BAP -19

Effects of Processing of *Mucuna sloanei* on the Organ Weight and Blood Parameters of Broiler Finisher Chickens

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Abstract
An experiment was conducted to evaluate the organ weights, biochemical and haematological changes of broiler finisher birds fed raw and processed *Mucuna sloanei* meals. 150 Anak broiler finisher birds fed raw and processed *Mucuna sloanei* at 10% inclusion levels were used in a completely randomized design (CRD) experiment. The birds were fed *ad-libitum* throughout the experimental period. SBMS encouraged a reduction in organ weight. The Hb, PCV, RBC, MCH, MCHC and MCV were within the normal range for all the test diets with the exception of RMS diet, which went out of range for Hb, PCV, RBC and MCH.

Keywords: *Mucuna sloanei,* broiler finisher, chickens

Introduction

The common feature about legumes is their high content of various naturally occurring constituents, which affect their nutritional quality. Olomu (1995) has described these natural constituents as endogenous toxic substances because they are part of the normal feedstuff. These anti-nutritional factors include haemagglutinins, protease inhibitors (like trypsin inhibitor), cyanogens, tannins, dopamine, LDopa, antivitamins, lipoxygenase, nicotin, phytates, goitrogens, and serotonin (Oke *et al*., 1996). The presence of these antinutritional factors in a feedstuff confers toxicity action to such feedstuff.

Red blood cell indices are blood tests that provide information about the hemoglobin content and size of red blood cells. Abnormal values indicate the presence of anemia and which type of anemia it is. The mean corpuscular volume, or "mean cell volume" (MCV), is a measure of the average red blood cell volume (i.e. size) that is reported as part of a standard complete blood count. In patients with anemia, it is the MCV measurement that allows classification as either a microcytic anemia (MCV below normal range) or macrocytic anemia (MCV above normal range).Anemia resulting from lack of sufficient iron to synthesize hemoglobin is the most common hematological disease in animals. Some animals suffers from iron deficiency anemia (IDA). Microcytic anemia in a case of thalassemia results from impaired globin chain synthesis and decreased hemoglobin (Hb) synthesis, resulting in microcytosis and hypochromia. The mean corpuscular hemoglobin, or "mean cell hemoglobin" (MCH), is the average of hemoglobin per red blood cell in a sample of blood. It is reported as part of a standard complete blood count: MCH value is diminished in hypochromic anemias. The mean corpuscular hemoglobin concentration, or MCHC, is a measure of the concentration of hemoglobin in a given volume of packed red blood cell. It is reported as part of a standard complete blood count (Onwukwe, 2000).

Analysis of blood chemistry can provide important information about the function of the kidneys and other organs. This common panel of blood tests measures levels of important electrolytes and other chemicals, including the following. Glucose, or blood sugar, is broken down in the body's cells to provide energy. Elevated levels may be caused by diabetes or medications such as steroids.

Materials and Methods

Organ weights/proportion evaluation were determined as described by Scott *et al.* (1969) and modified by Ojewola and Longe (1999). It involved the selection of 3 birds from each treatment (birds closest in mean weight per replicate). The selected birds were fasted overnight and weighed to obtain the live weight thereafter bled by severing the jugular vein. They were then dipped in hot water and defeathered. The head, neck and shank were removed to have the dressed weight and percentage dressed-weight was calculated as shown below. The wings were removed by cutting anteriorly, severing at the humero scapular joint. The cut was made close to the body line. Lateral cuts were made through the rib heads to the shoulder girdle and the breast were removed intact by pulling anteriorly. The thighs, drumsticks and back were also dissected from each carcass.

Also, organs like, heart, kidney, spleen and gizzard were dissected from each carcass. All parts were weighed and expressed as percentage dressed weight.
Live weight = Weight of the bird after fasting

Dressed weight = Live weight – weight of the head + shank + feathers + blood

$$\% \text{ dressed weight} = \frac{\text{Dressed weight}}{\text{Live weight}} \times 100$$

Values of cut-parts (cut-up yeilds) and organs expressed as % dressed weight

$$\text{Cut–parts} = \frac{\text{Thigh/ drum stick/ breast cut/ wing}}{\text{Dressed weight}} \times 100$$

$$\text{Organs} = \frac{\text{Heart/ liver/ intestine/ proventriculus}}{\text{Dressed weight}} \times 100$$

Blood samples from one bird from each of the replicates were collected into labeled sterile universal bottles containing anti-coagulant (EDTA –Ethyl diamine tetra acetic acid powder). These samples were used to determine values of haematological indices like red blood cells, white blood cells, haemoglobin and packed cell volume. Values obtained were used to calculate MCV, MCHC and MCH.

Results and Discussion

Table 1 represents organ weights of broiler finisher birds expressed as a percentage dressed weight of broiler birds fed raw and differently processed *Mucuna sloanei* meal–based diets. Similar to the starter phase, there were significant differences among the treatment means for all the parameters considered with the exception of spleen. The values for the heart vary from 0.50% to 0.93 with the control diet having the lowest value and the diet containing the RMS having the highest value. The values for the BMS and TMS diets were similar ($p>0.05$) but higher ($p<0.05$) than the SBMS diet. For liver, the values ranged from 1.70% to 2.57% with the control diet having the lowest value and the diet containing the raw *Mucuna sloanei* having the highest value. The values for kidney followed the same trend with the liver. The higher values obtained for the heart, liver and kidney in the diet containing the RMS could be due to the presence of anti–nutritional factors contained in the diet. Since the liver is the major detoxification organ and hence increase in its activity may result in enlargement and probably increased weight (Ukachukwu, 2000; Akinmutimi, 2004).

Increase in metabolic activities of kidney and heart due to anti–nutritional factor has resulted in their increase in weight (Akinmutimi, 2004). The increase in the weight of kidney could be attributed to increased activity that probably leads to increase in weight (Akinmutimi, 2004). The values for proventriculus varied from 0.637% to 1.011% with the SBMS diet having the lowest value and the diet containing the RMS having the highest value. However, the values for the TMS diet was significantly ($p<0.05$) higher than BMS and control diets that were similar ($p>0.05$).

Table 1: Organ weights of broiler finisher birds expressed as a percentage dressed weight of finisher broiler birds fed raw and differently processed *Mucunasloanei*meal-based diets**.**

Parameters	Control	SBMS	BMS	TMS	RMS	SEM
Heart (%)	0.50^{d}	0.63^{c}	0.70^{b}	0.74^{b}	0.93^{a}	0.028
Liver (%)	1.70^{e}	1.77^{d}	1.97^{c}	2.07^{b}	2.57^{a}	0.200
Kidney (%)	0.92^{e}	1.00^{d}	1.07^{c}	1.25^{b}	1.62^{a}	0.014
Spleen (%)	0.132^{a}	0.130^{a}	0.129^{a}	0.125^{a}	0.130^{a}	0.005
Intestine (%)	4.493^{d}	5.073^{c}	5.020^{c}	5.833^{b}	6.567^{a}	0.0267
Proventriculus (%)	0.712^{c}	0.637^{d}	0.734^{c}	0.803^{b}	1.011^{a}	0.016
Gizzard (%)	3.657^{bc}	2.787^{d}	3.493^{c}	3.783^{b}	4.120^{a}	0.076

SBMS: soaked-and-boiled *Mucuna sloanei*, TMS: toasted *Mucuna sloanei,* BMS: boiled *Mucuna sloanei*, RMS: raw *Mucuna sloanei*, SEM: standard error mean.

The values for gizzard varied from 2.787% to 4.120 with the diet containing the SBMS having the lowest value and the diet containing the RMS having the highest value. However, the value for TMS was significantly ($P<0.05$) higher than those of the SBMS and BMS diets that were themselves different; however, the control diet and BMS were similar ($P>0.05$). The higher values obtained in the RMS for intestine, proventriculus and gizzard could be as a result of increase in the activity of these organs due to high fibre level of the diet (Ologhobo *et al*., 1993). The fibre level in the processed *Mucuna sloanei*, especially SBMS was taken care of by the thermal treatment that softened the hard seed coat enhancing the breakdown of the dietary fibre content of the diets (Ukachuwku and Obioha, 2007).

Table 2 represents the haematological values of broiler finisher fed raw and processed *Mucuna sloanei* meal-based diets. There were significant differences ($p<0.05$) among the treatment means for all the parameters measured. The haematological values for haemoglobin (Hb), packed cell volume (PCV) and red blood cell (RBC) followed the same pattern. The values for SBMS were significantly ($p<0.05$) higher than the control, BMS and TMS that were similar ($p>0.05$) but higher ($p<0.05$) that the RMS diet. The values for Hb varied from 6.80g for RMS to 9.566 g for SBMShaving the lowest value and the control having the highest, however, there is no difference between the control, BMS and TMS diets whereas SBMS was significantly ($p<0.05$) higher than all of them.

Table 2: The haematological values of broiler finisher fed raw and processed *Mucunasloanei* meal-based diets

Parameters	Control	SBMS	BMS	TMS	RMS	SEM
HB(g)	8.600^{b}	9.5667^{a}	8.633^{b}	8.267^{b}	6.800^{c}	0.360
PCV (%)	25.133^{b}	28.733^{a}	26.033^{b}	25.300^{b}	19.133^{c}	0.733
RBC(x10^6mm^3)	2.7000^{b}	3.1667^{a}	2.800^{b}	2.7000^{b}	1.7667^{c}	0.130
WBC(x10^3mm^3)	15.333^{c}	16.000^{bc}	17.667^{b}	18.000^{b}	24.667^{a}	0.817
MCH (%)	31.8533^{b}	30.2167^{b}	30.8133^{b}	30.6100^{b}	38.943^{a}	1.870
MCHC (%)	34.230^{ab}	33.3033^{ab}	33.140^{ab}	33.000^{b}	35.5833^{a}	1.124
MCV (%)	93.1900^{b}	90.7333^{b}	92.9667^{b}	93.8533^{b}	109.240^{a}	4.157

SBMS: soaked-and-boiled *Mucunasloanei*, TMS: toasted *Mucunasloanei,* BMS: boiled *Mucunasloanei*, RMS: raw *Mucunasloanei*, SEM: standard error mean. Hb: haemoglobin, PCV: packed cell volume, RBC: red blood cell, WBC: white blood cell, MCH: mean corpuscular haemoglobin, MCHC: mean corpuscular haemoglobin, MCV: mean corpuscular volume.

The PCV values varied from 19.133% in the RMS to 28.733 in the SBMS diet. No difference was observed between the control diet and BMS and TMS, moreover, the values for SBMS were higher ($P<0.05$) than the control, BMS and TMS but RMS was significantly lower than all of them. The values for RBC was lowest in the RMS–based diet (1.7667), while the SBMS–based diet had the highest value (3.1667). However, no difference was observed between the control diet and, BMS and TMS but RMS was significantly lower than all of them. It was observed that the values of Hb, PCV and RBC followed the same trend. The low values of Hb, PCV and RBC obtained in the raw mucuna based diet could be due to presence of toxic materials affecting the points of production of RBC and cause a drop in red blood cell production. The low value of Hb could result in the birds being prone to anemia.

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