

# Optimizing the Performance of the Small Intestine of Joper Chickens and KUB Chickens Using Herbal Medicine

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**Abstract.** This research aims to see the small intestine performance of KUB (*Kampung Unggul Balitbangtan*) and Joper (*Jowo Super*) chickens given herbal medicine. Amount of 200 chickens consisting of Joper and KUB chickens, rearing was carried out using open-house system cage. The feed used is commercial feed. The herbal medicine was produced by the UMM experimental farm, given through feed as much as 1 % of the total feed. The treatment in this study was the provision of herbal medicine in the feed and no herbal medicine in the feed (control). The variables observed were the length and relative weight of the small intestine (duodenum, jejunum, ileum). The data obtained was analyzed descriptively. Joper chickens given herbs and those without herbs gave relatively similar and normal small intestine weights. Meanwhile, in KUB chickens, chickens given herbal medicine had higher jejunum and ileum lengths compared to controls with values of 1.47 % and 1.17 % respectively. This research concludes that herbal medicine can increase the length and weight of the small intestine of KUB chickens but has no effect on Joper chickens.

**Keywords:** Environmental friendly, laying hens breeders, native chickens, organic siyuna herbal, visceral organs

## 1 Introduction

Chicken meat is one of the largest sources of animal protein consumed by Indonesians. This is because chicken meat is affordable and easy to obtain compared to other animal protein sources. In 2017, meat consumption in Indonesia was  $7.35 \text{ kg capita}^{-1} \text{ yr}^{-1}$ . From this data, broiler chicken supplies up to 77.31 % of meat needs, which is then followed by native chicken meat at 10.64 %, beef at 6.38 %, and the rest is supplied by other livestock meat [1].

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The broiler chickens are imported. This chicken is designed with high growth rates and feed efficiency, but to obtain optimal performance it requires an appropriate environment. In the finisher phase, the broiler chicken requires a temperature of 18 °C to 20 °C [2]. This is a problem for livestock in Indonesia because the average environmental temperature in Indonesia is + 31.5 °C [3]. This temperature difference will lead to heat stress in broiler chickens so production cannot be optimal [4].

Local chickens or native chickens are chickens that originate from Indonesia, so they do not have adaptation problems for rearing in Indonesia. Among the native chickens that have high productivity are Superior Native Chicken, Agricultural Research and Development Agency (*Kampung Unggul Balitbangtan - KUB*), and Super Javanese Chicken (*Jowo Super - Joper*). KUB chicken is a native chicken that has high productivity compared to other native chickens in Indonesia and the taste of this chicken meat is liked by the Indonesian [5]. Joper chicken is a cross between native chickens and female laying hens. This chicken is more disease-resistant than broiler chickens. The growth of this chicken is also faster than other native chickens. This chicken meat is in great demand by Indonesian because it is cheaper than other native chickens [6].

The length and weight of the small intestine are some of the variables that have a positive correlation with chicken performance. The longer and heavier the small intestine, the higher the chicken's performance, this is related to its effectiveness in absorbing feed nutrients [7–9]. The length and weight of the small intestine are influenced by the feed additives given, one of which is the active compound found in plants. Siyuna herbal medicine is a chicken herbal medicine made from ginger (*Zingiber officinale* Rosc), garlic (*Allium sativum* L.), turmeric (*Curcuma longa* Linn), galangal (*Alpinia galangal* L. Willd), betel leaves (*Piper betle* L.), and cinnamon (*Cinnamomum verum* J. Presi). These ingredients contain natural active compounds in the phenolic group, so they are thought to increase the length and weight of the chicken's small intestine. Therefore, this research aims to see the performance of the small intestine of KUB and Joper chickens given herbal medicine.

## 2 Materials and methods

### 2.1 Materials

The material used in this research was two types of native chickens (Superior Native Chicken, Agricultural Research and Development Agency (KUB) and Super Javanese Chickens (Joper)) species *Gallus gallus domesticus* (Linnaeus, 1758) with a total of 200 chickens, which were divided into four plots or groups. The feed used is the commercial feed, *i.e.* BRI Fine Crumble, 811 New Hope, and 511-Bravo. The herbal medicine used is Organic Siyuna herbal medicine produced by Experimental Farm UMM. These herbal medicine ingredients are ginger, garlic, turmeric, galangal, betel leaves, and cinnamon.

### 2.2 Experimental design

The design used in this research was a randomized block design consisting of two groups, namely KUB Chickens and Joper Chickens. Each group consists of 50 chickens. The treatment in this study was the provision of Siyuna herbal medicine at 1 % of the feed given and no herbal medicine as a control.

### 2.3 Management of experimental chickens

Rearing is carried out for 2 mo in an open house system with a cage size was 7 m × 6 m. The base of the cage uses burnt husks as litters. Feed and drinking water were provided *ad libitum*. BR1 Fine Crumble feed was given at the age of 1 d to 10 d. Furthermore, the 811 New Hope feed was given at the age of 11 d to 28 d. The 511-Bravo feed was given at 29 d until harvest.

### 2.4 Data collection

The variables observed in this study were the length and weight of the small intestine (duodenum, jejunum, and ileum). From each group, five chickens were taken randomly to be slaughtered and observed for the length and weight of the small intestine. The length and small intestine obtained are then measured based on relative length and weight using the following Equation (1) and Equation (2) [10]:

$$\text{Relative intestinal length} = \frac{\text{Intestinal length (cm)}}{\text{Live weight (g)}} \times 100 \% \quad (1)$$

$$\text{Relative intestinal weight} = \frac{\text{Intestinal weight (cm)}}{\text{Live weight (g)}} \times 100 \% \quad (2)$$

### 2.5 Data analysis

The data obtained was then analyzed descriptively. This research was carried out with the recommendations stated in the Description of Ethical Approval, No. E.5.a/048.a/KEPK-UMM/III/2022, issued by the Health Research Ethics Committee (*Komite Etik Penelitian Kesehatan - KEPK*), Faculty of Medicine, University of Muhammadiyah Malang

## 3 Results and discussion

The addition of herbal medicine as a feed additive given via feed has been carried out to determine the effect on the relative weight and length of the small intestine (duodenum, jejunum, and ileum) of native chickens (Joper and KUB). There was no difference in the relative weight of the duodenum, jejunum, or ileum in Joper chickens given herbs and those without herbs. The values for the weight and relative length of the small intestine of Joper chickens are shown in Table 1.

**Table 1.** Relative weight and length of the small intestine in Joper Chickens with and without herbal medicine.

Variables	Treatment	
	Basal feed	Basal feed + herbal 1 %
<b>Relative weight of small intestine (%):</b>		
Duodenum	0.88 ± 0.01	0.85 ± 0.02
Jejunum	1.19 ± 0.19	1.12 ± 0.03
Ileum	0.87 ± 0.05	0.80 ± 0.03
<b>Relative length of small intestine (%):</b>		
Duodenum	3.04 ± 0.05	2.87 ± 0.05
Jejunum	6.91 ± 0.19	5.80 ± 0.12
Ileum	6.63 ± 0.13	6.28 ± 0.10

Table 1 shows that Joper chickens given and without herbs gave almost the same and normal relative weight of the small intestine. This is based on the results of previous research,

that the addition of turmeric additives did not affect the relative weight of the small intestine of super native chickens. These average relative weight of the duodenum, jejunum, and ileum higher than relative weight of duodenum, jejunum, and ileum of broiler that are 0.60 %, 0.86 %, and 0.549 % respectively [11]. In contrast to research using *Amorphophallus campanulatus* (Roxb.) Blume ex Decne. (AC) tuber flour, with the addition of 7.5 % AC tubers, the length of the small intestine was significantly higher ( $P < 0.05$ ) compared to other treatments. This is thought to be because the increase in body weight and live weight of chickens in this treatment was higher than in other treatments. The increase in body weight and live weight of chickens in this study was followed by an increase in intestinal length [12]. The length of the small intestine is positively correlated with body weight, the higher the body weight, the longer the small intestine [7–9]. The relative weight and length values of the small intestine of KUB chickens are shown in Table 2.

**Table 2.** Relative weight and length of the small intestine in KUB Chickens with and without herbal medicine

Variables	Treatment	
	Basal feed	Basal feed + herbal 1 %
Relative weight of small intestine (%):		
Duodenum	1.13 ± 0.04	1.03 ± 0.04
Jejunum	1.39 ± 0.07	1.47 ± 0.08
Ileum	1.05 ± 0.04	1.17 ± 0.10
Relative length of small intestine (%):		
Duodenum	4.00 ± 0.09	3.79 ± 0.11
Jejunum	7.31 ± 0.27	7.67 ± 0.24
Ileum	7.44 ± 0.18	7.66 ± 0.25

Table 2 shows that the average relative weight and length of the jejunum and ileum were higher in KUB chickens given herbs compared to those without herbs. These results show that the function of the jejunum and ileum in the absorption of nutrients is increasing, because of an increase in villi and crypt depth in the jejunum and ileum, this is by the results of previous research. Various phytobiotic actions, such as antimicrobial, antioxidant, and anti-inflammatory activities of herbs provide important support for increasing villous height and crypt depth to support the absorption of nutrients [13]. The ability to digest and absorb food substances is influenced by the intestinal epithelium, the number of folds, the number of villi, and the surface area of the villi in the duodenum, jejunum, and ileum. The wider the villi cause the increase in feed absorbed which has an impact on the growth of the intestinal organs [14]. It is suspected that the flavonoids in herbs function to protect the mucosa of the small intestine, and increase the height of the villi, so that the surface area for absorption becomes wider, which results in increased digestibility of nutrients, including protein, thereby increasing the weight of the small intestine. This is to research results, that the flavonoids contained in herbs have various activities, namely inhibiting pathogenic bacteria in the digestive tract, increasing the Villus Height and Crypt Depth (VH: CD) ratio, stimulating mucus secretion, thereby providing better villus protection and increased growth of probiotic bacteria in the intestines [15]. Increasing the VH: CD ratio value increases the digestive and absorption capacity of the intestine, this is related to the phytobiotic content in herbs, such as flavonoids, alkaloids, tannins, phenols, polyphenols, terpenoids, and essential oils, which have antibacterial and anti-inflammatory properties [16]. Herbal medicines such as white turmeric (curcumin), red ginger (zingerone), galangal (methyl-cinnamic), and garlic (allicin) can increase chicken viability, characterized by reduced mortality rates, increased digestibility, and nutrient absorption, thus increasing endurance and weight gain in chickens [17]. Turmeric not only increases the weight of the bursa of Fabricius but also increases the

production and secretion of bile and digestive enzymes, thereby improving digestion and absorption of food nutrients [18]. Furthermore, Widodo *et. al.* [19, 20] also explained that giving Curcuma (*Curcuma xanthorrhiza* Roxb.) through feed can increase the weight gain of Super Kampong Chicken.

## 4 Conclusion

The relative length and weight of the small intestine given the herbal medicine feed additive in Joper chickens are not much different on average from Joper chickens which are not given the herbal feed additive, whereas in KUB chickens on average the chickens given the herbal medicine feed additive have the weight and length of the jejunum and ileum higher.

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