The Effects of Ciplukan, Betel, Moringa and Patchouli Waste Extract as Phytogenic Feed Additive and Their Effect on Broiler Performance

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ABSTRACT
The aim of this study was to examine the potential of ciplukan (*Physalis angulata L.*), betel (*Piper betle L.)*, moringa *(Moringa oliefera L.)* and patchouli (*Pegostemon patchouli Pellet*) oil waste as a phytogenic feed additive to replace Antibiotic Growth Promoter (AGP) and their effect on broiler performance. The study was conducted experimentally, using a completely randomized design (CRD) consisting of 5 treatments with 4 replications. The treatments consisted of: R0 (control), R1 (0.5% ciplukan extract), R2 (0.5% betel extract), R3 (0.5% oringa extract) and R4 (0.5% patchouli waste extract). Antioxidant content, ration consumption, final body weight, ration conversion and broiler mortality were observed. The obtained data were analyzed by Analysis of Variance (ANOVA) and continued with Duncan's multiple distance test. The results showed that the highest antioxidant content was found in ciplukan extract (75.69%) followed by patchouli extract (73.53%), moringa extract (73.41%), and then lowest was betel extract (61.29%). Addition of ciplukan, betel, moringa and patchouli waste extracts with a percentage of 0.5% in drinking water did not significantly affect ration consumption, final body weight, ration conversion and broiler mortality. It was concluded that the highest antioxidant content was obtained in ciplukan extract and the addition of 0.5% ciplukan, betel, moringa and patchouli waste extract in drinking water could not a negatif effect on the appearance of broiler.

Keywords: *Broiler performance, Phytogenic, Feed additives*

1. INTRODUCTION

One of the obstacles that are often faced in poultry farming is the problem of decreasing growth performance and increasing disease infections. Efforts that can be made to increase productivity and prevent disease infections in poultry are by increasing non-specific immune responses through the provision of feed additives. Feed additives that are very commonly used, are antibiotics or better known as Antibiotic Growth Promoter (AGP), which serves to help fight pathogenic bacteria and consequently can increase livestock production. However, the use of antibiotics today has received special attention from the government and consumers. Due to the administration of certain antibiotics, livestock are resistant to Enrofloxacin which functions to eradicate *Escherichia coli*. WHO has banned the use of AGP in livestock because it can be bad for human health.

In connection with the prohibition on the use of AGP in poultry feed, it is necessary to find alternative livestock growth promoters from other sources, in addition to supporting food safety, also having the ability to act as antibiotics in increasing livestock productivity and health. One alternative growth promoter that can be used today in poultry rations is phytogenic as a feed additive. Phytogenic feed additives (phytobiotics or botanicals) are generally defined as additional compounds, which are the result of plant secondary metabolites. They either contain nutritional, non-nutritious, or anti-nutritional compounds that are included in the ration to increase livestock productivity by improving feed properties and the qualities of livestock production, as well as increasing production performance and digestive tract health by controlling pathogenic bacteria [1], [2].

Feed additives are generally considered as products applied to livestock, which aims at improving their health status and production performance. In contrast, they are

generally applied for prophylactic and therapeutic purposes in veterinary medicine for health problems that have been diagnosed for a limited or a waiting period basis. However, phytogenics and their application aspects are a relatively new group in feed additives. One of the herbal plants that are used as a source of phytogenic additive feeds is ciplukan (*Physalis angulata L.*), betel (*Piper betle L.)*, moringa (*Moringa oliefera L*), and patchouli (*Pegostemon patchouli Pellet*) oil wastes. They have a height of 0.1-1 m, grow wildly and evenly in lowland areas to an altitude of 1.550 above sea level [3], and have a high nutritional value, which are rich in vitamins, minerals, and antioxidants [4]. Likewise, patchouli is an essential oil-producing plant that make an important contribution in the world of flavour and fragrance, especially for the perfume and aromatherapy industry. Meanwhile, this plant is used as a drug that functions as an anti-inflammatory, anti-depressant, divertic, antifungal, and antibacterial in the pharmaceutical industry [5].

However, there are not much information and reports on the use of ciplukan, betel, moringa and patchouli oil refined waste as the potential sources of feed additive for livestock. With this in mind, it is necessary to investigate the potential of these plantsas an alternative source of phytogenic feed additives, in an effort to providing a replacement for AGP in livestock. Therefore, this research aims of this study was to examine the potential of ciplukan, betel, moringa and patchouli oil waste as a phytogenic feed additive to replace AGP and their effect on broiler performance.

2. MATERIALS AND METHOD

2.1 Material/sample Handling

Leave samples of ciplukan, betel, moringa plants and patchouli wastes were cleaned and dried by aerating for 7 days. Furthermore, these samples were mashed using a diskmill machine to produce mesh-shaped leaves and then stored for further testing.

2.2 Extraction of Ingredients

Meshed samples of ciplukan, betel, moringa and patchouli wastes were extracted by the maceration method, which was used to attract the required compounds by immersing the material into 96% ethanol solvent. The use of this solvent was intended to extract chemical components and to determine the yield and antioxidant content of each sample.

Maceration extraction was carried out with a sample and solvent ratio of 1:4 for 48 hours at a 28ºC. Subsequently, the extraction results were filtered with a vacuum filter paper. Afterward, the filtrate was evaporated using a rotary evaporator get a concentrated extract and then stored at 0ºC for the next test process.

The crude extract was weighed to determine the yield based on the extraction method, and the type of solvent using the formula:

$$\text{Yield} = \frac{\text{dry extract weight (g)}}{\text{initial sample weight (g)}} \text{ x } 100\%$$

2.3 Broiler Treatment

This study used 100 broiler chickens that were reared up to 4 weeks of age in 20 postal/litter cages with the size of each cage unit being 1 x 1 meter and covered with a pad of rice husk as thick as ± 10 cm. Each cage unit consisted of 5 broilers. The study was conducted using an experimental method, using a completely randomized design (CRD) with 5 ration treatments in quadruplicate.

The treatments consisted of: R0 (control), R1 (0.5% ciplukan extract), R2 (0.5% betel extract), R3 (0.5% moringa extract), R4 (0.5% patchouli waste extract). The observed variables were antioxidant content, ration consumption, final body weight, ration conversion and broiler mortality. The obtained data were analyzed by Analysis of Variance (ANOVA) and continued with Duncan's multiple distance test.

3. RESULT AND DISCUSSION

3.1 The Antioxidant Content of Ciplukan, Betel, Moringa and Patchouli Waste Extract

Further test results showed that the antioxidant levels tended to be higher in the ciplukan extract with a percentage of 75.70%, followed by patchouli waste (patchouli leaves) of 73.53%, moringa extract of 73.41%, and betel extract of 61.29%, (Table 1).

Table 1. Antioxidant test results.

Material/sample type	Antioksidan (%)
Ciplukan extract	75.70±0.66
Betel extract	61.29 ±9,94
Moringa extract	73.41 ±0,86
Patchouli waste extract	73.53±0.17

Source: Lab. of Food and Agricultural Product Analysis, Syiah Kuala University (2020).

Antioxidant is a substance that neutralizes or reduces the negative impact of free radical, which is a molecule containing the collection of an unpaired electron in an outer circle. Various researches have studied broadly the benefits of antioxidants to ward off free radicals. The results showed that antioxidants slow down processes

caused by free radicals, such as the presence of tocopherol, ascorbate, flavonoids, and lycopene [6].

3.2. Broiler Performance

3.2.1 Ration Consumption

The consumption of broiler rations from each treatment is shown in Table 2. The results of statistical analysis showed that the consumption of broiler chicken rations had no significant difference between treatments. Relatively higher ration consumption was found in treatment T3 (moringa extract), but it was not significantly different when compared to other treatments (Table 2)..

Previous study stated that the provision of moringa leaves in rations up to a level of 24% did not have a significant effect on ration consumption, weight gain, and efficiency of ration use in chickens [7]. Furthermore, the results of research [8] also showed that giving betel leaf extract in drinking water up to 2% had no effect on ration consumption, daily body weight gain, feed conversion and final body weight of broiler chickens

3.2.2 Final Body Weight

The results showed that the administration of ciplukan leaf extract, betel leaf, moringa and patchouli leaf wastes did not significantly affect the final body weight of broiler chickens aged 4 weeks (Table 2).

However, the final body weight in T3 treatment with 0.5% moringa leaf extract tended to be higher than other treatments.

Based on the research results of [9] that administration of 5% oringa leaf extract through drinking water, was able to increase body weight gain and final body weight compared to controls because moringa leaves have high protein and carbohydrate content. In addition, the phytogenic compounds in moringa leaves can inhibit the growth of harmful microorganisms in the digestive tract of chickens, so that the utilization of nutrients by broiler chickens can be optimal. As reported by [10], moringa leaves contain phytogenic compounds, such as flavonoids, saponins, tannins and several other phenolic compounds that have antimicrobial activity.

Research results [11] also show that the administration of various herbs does not have a significant effect on livestock performance . The similar result was also reported by another study [12] where broiler chickens fed phytogenic feed additives (PFA) containing essential oils with different levels from 150-1500 mg/kg feed did not affect the weight gain of livestock at the age of 21, 35 or at the age of 42 days.

3.2.3 Feed Conversion Ratio

The results of statistical analysis showed that the cumulative conversion value of 4 weeks old broiler rations did not show a significant difference between treatments (Table 2). Similar results was reported by [13], that the addition of boiled water of betel leaves into broiler drinking water did not have a significant effect on ration consumption, drinking water consumption and ration conversion. And also, the research of [14] reported that administration of 5% moringa leaf extract and garlic leaves through drinking water could significantly increase the efficiency of the use of rations.

3.2.4 Mortality

The administration of ciplukan leaf extract, betel leaf, moringa and patchouli leaf wastes did not show a significant difference in broiler mortality during the study. However, there were also deaths in the T3, T3, T4 and T0 treatments as shown in Table 2.

Based on the results of the necropsy test, the death of the chickens was caused by infection with the pathogenic Escherichia coli bacteria, which can cause abnormalities in chickens whose characteristics include: air sacs, severe heart bag inflammation and severe liver inflammation with a layer of fibrin that covers most or all of the surface of the liver with a grayish-white or yellowish color. Giving ciplukan extract (T1) there were no deaths in broiler chickens, this was because the active compounds contained in ciplukan extract could reduce mortality because these compounds had bacterial inhibitory power.

As the results of previous research [15] that ciplukan extract contains flavonoids and polyphenols, which are efficacious as antioxidants and antibacterials. The active compounds contained in ciplukan are saponins, flavonoids, polyphenols, chlorogenic acid, sugars and fisalin. Polyphenols and flavonoids are the most abundant main compounds in ciplukan plants that can be used as antioxidants. Stated that flavonoids can inhibit the growth of bacteria [16].

4. CONCLUSION

It was concluded that the highest antioxidant content was obtained in ciplukan extract and the addition of 0.5% ciplukan, betel, moringa and patchouli waste extracts in drinking water could not a negative effect on the appearance of broiler.

Table 2. Performance of broiler chickens

Variable	Treatment				
	T0	T1	T2	T3	T4
Ration consumption (g/h)	2160.73±31.4	2113.10±30.5	2138.40±32.4	2360.98±38.7	2192.55±32.1
Final body weight (g/h)	1511.58±112.62	1590.45±37.72	1493.50±111.98	1620.12±43.97	1579.19±89.68
Feed convertion ratio	1.43±0.13	1.36±0.09	1.48±0.22	1.46±0.11	1.42±0.13
Mortality (%)	0.50±0.58	0.00±0.00	0.25±0.50	0.75±0.96	0.25±0.50

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