

Effects of Andaliman (*Zantoxylumachantopodium*, DC) Supplementation on Broiler Immunity

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Abstract. The research aimed to effect of andaliman fruit flour (AFF) supplementation in the ration on broiler immunity. This study used 80 broiler strains of CP 707 (charoenpokhphand Indonesia) who were given a treatment ration starting at 3 days with an average body weight of 71.28 ± 3.07 g /bird and terminated on day 30. This research was conducted in July to August 2019 at the Mix Farm Experience Faculty of Animal Science UM-Tapsel. A completely randomized design (CRD) with four treatments and four replication and five birds in each replication was used in this experiment. Dietary treatments were: P1 = basal ration + 0% AFF (control); P2 = basal ration + 0.25% AFF supplementation; P3 = basal ration + 0.50% AFF supplementation; P4 = basal ration + 0.75% AFF supplementation. Variables measured were broiler immunity by the weight of the thymus and bursa fabricius. The results showed that AFF supplementation in diet a significant effect on the weight of the bursa fabricius ($P < 0.05$) and no significant effect on the weight of the thymus. Supplementation of 0.50% AFF in diet showed that highest level of immunity based on the average weight of the bursa fabricius (0.0350 ± 0.001) compared to AFF supplementation (0.0120 ± 0.006), supplementation 0.25% AFF (0.0095 ± 0.0015), and supplementation 0.75% andaliman (0.0255 ± 0.0055). The conclusion of this study was that supplementation of AFF 0.50% in the diet increased broiler immunity.

1. Introduction

Andaliman (*Zantoxylumachantopodium*, DC) is a spice plant that is widely found in North Sumatra. In general, the Andaliman has a height of 3-8 m, a red, spiky, and furry branch. This plant grows in the area of Tapanuli, the people use it as a spice of Batak specialties [1]. Andaliman has alkaloid and steroid compounds contained in high quantities and saponins in small quantities [2]. Andaliman has a content of citrus scented essential oil that is antimicrobial[3]

According to scientific report [4]a volatile component of the form of an antioxidant-type terpenoids. Antioxidants have a role as immunomodulators[5]. The reliable fruit has high antioxidant activity and is resistant to heat up to 1750 C for 120 minutes[6]. This plant extract shows the existence of immunostimulatory and antimicrobial activity [7]

In body endurance broilers can be seen from the weight of primary lymphoid organs, consisting of the bursa fabricius and thymus. Primary lymphoid organs serve as antibody forming. Scientific report regarding the use of andaliman in vivo is still very limited to animals to be conducted further study.



Based on potency antioxidant as immunostimulant owned by Andaliman, research with the andaliman supplementation of fruit flour into the diet of broiler immunity.

2. Materials and methods

2.1 Research design, bird management and treatment

Andaliman (*Zantoxylumachantopodium*, DC) obtained from the traditional market town of Padangsidempuan, North Sumatera. The reliable fruit is processed into flour by sun-drying and grinding. The andaliman fruit flour (AFF) is then formulated into broiler dietary. The study was conducted from July to August 2019 at the Mix Farm Experience Faculty of Animal Science at Muhammadiyah University of South Tapanuli.

This research used the broiler strains of CP 707 (Charoen Pokphand Indonesia) Age 3 days with an average body weight 71.28 ± 3.07 g/bird, maintenance for 30 days. A completely randomized design of four treatments and four replication consisted of 5 bird in each replication was used in this study. The cage is divided into 16 units with a size of 1 m x 1 m for 5 bird in this experiment, equipped with a feed, place of drinking, lamps, thermometer, fan, and scales. The dietary treatments contained are: P1 = basal rations + 0% AFF (control); P2 = basal ration + 0.25% AFF supplementation; P3 = basal rations + 0.50% AFF supplementation; P4 = basal rations + 0.75% AFF supplementation. The Data weights of bursa fabricius and thymus were taken at the end of research. In this research feed and drink is given ad libitum. The feed ingredient used are AFF, yellow corn milled, rice bran, soybean meal, fish flour, palm oil, and premix. The feed was compiled on the recommendation of [8], the nutrient research content used can be seen in table 1.

Table 1. Nutrient content of broiler diet with andaliman fruit flour (AFF) supplementation

Nutrient composition	Starter Period (%)	Grower period (%)
Metabolizable energy (kkal/kg)	3058.20	3102.20
Crude protein (%)	22.03	20.1
Crude fat (%)	4.20	4.30
Crude fiber (%)	2.59	2.53
Lysine (%)	0.39	1.30
Methionine (%)	0.50	0.45
Meth + Cystine (%)	0.89	0.79
Calcium (%)	1.15	0.95
Phosphor (%)	0.62	0.49

* Calculation of ration based on Leeson and Summers (2008).

2.2. Variable measured

Weight of bursa fabricius and thymus

Bursa fabricius and thymus are primary lymphoid organs having a role in the immune system. The weight of the bursa fabricius and thymus is obtained at the end of maintenance, the broiler randomly take each one of the tail of each replay then slaughtered according to syariat Islam. Primary lymphoid organs are separated from the carcass then weighed.

2.3. Data analysis

The study used the complete randomized design (CRD) of four treatments and four repeats. Significantly different means level was determined by one-way analysis of variance (ANOVA) different were considered significant at ($P < 0.05$). The data were further analyzed by using Duncan multiple range test. Statistical Package for Social Sciences (IBM® SPSS® version 21.0) is used to analyze data.

3. Results and discussion

Immunity can be seen from lymphoid organs [9]. Bursa fabricius and thymus are primary lymphoid organs that are the immune system in poultry [10]. According to [11] in [12]; [13] the bursa fabricius located at the posterior of the The cloaca plays an important role for the production of antibodies.

The results of research with supplementation of 0.50% (P3) andaliman fruit flour (AFF) in diet significantly ($P < 0.05$) on weight of the bursa fabricius. This condition describes the antioxidant contained in the Andaliman to serve as immunostimulatory, when viewed from the average weight of the primary lymphoid organ weight (table 2). This condition is influenced by the antioxidant content of andaliman. Antioxidants in the form of flavonoids, have antimicrobial properties [14]. Plants that contain flavonoids, tannins and terpenoids have immunomodulatory and antioxidant activity[15]. Andaliman ethanol extract has an influence as a cellular immunostimulatory in white rats [16].

Table 2. Weight of bursa fabricius and thymus with of andaliman fruit flour (AFF) supplementation

Treatment	Bursa fabricius (g)	Thymus (g)
P1	0.0123±0.0060	0.0285±0.0192
P2	0.0095±0.0015	0.0085±0.0036
P3	0.0350±0.0010	0.0340±0.0144
P4	0.0255±0.0055	0.0250±0.0135

Note: numbers followed by different letters show significantly different at the 5% test level (duncan multiple interval test); At P1 = basal ration + 0% AFF (control); P2 = basal ration + 0.25% AFF supplementation; P3 = basal ration + 0.50% AFF supplementation; P4 = basal ration + 0.75% AFF supplementation.

According to [17] antioxidants have a good influence for the immune system. Plants with essential oil content, flavonoids, carotenoids, saponins, steroid plants, phenolic compounds, tannins, polypeptides, have been shown to boost the immune system and improve poultry performance [18]; [19]. Andaliman can improve the immune system[16].

The andaliman fruit flour (AFF) supplementation in diets not significant ($P > 0.05$) to the thymus weight. It is showed from the average weight 0.0340 ± 0.0144 (P3) is higher than the P1, P2, and P4. Thymus on the left and right side of the respiratory tract, the adult broiler thymus will change into fatty tissues because of the atrophy of the cortex. During postnatal broiler development, the thymus experiences severe atrophy [20]. Based on the thymus histological test used to diagnose several diseases [21]. The thymus function has not been widely known in detail, but allegedly had an indirect role [12].

4. Conclusion

Andaliman fruit flour (TBA) could be used in the diet of broiler rations up to 0.50%. Andaliman fruit flour (TBA) supplementation increases broiler immunity, as can be seen from the increased weight of the bursa fabricius.

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