



# The Effects Different Form of Feed Additive from Combination of Sambiloto and Moringa Leaves on Physiological Respons of Broiler

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**Abstract.** The purpose of this study was to assess the effects of adding a feed additive, a mixture of sambiloto leaf and moringa extract, on the physiological responses of starter phase broilers. As the subject of the research, a total of 300 broilers were used, with a body weight coefficient of variation is 9.38%. This study employed an experiment with a Completely Randomized Design (CRD) that included six treatments and five replications. There are ten broilers in each repetition. T0: Without any additional treatment, the treatment used (negative control). T1: addition of 0.80% sulfamix (positive control). T2: 0.80% mixture of sambiloto and moringa extracts in liquid form, T3: 0.80% mixture of sambiloto and moringa extracts in nano liquid form, T4: 0.80% mixture of sambiloto and moringa extracts in powder form, and T5: mixture of sambiloto and moringa extracts in encapsulated form. The treatment is given from the first day to the fourteenth day. The observed physiological response variables are shank temperature, comb temperature, rectal temperature, heart rate, and respiratory frequency. Analysis of variance is used to examine data, and effects are considered significant if  $P < 0.05$ . The addition of a feed additive consisting of a mixture of sambiloto and moringa was found to have no significant effect ( $P > 0.05$ ) on heart rate, comb temperature, rectal temperature, shank temperature, and respiratory rate. In this study, the respiratory rate of broilers ranged from 205 to 307 times per minute. The rectal temperature of broilers ranges from 38.40°C to 39.80°C. The comb temperature is between 36.20°C and 38.10°C. The shank temperature ranges from 36.84°C to 38.00°C. The respiratory rate ranges from 60 to 100 breaths per minute. The conclusion of this study is that the addition of feed additives in the feed has an effect on stabilizing heart rate, respiratory frequency, shank temperature, rectal temperature, and comb temperature in broilers. The best treatment in this study is the addition of a feed additive with a mixture of andrographis extract and moringa in encapsulated.

**Keywords:** broilers, mixture of sambiloto and moringa extracts in nano liquid, mash, and encapsulated. physiological responses

## 1 Introduction

Broiler farming has evolved into one of the most popular businesses in Indonesia, whether individually, in partnerships, or through large corporations. This is due to many advantages in terms of age: its rapid and efficient growth converts feed into the required meat production, and it can reach the desired weight in a short time. In addition to its advantages, broiler chickens have a weakness: they are susceptible to diseases and climate due to their low immune system and are easily stressed. Broiler chicken is a great source of protein [1].

For years, growth promoter antibiotics (AGP) have been used as feed additives to prevent disease and kill harmful bacteria in the digestive tract, which helps improve feed conversion ratios and reduce body weight. The addition of antibiotics to feed can reduce the number of gut microflora, suppress pathogenic bacteria, and ensure that the feed is used more efficiently. The use of antibiotics, however, can be dangerous for livestock as it can lead to bacterial resistance to antibiotics. Antibiotic-resistant bacteria can spread to humans through the food chain originating from livestock. This is due to the fact that the use of antibiotics in animals can lead to residues in tissues if there is not enough withdrawal time, which can result in contamination through the food chain. [2]. However, the use of antibiotics as feed additives cannot yet be completely eliminated because there are concerns about its impact on the livestock industry, including increased mortality and decreased feed efficiency if not anticipated with the use of alternative substitutes. In an effort to anticipate the impact of decreased livestock performance and the losses faced by farmers due to the ban on AGP, as well as to reduce the impact of residues on human health [3].

Sambiloto (*Andrographis paniculata*) contains bioactive compounds, particularly andrographolide, which has anti-inflammatory, antibacterial, and immunomodulatory properties. This makes it an interesting choice for improving digestive health and immune response in broilers. On the other hand, kelor (*Moringa oleifera*) is a type of plant that used as a food and medicine, with various active compounds such as saponin, tannin, alkaloid, phenol, and flavonoid. Saponin acts as an antimicrobial, promoting regeneration and revitalization, while flavonoid acts as an antioxidant and supports the tubular filtration system. Kelor also has antioxidant properties that can help strengthen the immune system [4].

Sambiloto and moringa together can be processed into powder, liquid extract, or tablet form for use as feed supplements. Every form has unique qualities that may influence how effective it is powder, may have less bioavailability, but is simple to include into feed. Liquid extract although the animal's body can absorb it more quickly [5], handling and storage of this substance need greater caution. Encapsulation helps with accurate dose, but if it tastes bad, broilers might not be as fond of it.

## 2 Materials and Methods

### 2.1 Research Materials

The in vivo research was conducted over 14 days in Kambingan Village, Tumpang District, Malang Regency. The production of herbal feed additives is carried out at the Animal Nutrition and Feed Laboratory of the Faculty of Animal Science, Brawijaya University, and the Natural Material Processing Laboratory of Materia Medika in Batu City. The observed physiological responses consist of heart rate, respiratory frequency, rectal temperature, shank temperature, and comb temperature. The DOC broiler chickens used amounted to 300 individuals, which were not differentiated by sex (unsexed), with a standard deviation of body weight of  $43.42 \text{ g} \pm 2.82$  and a coefficient of variation of 9.38%. The broiler chickens used were of the Lohmann strain produced by PT. Japfa Comfeed Indonesia Tbk. with code MB 202, which were fed a basal diet with a feed additive treatment level of 0.8% in different forms. (liquid, nano particles, mash, dan encapsulation). Feed and water are provided ad libitum.

**Table 1.** Nutrient Content of Broiler Feed

Nutrient Content	
Moisture content	Min 12,00%
Crude protein	Min 21,00%
Crude fat	Min 5,00%
Coarse fiber	Max 5,00%
Ash	Max 7,00%
Calcium	0,80-1,10%
Phosphorus	Min 0,50%
Lysin	Min 1,20%
Methionine	Min 0,45%
Methionine + Cystine	Min 0,80%

### 2.2 Method Research

**Extraction of Sambiloto and Moringa.** The materials used in the extraction process are moringa leaves and andrographis. Fresh moringa leaves and andrographis are washed with running water to remove any dirt that may be attached. They are then placed in an oven at a temperature of  $60^{\circ}\text{C}$  for 48-72 hours to reduce moisture content. After that, the dried herbs are ground into powder through a grinding machine. The herbal simplicia of moringa and andrographis is then extracted by mixing the simplicia of moringa and andrographis in a 1:1 (w/w) ratio. The simplicia of moringa and andrographis is macerated using 75% ethanol at a ratio of 1:5 (w/v), and then macerated for 24 hours with stirring every 4 hours. The resulting maceration is poured into a

Kjeldahl flask, filling it to a maximum of half the flask's volume. The sample was extracted through distillation using a MAE ( Microwave Assisted Extraction) device at a frequency of 2450 MHz at a temperature of 50-60 °C for 10 minutes with a medium-low temperature setting. The sample was cooled to room temperature and then filtered using a filter cloth to obtain the filtrate. The filtrate was distilled until all the ethanol evaporated using a MAE device at a frequency of 2540 MHz at a temperature of 50-60 °C for 30 minutes with a low temperature setting.

**Production of Liquid Nano.** The result of the extraction of the combination from Sambiloto and moringa is then measured at 100 mL using a beaker glass. The herbal extract was then sonicated into a nano form using an Intelligent Ultrasonic Processor for 3×10 minutes with a 1-minute interval. after that, the particle size becomes 100 mesh.

**Production of Mash.** The production of mash feed additive is done by mixing liquid nano and filler in a 1:1 (v/w) ratio. After that, it is stirred until homogeneous and then transferred to a tray with a thickness of 1 cm. The dough is baked in the oven at 60oC for 24 hours. Once dry, the dough is ground until it becomes a mash.

**Production of Encapsulation.** Liquid nano and maltodextrin are mixed in a ratio of 7:3 and then homogenized. After that, it is poured into a silicone mold with a capacity of 50 ml (thickness of less than 0.5 cm) and heated in the microwave for 70 minutes (dry condition). The dried dough is ground until fine into powder.

**Treatments.** Treatments in this study were T0: Without any additional treatment, the treatment used (negative control); T1: addition of 0.80% sulfamix (positive control); T2: 0.80% mixture of sambiloto and moringa extracts in liquid form; T3: 0.80% mixture of sambiloto and moringa extracts in nano liquid form; T4: 0.80% mixture of sambiloto and moringa extracts in powder form; and T5: mixture of sambiloto and moringa extracts in encapsulated form. The use of treatment doses is based on previous research, which used a combination feed additive dose of sambiloto and moringa at 0.75% [6]. Therefore, this study uses a higher dose for variation is 0.80%.

## Variables

*Shank Temperature.* The shank temperature was obtained through measurements using an infrared thermometer [7].

*Comb Temperature.* The comb temperature was obtained through measurements using an infrared thermometer [7].

*Rectal Temperature.* Rectal temperature is obtained by measuring with a rectal thermometer [7].

*Respiration Rate.* The respiratory rate is calculated by counting the movements of the thorax over one minute [7].

*Heartbeat Rate.* The heart rate frequency is obtained by placing a stethoscope on the left side of the broiler's chest, allowing the heartbeats to be heard for one minute [7].

**Data Analyzies.** Data was analyzed with the help of Microsoft Excel. The data was then statistically analyzed using analysis of variance (ANOVA) from a Completely Randomized Design. (RAL).

$$Y_{ij} = \mu + \tau_i + \epsilon_{ij}$$

Description:

$Y_{ij}$  = observation on the  $i$ -th treatment,  $j$ -th replication

$\mu$  = overall mean value

$\tau_i$  = effect of the  $i$ -th treatment

$\epsilon_{ij}$  = experimental error for the  $i$ -th treatment,  $j$ -th replication

If it is known that the results of each variable test show a significant effect ( $P < 0.05$ ), then it will be followed by Duncan's multiple range test (DMRT) to determine the best treatment based on its ranking.

### 3 Results and Discussion

The effect of the addition of a combination feed additive of sambiloto and moringa in liquid, nano liquid, mash, and encapsulated forms can be seen in Table 2.

**Table 2.** Effects different form of feed additive of several treatments on shank temperature, comb temperature, rectal temperature, respiration rate, and heart beat rates of broilers.

Variables <sup>2</sup>	Treatments					
	T0	T1	T2	T3	T4	T5
Shank temperature (°C)	38.20 ± 1.64	37.90 ± 1.24	37.40 ± 1.10	37.05 ± 1.11	37.40 ± 1.66	37.50 ± 1.42
Comb temperature (°C)	37.24 ± 1.12	37.00 ± 0.75	37.21 ± 0.86	37.02 ± 0.80	37.19 ± 1.19	37.19 ± 1.09
Rectal temperature (°C)	39.59 ± 0.75	39.35 ± 0.39	39.36 ± 0.80	39.34 ± 0.95	39.33 ± 0.76	39.38 ± 0.93
Respiration rates (times/minute)	75.15 ± 10.42	72.88 ± 11.37	69.29 ± 8.78	71.4 ± 10.51	73.75 ± 14.84	70.95 ± 8.49
Heart beat rates (times/minute)	272.81 ± 33.53	266.12 ± 50.38	267.58 ± 28.38	272.65 ± 33.95	265.41 ± 49.36	265.15 ± 45.06

Data were presented as mean ± standard deviation from five replicates with each replicates consisted of 10 broilers

Based on the research results, the addition of a combination feed additive of sambiloto and moringa did not have a significant effect. This is due to the measurement of variables in the starter phase, where the broiler's body is still in growing. The normal temperature of the shank ranges from 37.67 to 37.69°C [8]. The research findings indicated that the temperature of the shank T0 (without treatment) and T1 (positive control) exceeded the normal temperature of the shank. Meanwhile, T2, T3, T4, and T5 were stable and aligned with the normal temperature of the shank during the starter phase [8].

The normal comb temperature in chickens ranges from 40-41°C [9]. The research results indicate that the comb temperature in all treatments remains within the normal limits. The comb temperature from T1, T2, T3, T4, and T5 compared to T0 (without treatment) is lower. This result proves that the addition of a combination feed additive of sambiloto and moringa can stabilize and even lower the comb temperature during the starter phase. The comb is a part of the skin that covers a chicken's head and serves as a thermoregulation tool. When the ambient temperature rises, more blood will be directed to the comb to carry heat from within the body to be released into the environment through the process of evaporation [10].

The research results indicate that in treatments T2, T3, T4, and T5, the rectal temperature remained stable, ranging from 39.33 to 39.38 °C. The normal range for broiler rectal temperature is between 41.5 and 41.9 °C [11]. These findings suggest that the combination feed additive of sambiloto and moringa can help stabilize rectal temperature under normal conditions. Flavonoids and alkaloids are bioactive compounds that possess strong antioxidant properties, which can help reduce oxidative stress in broilers. This oxidative stress can affect the ability of broilers to regulate their body temperature, thereby reducing stress [12].

The respiratory rate of broilers under normal conditions is 20-30 times per minute [13], compared to normal breathing, it is indeed above the normal standard, so it does not have a significant impact. The respiratory frequency at T0 (without treatment) is higher compared to T2, T3, T4, and T5, which were given feed additives.. Thus, the treatment with feed additives can help stabilize the respiratory frequency, although not significantly yet. The lowest respiratory frequency was observed in treatment T2 with the addition of liquid feed additives.

A normal heart rate ranges from 250 to 470 beats per minute. The research results indicate that the heart rate is still considered normal across all treatments. However, the lowest heart rate in treatment T5 (encapsulation) is 265.15 beats per minute. This is aimed at one of the functions of flavonoids that can help facilitate blood circulation. Flavonoids can cause the dilation of blood vessels (vasodilation) by stimulating the production of nitric oxide (NO) in the endothelial cells of blood vessels. Nitric oxide is a molecule that helps widen blood vessels, thereby increasing blood flow [14].

## 4 Conclusion

The conclusion of this study is that the addition of a combination feed additive of sambiloto and moringa to the feed has not been able to reduce shank temperature, comb temperature, rectal temperature, respiratory rate, and heart rate in broilers. However, it has been able to stabilize under normal conditions in physiological responses. The best treatment in this study is the addition of a feed additive in the form of liquid nanoparticles.

**Disclosure of Interests.** The authors have no competing interests to declare that are relevant to the content of this article.

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