplement on Mondays and Thursdays.

3. Result and Discussion

As the observation on the impact of liquid fermeherbafit supplement to the relative weight of lymphoid organ (*bursa of fabricius*, lymph, and thymus) and blood profile (Leukocyte, Monocyte, Lymphocyte and Hb) of broiler chickens are presented in **Table 1**.

Table 1 shows that the weights of bursa of Fabricius and lymph were 0.81 ± 0.06 - 1.00 ± 0.12 (%) and 0.12 ± 0.03 - 0.24 ± 0.16 (%), respectively. This result supported [11] that the organ immunity of Sentul chicken provided with herbal potion weighed 0.479 ± 0.124 (lymph), 0.875 ± 0.181 (bursa of Fabricius), and 0.17 ± 0.05 - 0.20 ± 0.05 (thymus). The relative weight of normal thymus was 0.21 - 0.28 % [12].

Table 1. The average relative weight of lymphoid organs in broiler chickens

Treatment	R_0	R_1	R_2	R_3
Bursa of fabricius (%) ^{ns}	1.00 ± 0.12	0.81 ± 0.06	0.84 ± 0.14	0.89 ± 0.10
Lymph (%) ^{ns}	0.13 ± 0.08	0.16 ± 0.06	0.24 ± 0.16	0.12 ± 0.03

Thymus (%) ^{ns}	0.19±0.03	0.20±0.05	0.17±0.05	0.20±0.05
Leukocyte (..x 10 ³ /μl) ^{ns}	8.830±2.01	8.340±2.47	8.810±1.34	8.700±1.87
Monocyte (%) ^{ns}	6.60±3.36	6.00±2.92	7.00±2.45	4.60±1.82
Lymphocyte (%) ^{ns}	53.00±11.92	56.80±9.23	54.40±9.18	57.20±9.73
Hb (g/dL) ^{ns}	6.36±0.37	7.08±0.34	7.2±0.37	7.38±0.40

^{ns}= non-significant (P>0.05). R₀= zero fermeherbafit; R₁= fermeherbafit supplement every day; R₂= fermeherbafit supplement every two days; R₃= fermeherbafit supplement on Mondays and Thursdays.

The herbal supplement did not significantly affect (P>0.05) the relative weight of lymphoid organ (bursa of Fabricius, lymph, and thymus) and blood profile (leukocyte, monocyte, lymphocyte, and Hb) of broiler chickens. It showed that supplementing liquid fermeherbafit in broilers' drinking water did not affect health status. The growth rate and regression of bursa of Fabricius are dependent on the species, breed, condition and sexual hormones, while the growth rate and bursa size in chicks are correlated with resistance against disease [13]. [14] stated that bursa of Fabricius could produce lymphocyte B that was transported to the secondary lymphoid organ such as lymph. Thymus also guarantee that the stem cells migrating from bone marrow undergo post-natal proliferation and differentiation into lymphocyte T with surface antigen [15]. Lymphocyte T is derived from the primary lymphoid system, macrophage, and dendrite cell [16].

Hematological profile of blood is the parameter of body immune. The number of leukocyte in this research was 8.810±1.34 to 8.700±1.87/103/μl. [17] reported that the average leukocyte of broiler chickens offered with feed supplemented with 6% herbal potion was 25.19±7.97 x 10³/μl. Standard broiler chickens have 12–30 × 10³/ml leukocyte [18]. Furthermore, [11] reported leukocyte broiler chickens around 8–9 x 10³/ml.

The percentage of monocyte in this study was 4.60±1.82 to 7.00±2.45 (%); it was within the normal range of monocyte in healthy chickens. Monocyte ideally comprises 3–5% [19] or 4.33–5.83% [11] of the total leukocyte in blood.

Lymphocyte level in this study was 54.40±9.18 to 57.20±9.73%. The percentage of lymphocyte in broiler chickens reported by [7] was within the normal range i.e., 60.1 – 64.5% while lymphocyte in poultry was generally 42–66% [20].

The dynamic amount of lymphocyte follows the number of leukocyte in blood, and lymphocyte plays a role in forming antibody [21]. An increased total lymphocyte leads to lymphocytosis – an anomaly in poultry where an absolute lymphocytosis could trigger lymphocytic leukemia [22].

Hb level in this study was 7.08±0.34 to 7.38±0.40 g/dL (**Table 1**). [23] reported that the normal hemoglobin in poultry was 6.5-9 g/dl. The gap may occur due to different physiology (age and activity), environment (temperature and humidity) and feed composition [23, 24].

Medicinal plants are reported capable of affecting the defense mechanism or immunity system, both specific and non-specific [25]. Plants as the source of phytogenic feed are widely used as an immunostimulant in feed to improve livestock immunity against the disease. Immunostimulant is the substance that generates and support body immune system in responding to foreign materials in the body – immunostimulant could be natural or artificial [26].

Plant-based herbal potions (red ginger, Andrographis, Curcuma, turmeric, Curcuma aeruginosa, noni leaves, and fruits) as feed additives are reported to contain an active substance that functions as immunostimulant [27]. Supplementing 1% moringa pit (*Moringa oleifera*) into broiler chicken feed showed a positive effect on growth, immunity, and biochemical serum [28].

4. Conclusion

The use of liquid fermeherbafit through drinking water at exact time daily, every two days and every Mondays-Thursdays are reviewed in the results of blood haematological profiles as well as Lymphoid organ of broiler chickens.

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