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Addition of Cashew (*Annacardium occidentale*) Apple Powder into Diet Can Increase Body Weight and Intestinal Relative Weight in Broiler

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Abstract: Natural feed additives are continuously being sought to improve broiler performance. The aim of this research was to study the effect of cashew apple powder (A *occidentale* powder) addition into broiler diet on body weight, relative weight of heart, liver, intestine and abdominal fat. One hundred and forty Day Old Chicks (DOCs) were randomly allocated and assigned into 4 treatment groups i.e., (1) Tc (commercial diet only), (2) T0.25% (commercial diet+ 0.25% A *occidentale* powder), (3) T0.5% (Commercial diet+ 0.50% *A.occidentale* powder) and (4) T1.0% (Commercial diet+1.00% A *occidentale* powder). The feed additives were given from day 5 to day 14. Each group consisted of 7 replicates with 5 bird in each replicate. Body weight was recorded weekly up to the 5th week. On day 35 one of each replicate from each group was sampled, sacrificed and organ weights were recorded. The results showed that *A.occidentale* powder increased significantly the body weight and relative intestinal weight ($p<0.05$). The highest body weight and relative intestinal weight were achieved by 0.50% addition A *occidentale* powder. Therefore it is potential to be used as feed additive to improve broiler performance.

Key words: A *occidentale* powder, abdominal fat, broiler, body weight, feed additives, intestinal weight

INTRODUCTION

Broiler is the fastest growing meat type chicken which is characterized by its body weight gain in short period of time. The body weight can reach more than 1.4 kg in 4 weeks and more than 1.9 kg in 5 weeks. However such growth can only be achieved when quality diet was provided. A commercial broiler diet which fulfilled the nutrient content according to Standard National Indonesia (SNI) can support such rapid growth which is the inherent genetic potential of modern broiler (Murwani 2010). Various attempts are continuously being carried out to improve the utilization of the existing diets. One of them is the use of antibiotics as feed additive which is the standard additive in commercial broiler diets (Murwani and Bayuardhi 2007). Other more natural feed additives were developed and have become commercially available such as probiotics, prebiotics, enzymes, nutrient supplements such as minerals, amino acids and vitamins. Other naturally occurring additives are extracts from fruits, herbs and botanical (Murwani, 2008; Murwani *et al.* 2011).

Fresh cashew apples (A *occidentale)* locally known as buah semu jambu monyet has 85% moisture, 11.80% reducing sugars, 0.64% crude fibre, 0.195% ascorbic acids, 0.33% ash, 0.13% Nitrogen and 0.33% Tanin (Mohanty *et al.,* 2006). It also contains bioactive compounds i.e., anthocyanin, glycosylated flavonol, cardanol and ascardic acid, all of which are potent antioxidants (Trevisan *et al.,* 2006; de Brito *et al.,* 2007). Cashew apple juice has been shown to have antibacterial activity against some antibiotic resistant pathogens (Vivek *et al.,* 2014; Kubo *et al.,* 2003). Therefore cashew apple with its content is a potential natural feed additive. The following research was carried out to study the addition of A *occidentale* powder into commercial broiler diet on body weight, relative weight of heart, liver, intestine and abdominal fat.

MATERIALS AND METHODS

A *occidentale* powder was prepared by cutting fresh cashew apples into small pieces, pressing the pieces to reduce its water content, drying it in the oven followed by grinding and sieving. The powder was kept in the refrigerator until before use. *In vivo* broiler experiment was carried out at a broiler house in Kaliancar village, Bodorejo, Ngaliyan West Semarang. The broiler house was typical of small-scale broiler housing belong to the local farmers dedicated for this experiment. The housing was divided into 4 square parts, with each part was 200 x 250 cm square. The floor was bedded with 10 cm thick rice husks. One hundred and forty DOCs were randomly allocated and assigned into 4 treatment groups. Each group consisted of 7 replicates with 5 birds in each replicate. Each replicate was color coded differently to ease sampling. Drinking water and feed were provided free access all day. All experimental birds were fed commercial broiler diet i.e. BR0-1 N (PT. CJ Feed Jombang 2014). The nutrient composition of the diet was given in Table 1.

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The diet was given from the first day as soon as DOCs broilers arrived. Starting on day 5 A *occidentale* powder was given by mixing it directly with the commercial diet. The dosage of the powder was designed as followed: (1) Tc (commercial diet only), (2) T0.25% (commercial diet + 0.25% *A.occidentale* powder), (3) T0.5% (Commercial diet + 0.50% A *occidentale* powder) and (4) T1 .0% (Commercial diet + 1.00% A *occidentale* powder). The powder was given from day 5 to day 14, after which only commercial diet was given. Body weight was recorded weekly up to the 5th week. On day 35 one of each replicate birds was sampled and sacrificed.

The heart, liver and intestinal organ were separated from the carcass and weighted. Abdominal fat around proventikulus, gizzard, duodenum and cloaca were separated, pooled and weighted. The relative weight of the organs was obtained by dividing the organ weight by live body weight (Murvvaniand Bayuardhi, 2007). All data were analyzed by ANOVA and Duncan's multiple range test was used when means were significant ($p<0.05$) (Steel *et al.*, 1997).

RESULTS AND DISCUSSION

Body weight and relative weight of heart, liver, intestineand abdominal fat: Weekly body weight was presented in Table 2 and relative weights of heart, liver, intestine and abdominal fat were presented in Table 3. ANOVA showed that there was a significant effect of A *occidentale* powder addition on broilers body weight ($p<0.05$). The highest body weight was achieved by addition of 0.5% A *occidentale* powder from the first to third week and on the fifth week.

For relative weight of heart, liver, intestine and abdominal fat, ANOVA showed that addition of A *occidentale* powder into the diet significantly affected only intestinal weight ($p<0.05$). The highest intestinal weight was found in broilers with addition of 0.5% A *occidentale* powder. This finding is in line with the previous result of highest body weight in T0.5%.

How addition of A *occidentale* powder can increase body weight and relative intestinal weight? It is known that pathogenic bacterial load within gastro intestinal tract can compete with the utilization of nutrients from the diet. Such competition can reduce body weight gain due to energy partition for defending gastro intestinal against pathogenic bacteria. A *occidentale* contains a mixture of antioxidants and antibacterial compounds i.e., tanin, anthocyanin glycosylated flavonol cardanol and ascardic acid (Mohanty *et al.*, 2006; Trevisan *et al.*, 2006; de Brito *et al.*, 2007; Vivek *et al.*, 2014; Kubo *et al.*, 2003). These bioactive substances posses antibacterial activity against various pathogenic bacteria (Kubo *et al.*, 1993; Kubo *et al.*, 1999; Kubo *et al.*, 2003; Vivek *et al.*, 2014) and therefore can reduce harmful bacterial load within the gastrointestine. Furthermore, a study using pure ascardic acid which is a signature bioactive chemicals in A *occidentale* can ameliorate lesion due to cocci infection (Murakami *eta/.*, 2014; Toyomizu *eta/.*, 2003). Reduction of gastrointestinal bacterial load can improve the utilization of nutrient from the diet and expressed in higher body weight gain as shown by results in Table 2. Improve body weight gain by addition of A *occidentale* powder was supported by in line increase in intestinal weight (Table 3). It is known that heavier intestinal weight is indicative of better development of intestine. Improve intestinal development would assist better absorption. Addition of A *occidentale* powder was initiated on day 5 up to day 14. During this time the development of gastrointestine including the digestive enzymes are the greatest (Murwani 200; Noy and Sklan 1995; Uni *et al.*, 1995; Uni *et al.*, 1998). At the same time during the

Table 1: Nutrient composition of commercial diet BR0-1N

Nutrient	(%)
Moisture	13
Protein	22-23
Fat	5
Crude fibre	4-5
Ash	6.5
Calcium	0.9-1.2
Phosphor	0.7-0.9
Antibiotic	+
Cocci di ostat	+

Table 2: Weekly body weights of broilers with addition of *A. occidentale* powder

Age	Tc	T0.25%	T0.5%	T1.0%
1st week (day 1-7)	156.0±7.3'	198.9±2.0'	206.3±6.0	212.6±11.6'
d week (day 8-14)	404.3±7.9"	402.9±7.6	418.6±14.6'	404.3±7.9
3rd week (day 15-21)	700.0±12.9'	738.6±24.1	777.9±53.0'	740.0±62.4
4th week (day 22-28)	1281.4±69.1	1317.1±77.4	1332.9±54.1	1362.9±77.6
week (day 29-35)	1620.0±23.1'	1650.0±22.4'	1728.6±16.8'	1680.0±25.8

Means are expressed±SD. Means within rows with no common superscript differ significantly ($p<0.05$)

Table 3: Relative weight of heart, liver, intestine and abdominal fat of broilers with addition of *A. occidentale* powder

Relative weight(%)	Tc	T0.25%	T0.5%	T1.00/o
Heart	0.65±0.108	0.64±0.094	0.61±0.123	0.63±0.107
Liver	0.017±0.003	0.017±0.002	0. 015±0 .002	0.016±0.002
estine	0.043±0.005'	0.051±0.003	0. 056±0 .005'	0.047±0.004"'
Abdominal fat	1.58±0.005	1.51±0.003	1.33±0.006	1.45±0.005

Means are expressed±SD. Means within rows with no common superscript differ significantly ($p<0.05$)

first two weeks of broiler rapid development more radicals are generated as part of a normal increase in metabolism. The antioxidants in *A. occidentale* powder could help neutralize these radicals more rapidly preventing harmful effect and hence protect and support such rapid metabolism. Moreover, addition of *A. occidentale* powder which did not affect the relative weight of abdominal fat suggested that increase body weight was due to improvement in muscle synthesis not fat synthesis.

Conclusion Addition of 0.25, 0.5 and 1% *A. occidentale* powder into commercial broiler diet can increase body weight and relative weight of intestine. The highest increase was obtained with 0.5% addition.

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