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The Effects of Raw and Processed *Mucuna pruriens* Seed Based Diets on the Growth Parameters and Meat Characteristics of Benin Local Guinea Fowl (*Numida meleagris,* L)

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Abstract: The aim of the present study was to compare the growth characteristics of guinea fowl fed on *Mucuna pruriens* (pica-pica, cow-hitch plant, cowhage, velvet bean, devil bean) seed with a control group at both starting and growing phases in extensive production in tropical Africa country (Benin). It was also attempt at determining meat traits and ascertains meat eventual contamination by L-Dopa for safely human consumption. To measure these effects, 20 % raw or processed (cooked or toasted) *Mucuna* seed were incorporated in guinea fowl diets. *Mucuna* seed processing reveals changes in ash, NNE, CP, Crude fibre and EE contents. Cooking markedly reduced L-Dopa level by 52 %. Roasting was also effective but at a lower extent, i.e., 36%. Feed intake showed that raw *Mucuna* seed significantly impaired feed intake but processing improved the condition. *Mucuna* depressing effect on growth parameters were less affective on adult birds than on keets. Lowest eviscerated carcass weights, dressing percentage and cut parts were recorded in group fed on raw *Mucuna* seed. The thigh-drumsticks, heads and legs of the male were found to be significantly heavier than those of the female. Differences between sexes were also noticed in liver, heart and gizzard. The liver and heart weights were significantly reduced in birds fed on raw seeds while the gizzard weights were increased significantly in processed seeds diets. *Mucuna* seed intakes did not change meat quality (pH24 and water holding capacity). Analyses of muscle, liver and kidney did not reveal the presence of L-Dopa in meat. The conclusions are that processed *Mucuna* seed can replace soybeans up to 20% for extensive guinea fowl production and contribute to diminish dependence to conventional protein for small holders.

Key words: *Mucuna pruriens*, L-Dopa, growth, carcass, meat characteristics, guinea fowls

INTRODUCTION

The production of guinea fowl as alternative poultry gains progressively throughout the world. However, its profitability is hampered by poor production and reproduction efficiencies due in part to lack of management and feeding guidelines (Nahashon *et al*., 2004). In developing countries, finding cheap and available feedstuffs for guinea fowls constitutes a major challenge, diet accounting for about 60-80% of the total cost of poultry production (Pym, 1990) and being based on the importation of conventional feed such as soybean and fish meal (Emenalom and Udedibie, 1998).

At small holders level, there is a lack of protein sources to complement the energetic feeds (Flores *et al*., 2002). In Benin, Dahouda *et al*. (2007) observed that supplements offered to guinea fowls in traditional farms, such as cereals and their by-products, or various products ingested through scavenging, couldn't cover nutrient requirements for minimal production. They suggested that complement should be proteo-energetic and contain calcium characteristics found in non-conventional protein sources such as tropical legumes seeds. Among leguminous seeds, *Mucuna pruriens* is identified as a potential source of protein and energy for poultry production in developing countries (Vijayakumari *et al*., 2002; Vadivel and Janardhanan, 2000). According to Pugalenthi *et al*. (2005), *Mucuna pruriens* var. *utilis* shows good nutritional qualities. The seeds of *Mucuna* are found to contain, per kg dry matter, about 220-350 g Crude Protein (CP), from 4600-5400 kcal Metabolizable Energy (ME) and about 480 g carbohydrates (Iyayi *et al*., 2005; Vijayakumari *et al*., 2002 and Adebowale *et al*., 2005). *Mucuna* seed has also similar amino acids profile as others legumes seed such as soya beans (Carew and Gernat, 2006). However, despite its nutritional advantages, *Mucuna* contains numerous antinutritional factors such as tannins, lectins, phytic acid, cyanogens, trypsin inhibitors and L-Dopa (3, 4-*dihydroxy-L-phenylalanine*), which is the prominent among these factors (Ravindran and Ravindran, 1988; Siddhuraju *et al*., 2000. Previous experiments showed however that heat-treatments could drastically reduce the toxicity of *Mucuna* seeds (Ukachukwu and Szabo 2003; Nyirenda *et al*., 2003).

Several studies focused on monogastrics concerns rabbits, broilers and hens (Dossa *et al*., 1998; Nyirenda *et al*., 2003; Iyayi and Taiwo, 2003; Iyayi *et al*., 2005). To our knowledge, there is a sole study reporting the use of *Mucuna* in guinea fowl (Farougou *et al*., 2006).

Thus, this study aims to investigate the effects of heat-treated *Mucuna pruriens* seed on the performance and on meat characteristics of guinea fowl.

MATERIALS AND METHODS

Animal management and diets: Two 28 weeks lasting trials were undertaken using unsexed local guinea fowl day-old. Animals were identified individually by wing pins. *Mucuna pruriens* seeds were obtained from the International Institute of Tropical Agriculture (IITA) Benin. They were roughly crushed and teguments were hand-removed. A third of the seeds were preserved while the remainder was heat-processed, i.e., cooked or toasted according to farmer common practices. Cooked seeds were obtained by pouring cracked seeds into boiling water (100°C) for 30 min. They were strained at room temperature for one day and dried in oven at 65°C for 72 h. Toasted seeds were obtained in a hot frying-pan placed in an oven (100-120°C) and stirred from time to time to maintain uniform heating. Toasting lasted about 20 min, until seeds were brown and crispy.

In the first trial, the animals received initially during 12 weeks a Control Diet (CoD) based on maize (575 g/kg), wheat bran (120 g/kg), soybean meal (200 g/kg), fishmeal (40 g/kg) and mineral and vitamins. Diets were formulated in order to obtain theoretical iso-nutrient concentrations according to guinea fowls requirements as recommended by INRA (1984) Du Preez and Sales (1997) and Larbier and Leclercq (1992). They were then maintained on the CoD or fed with a diet in which either raw, cooked or toasted *Mucuna pruriens var. utilis* seeds was incorporated at level of 20% (RD, CD and TD respectively) instead of soybean meal. In the second trial, keets were fed from starting to the end of the experiment with the control diet or one of the experimental diets. In each trial, animals were raised in a breeding house (10 mx5 m) with 90 cm height, walls surmounted by a wire netting of 2 m. Birds were allocated to four pens according to a completely randomized design. The heating of the keets lasted for three weeks and animal were reared on a deep litter. Individual live weights were recorded weekly and daily feed intakes were recorded by group. Weight values were presented at the end of starting period (12 weeks) and at the end of growing period (28 weeks). Feed and water were provided on an *ad libitum* basis throughout both experiments. Animals were subjected to routine vaccinations against Newcastle disease (Avi-new®) and infectious bursal disease (Bioral H120®) and other required veterinary care against coccidiosis (Amprolium® 1 g/l during 5 days) and helminthiasis (Polystrongle® 1 g/l for 1 day).

Carcass characteristics and meat quality: At the end of the trial 2, fourteen birds-7 males and 7 females-from each group were slaughtered for carcass characteristics and meat quality determination. The birds were fasted overnight and were weighted before slaughtering. They were bled by section of the jugular veins, scalded in warm water (about 60°C) and plucked manually. The legs and head were cut at tibio-metatarsus and atlanto-occipital joints, respectively. Weights of carcass, head, legs, hearts, livers and gizzards were obtained. Carcasses were preserved in fridge at 4°C during 24 h and reweighed. Carcasses were then carved out and weights of breasts, thigh-drumsticks, wings, necks and back cut were determined. The pH was measured in breast at 24 h after slaughter, using a HANNA pH-meter. After carving out, breasts samples of about 50 g were used for drip loss determination. Meat samples were placed in plastics bags and freely hanged up to a hook at 4°C during 48 h. Samples were then removed, mopped up, weighed for drip loss determination and replaced in plastics bags that were seal up. Samples were placed in a hot water at 75°C during 30 min, cooled during 40 min and mopped up. The difference in weight before and after cooking gave the cooking loss, expressed as a percentage of initial weight.

Diets and L-Dopa analysis: Experimental diets and *Mucuna* meals samples were analyzed according to AOAC procedures for Dry Matter (DM) (method no. 934.01), organic matter (OM, method no. 942.05), ether extract (EE, method no. 920.39), crude fibre (CF, method no. 978.10) and ash (method no. 942.05). Crude Protein (CP) was determined by the Kjeldahl method, as nitrogen (N) x 6.25. Nitrogen Non-extract (NNE) was calculated as: (1,000 - CP - NDF - ash - ether extract, fractions being expressed as g/kg) (NRC, 2001). Experimental diets, *Mucuna* seed meals and meat (breast, liver and kidney) samples were also analyzed for L-Dopa. All the reagents used were of analytical grade. Analysis were carried out with a HPLC equipped with a binary pump, an autosampler, a thermostated column compartment and a diode-array detector, all HP series 1100 from Hewlett-Packard. A LC Chemstation (Hewlett-Packard) was used for instrument control, data acquisition and data handling. The separation was performed on an Alltima HP C18 Amide (250x3.0 mm, i.d.; particle size: 5 µm) column from Alltech. The mobile phase consisted in 0.46 % m/v formic acid in water. Prior to use, mobile phases were degassed for 15 min in an ultrasonic bath. The chromatographic separation was performed at 30°C using a constant flow rate of 0.5 ml/min. The injected volume was 10 µl and the UV detection was performed at 280 nm. A stock solution Levodopa was prepared by dissolving the appropriate amount of analytes in 100 mM hydrochloric acid solution in order to obtain a concentration of 0.2 mg/ml. Diluted solutions were prepared in the same media to reach final concentrations of 1, 5, 10 and 20 µg/ml. An accurately weighted amount of 50 mg of seeds powder was suspended in 10 ml of 100 mM hydrochloric acid solution. For feed and seed meal, an accurately weighted amount of 200 mg was mixed in 40 ml of 100 mM hydrochloric solution. The mixtures were then Vortex, mechanically shaked for 30 min at room temperature, sonicated for 5 min and finally centrifuged at 4500 rpm and 4°C for 5 min. Five or 20 ml of extraction solution issued from seeds powder or from feed, respectively were placed in a 50 ml volumetric flask and filled to volume with the 100 mM hydrochloric solution. Solutions were conserved between 2 and 8°C.

Statistical analysis: Weights, daily weight gain, feed intakes, feed conversion ratio and carcass characteristics were analyzed according to General Linear Models using SAS package (SAS, 1999). Models included the effect of the diet and sex. For carcass characteristics, the model included the diet and sex effects, but their interaction being not significant was thus removed from model. For growth parameters, the effect of diet was used. Monthly weights were considered to establish growth curve. Mortality rates were compared by a Chi-square test.

RESULTS

Composition of diets: The chemical composition and L-Dopa content in seeds and in experimental diets are reported in Tables 1 and 2. Heat processing affected seed nutrients contents mainly by decreasing NNE contents and enhancing CP. Cooking markedly reduced L-Dopa level by 52%. Roasting was also effective but at a lower extent, i.e., 36 %. The nutrient values of control and experimental diets were fairly similar. As expected from *Mucuna* seed analysis, the level of L-Dopa in cooked seed diet was lower than in raw and toasted seed diet.

Table 1: Chemical composition of raw, cooked and toasted *Mucuna pruriens* seeds

Heat treatment	Raw	Cooking	Toasting
Chemical composition (% DM)			
Dry matter	93.78	94.95	94.72
Ash	6.57	4.33	4.60
Crude Protein	23.17	32.97	34.33
Crude fibre	9.60	9.50	8.77
Ether extract	4.50	3.43	4.50
Non nitrogen extract	69.00	57.93	57.10
L-Dopa	3.45	1.65	2.19
ME (MJ/kg)	12.8	13.0	13.5

Table 2: Ingredients and chemical composition of control and test diets

Ingredients (%)	CoD	RD	TD	CD
Maize	57.3	50.0	50.0	50.0
Wheat bran	12.0	14.3	14.3	14.3
Soybean meal	20.0	0.00	0.00	0.00
Fish meal	4.0	9.00	9.00	9.00
Mucuna meal	0.0	20.0	20.0	20.0
Premix	0.25	0.25	0.25	0.25
NaCl	0.25	0.25	0.25	0.25
Shell of mollusc	6.0	6.0	6.0	6.0
Lysine	0,1	0,1	0,1	0,1
Methionine	0,1	0,1	0,1	0,1
Chemical composition				
Dry matter (%)	91.6	90.5	90.1	91.1
Ash (%)	12.2	14.3	11.3	12.5
Crude protein (%)	19.4	19.7	18.8	18.7
Crude fibre (%)	3.3	4.7	4.2	4.3
Ether extract (%)	5.8	4.0	3.8	3.9
Non nitrogen extract (%)	77.3	75.4	77.2	77.4
ME (MJ/kg)	14.5	13.2	13.9	13.6
L-Dopa (%)	0.00	0.427	0.499	0.294

Animal performance: In trial 1 (Table 3), feed intakes were similar between groups during the first period. Afterwards, feed intake in CoD group was significantly higher ($p<0.05$) than in other groups. In trial 2 (Table 4), feed intake during the first 12-week period was similar ($p>0.05$) between CoD and processed seed diets, while the RD intake was lower than that of the control. In the second period, there was a marked reduction of RD intake (62 and 71% with regard to CoD and TD, respectively, $p<0.05$). TD was significantly more ingested than others diets ($p<0.05$). CoD and CD intakes were not significantly different. *Mucuna* seed processing restored or even improved feed intake when compared to control.

During the first period of trial 1, mean weights remained similar between groups. At the end of the trial at week 28, the weight of the control birds was significantly higher ($p<0.05$) than that of animals fed *Mucuna*, the lowest values being observed in RD group ($p<0.05$). However, all groups reached mean weight close to 1 kg at the end of the experiment. In trial 2, the birds fed on the CoD were significantly ($p<0.05$) heavier at the end the starting and finishing phases than those having received the experimental diets. Drastic weight reduction was observed in RD group (46.7 and 40.0% with regard to CoD and CD, respectively). At starting as well at finishing phase, daily weight gain and feed conversion ratio were not significantly different (p>0.05) between groups (trial 1). During the first phase in trial 2, daily weight gain and feed conversion ratio were significantly higher in CoD and, within experimental groups, in CD. During the second phase, daily weight gain and feed conversion ratio were also significantly different (p<0.01). Weight gains were similar between CoD and processed seeds. Value was significantly weaker in RD (p<0.05). Feed conversion values were similar between CoD and TD (p>0.05) and were significantly higher than the 2 others groups (p<0.05).

The growth curves of the birds in trials 1 and 2 are reported in Fig. 1 and 2, respectively. In CoD groups live weight showed a sigmoid evolution, the growth rate being low the first month, reaching regular value until 5 mo and decreasing afterward. As expected, the profile was similar in the other groups until the 12^{th} week in trial 1. Afterward, the growth was lower and remained linear until the end of the experiment in experimental groups. Mortality rates were high during starter phase in trial 2, particularly RD and TD.

Carcass characteristics and meat quality: The weights (p<0.05) of carcass, breast, back cut, thigh-drumstick, wings and necks were lower in group fed on raw *Mucuna* seed (Table 5), but dressing percentages were similar between groups. The gender did not affect significantly the carcass, breast and back cut weights, while the thigh-drumsticks, heads and legs of the male were found to be significantly heavier (p<0.05) than those of the female. The effect of gender was also observed for heart, liver and gizzard weights. Males' heart (8.75 g) was heavier than that of females (4.88 g) while the opposite was observed for liver and gizzard. The liver and heart weights were significantly reduced (p<0.05) in birds fed on RD while the gizzard weights were increased significantly with processed seeds diets when compared to CoD and RD groups. *Mucuna* seeds inclusion did not modify meat traits such as pH, drip loss and cooking loss. The ultimate pH varied between 5.7-5.76. Drip loss and cooking loss values were comprised between 2.31-3.87 and 11.2-13.42. Moreover, L-Dopa analysis in liver, kidney and breast muscle samples did not reveal the presence of any residues of this substance.

DISCUSSION

Composition of diets: The proximate compositions in *Mucuna* seed, mainly in protein, ether extract and metabolizable energy are closed to the data found in others studies (Emenalom and Udedibie, 2005). Heat processing altered several nutrient concentrations in *Mucuna* seeds. Changes were also observed in proximate composition in *Mucuna* seed by Ukachukwu and Obioha (1997) and Emenalom and Udedibie

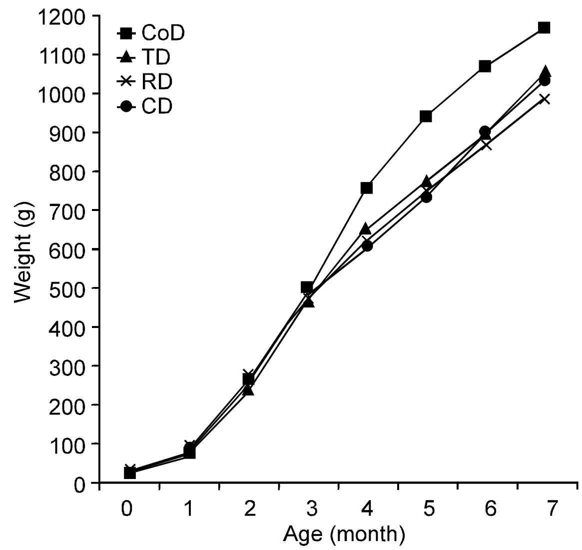

Fig. 1: Growth of guinea fowls fed a control diet from 0-3 mo before receiving diets containing raw, toasted or cooked *Mucuna pruriens* seeds in trial 1

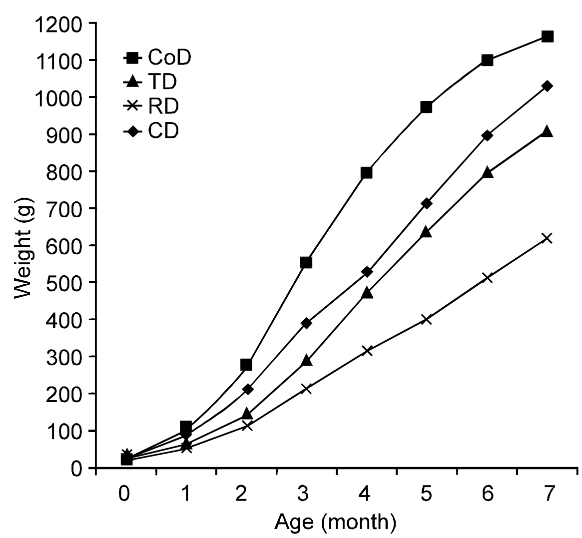

Fig. 2: Growth of guinea fowls fed a control diet or diets containing raw, toasted or cooked *Mucuna pruriens* seeds in trial 2

(2005). Similarly to our results, these authors observed that the crude protein content was slightly increased (6.5%) when toasting. The control and experimental diets composition are in agreement with requirements reported by INRA (1984) for guinea fowl meat production. The comparison of nutrient values between control and experimental diets showed that their contents in protein were fairly similar. In diets containing *Mucuna*, crude fibre levels were slightly higher and the calculated energy value lowers. *Mucuna* coats probably contributed

Table 3: Feed intake, growth performance and mortality rate of guinea fowls fed a CoD or diets containing raw, toasted or cooked *Mucuna pruriens* seeds (trial 1)

Parameters	CoD	RD	TD	CD	P>F	RSD
Weight at 0 mo (g)	23.2	22.8	23.3	22.8	0.63	2.1
Weight at 3 mo (g)	487.9	465.8	464.8	485.3	0.69	96.1
Weight at 7 mo (g)	1164.8[a]	981.3[b]	1047.5[b]	1033.5[b]	0.00	121.1
Daily weight gain 0-3 mo (g/day)	5.5	5.3	5.2	5.5	0.65	1.1
Daily weight gain 3-7 mo (g/day)	5.6[a]	4.5[b]	5.2[a]	4.3[b]	0.00	0.88
Daily feed intake 0-3 mo (g)	23.4	21.1	18.2	20.7	0.59	10.9
Daily feed intake 3-7 mo (g)	47.5[a]	42.0[b]	41.3[b]	44.0[b]	0.00	4.4
Feed conversion ratio 0-3 mo	4.6	4.1	3.9	4.1	0.66	1.3
Feed conversion ratio 3-7 mo	10.2	9.9	9.4	10.8	0.85	4.4
Mortality rate 0-3 mo (%)	5.6	6.5	12.9	13.3	NS	
Mortality rate 3-7 mo (%)	14.7	17.2	18.5	23.1	NS	

In a line, values with the common letter are not significantly different

Table 4: Feed intake, growth performance and mortality rate of guinea fowls fed a CoD or diets containing raw, toasted or cooked *Mucuna pruriens* seeds (trial 2)

Parameters	CoD	RD	TD	CD	P>F	RSD
Weight at 0 mo (g)	23.6	24.0	23.6	24.6	0.12	2.5
Weight at 3 mo (g)	553.6[a]	215.8[c]	289.6[b]	392.4[d]	0.00	116.1
Weight at 7 mo (g)	1164.0[a]	620.0[c]	912.3[b]	1034.3[d]	0.00	170.5
Daily weight gain 0-3 mo (g/day)	6.3[a]	2.3[c]	3.2[b]	4.4[d]	0.00	1.4
Daily weight gain 3-7 mo (g/day)	5.2[a]	3.7[b]	5.5[a]	5.7[a]	0.00	1.2
Daily feed intake 0-3 mo (g)	23.3[a]	13.1[b]	19.3[ab]	21.0[ab]	0.14	10.8
Daily feed intake 3-7 mo (g)	48.9[a]	18.5[c]	63.3[b]	49.3[a]	0.00	6.3
Feed conversion ratio 0-3 mo	4.0[a]	5.6[ab]	7.7[b]	5.2[a]	0.01	2.7
Feed conversion ratio 3-7 mo	11.1[a]	6.9[b]	13.6[a]	9.2[b]	0.01	5.3
Mortality rate 0-3 mo (%)	20.0[a]	66.2[b]	63.8[b]	50.0[b]	**	
Mortality rate 3-7 mo (%)	00.0[a]	29.2[b]	16.0[b]	19.2[b]	**	

In a line, values with the common letter are not significantly different

Table 5: Carcass characteristics and organs weights of guinea fowls fed a control diets or diets containing raw, toasted or coocked *Mucuna pruriens* seeds in trial 2

	Treatments				Sex				
Variables	CoD	RD	TD	CD	M	F	P>F Diet	P>F Sex	RSD
Carcass weight (g)	876.5[a]	465.8[c]	706.5[b]	812.0[a]	723.6[a]	706.8[a]	0.00	0.52	98.6
Breast (g)	224.5[a]	124.4[c]	201.9[a]	200.5[a]	191.6[a]	184.1[a]	0.00	0.38	31.6
Back cut (g)	191.7[a]	113.1[c]	166,6[b]	175.4[ab]	160.1[a]	163.2[a]	0.00	0.67	26.9
Thigh-Dumstick (g)	249.7[a]	130.8[c]	207.1[b]	237.7[a]	225.3[a]	187.4[b]	0.00	0.00	35.5
Wings (g)	105.1[a]	60.1[c]	89.0[b]	97.3[ab]	90.7[a]	85.1[a]	0.00	0.14	14.2
Dressing (%)	72.1[a]	72.4[a]	70.0[b]	71.1[ab]	71.8[a]	70.8[a]	0.08	0.20	2.6
Head (g)	35.7[a]	31.6[b]	34.0[ac]	32.9[bc]	37.1[a]	30.0[b]	0.00	0.00	2.3
Neck (g)	63.2[a]	35.2[c]	53.7[b]	55.9[ab]	52.1[a]	51.8[a]	0.00	0.91	9.7
Leg (g)	28.8[a]	24.3[c]	26.2[b]	27.5[ab]	29.6[a]	23.8[b]	0.00	0.00	2.2
Heart (g)	7.4[a]	5.8[b]	7.5[a]	6.6[ab]	8.8[a]	4.9[b]	0.00	0.00	1.2
Liver (g)	19.6[a]	16.2[a]	22.6[b]	25.9[c]	18.2[a]	23.9[b]	0.00	0.00	3.1
Gizzard (g)	24.1[a]	24.4[a]	29.5[b]	28.7[b]	22.8[a]	30.6[b]	0.00	0.00	2.5
pH 24	5.73	5.76	5.73	5.70	5.74	5.72	0.11	0.14	0.1
Drip loss (%)	3.37	2.31	3.87	3.83	3.41	3.28	0.18	0.78	1.2
Cooking loss (%)	12.17	11.15	11.2	13.42	11.4	12.57	0.48	0.32	2.8

Values with the same letter are not significantly different

to increase crude fibre level in diets. *Mucuna* seeds are effectively known to contain more crude fibre and lesser fat than soybeans (Tuleun *et al*., 2008). The presence of anti nutritional factors in seed is the main challenge in countries where this legume is abundantly grown in fallows. The level of L-Dopa in cooked seed diet was lower than in raw and toasted seed based diet. Generally, L-Dopa level is low in mixture diet. Nevertheless, in spite of these low levels, crude *Mucuna* decreased feed palatability. The effects of heat treatment on feed intake have been yet discussed in a previous paper (Dahouda *et al*., in press). It has been commonly assumed that many of the negative impacts from *Mucuna* consumption are caused by the presence of L-Dopa, but *Mucuna* is known to contain also a number of other anti-nutritional compounds including polyphenols or tannins, which can bind proteins and lower their digestibility (Siddhuraju *et al*., 1996; Ravindran and Ravindran, 1988). Phytic acid can reduce bioavailability of certain minerals and reduces the digestibility of proteins (Siddhuraju *et al.*, 1996; Laurena *et al*., 1994). Trypsin inhibitor activity also has been found in *Mucuna* (Rajaram and Janardhanan, 1991; Del Carmen *et al*., 1999). According to Flores *et al*. (2002) and Del Carmen *et al*. (2002), L-Dopa is not a factor involved in the low feed intake of *Mucuna* diets, but intake improvement in processed *Mucuna* seed diets is due to the reduction of anti-trypsic factors.

Performance of guinea fowl fed with *Mucuna:* As a rule, *Mucuna* decreased the weight of the birds but thermal treatments lowered strongly the negative effects on animals. In trial 1, all groups reached mean weights close to 1 kg at the end of the experiment suggesting that, when used in adult fowls, *Mucuna* allows reaching commercial weight. In trial 2, mortality rates were particularly high during the starting phase in animals that received either *Mucuna* diets mortgaging thus the use of *Mucuna* sources in keets. The evolution of live weight in both CoD groups was a sigmoid, as reported also by Nahashon *et al*. (2006) in guinea fowl. By contrast, *Mucuna* intake did not allow the expression of the different phases of birds growth owing probably to *Mucuna* depressing effect on feed intakes. It must be however noted that the feed conversion ratio was similar between groups and even better in trial 1. At both starting and growing phases, daily weight gain and feed conversion obtained in CoD and with processed seeds were similar to those obtained by Ayorinde and Ayeni (1987) when studying the effect of management systems on the fattening of indigenous guinea fowl. The dramatically lower body weight obtained with raw *Mucuna* diets in trial 2 probably resulted of cumulative adverse effects of anti-nutritional factors from day-old animals. The depressive effects of these factors on poultry weight have been largely reported by Akinmutimi and Okwu, 2006; Siddhuraju *et al*., 1996; Rajaram and Janardhanan, 1991 and Del Carmen *et al*., 1999. According to these authors, they reduce not only feed palatability but also the digestibility of the diet, particularly proteins utilisation. For example, tannin has been reported to reduce palatability of the diet due to its astringent property as a result of its ability to bind with protein of saliva and mucosa membranes (D'Mello and Devendra, 1995). In the literature, several results concerning the effects of *Mucuna* processing on poultry performance were largely commented (Farougou *et al*., 2006; Akinmutimi and Okwu, 2006; Emenalom Udedibie, 2005; Tuleun and Igba, 2008) and results are consistent with our findings (Akinmutimi and Okwu, 2006; Tuleun and Igba, 2008). Akinmutimi and Okwu (2006) and Tuleun and Igba (2008) found that at both starting and finishing phases, the inclusion of 20% raw *Mucuna* seed meal reduced birds weight gain, but, cooking *Mucuna* seeds restored growth rate. Thus, they concluded that 20% of cooked seed inclusion in diet is acceptable for growth performance. Farougou *et al*. (2006) in a similar work aiming at using *Mucuna* meal in growing guinea fowl diet in Benin, obtained higher body weight (704.78g), better feed conversion ratio (3.39) and daily weight gain (14.29 g/day) at week 12, than those reported in the present study, but with lesser *Mucuna* seed proportions (13.75%).

Carcass characteristics and meat quality: The thigh-drumsticks, heads and legs of the male were found to be heavier than those of the female. Guinea fowl cocks were described to have bigger head and taller than hens (Le Coz-Douin, 1992). The lowest weights of carcass and cut-parts recorded in group fed on raw *Mucuna* seed is due to the growth depressing reported above. Raw *Mucuna* effects on carcass and organs weights were earlier reported by several authors such as Tuleun and Igba (2008) and Ferriera *et al*. (2003). Similarly, they observed lower carcass weight and dressing percentages of broilers fed 20% raw *Mucuna* seed meal diets as a result of smaller live weight. Cut-parts weights were improved by seed processed.

The effect of diets on the organs was also noticed. Thus, the liver and heart weights were reduced in birds fed on raw *Mucuna* seed while the gizzard weights were increased in processed seeds diets. Similarly, Carew and Gernat (2006) reported, in their review on *Mucuna,* that weights of the gizzard increased in chicks fed raw *Mucuna* seed, but these changes did not occurred in chicks fed pure L-Dopa. In view of this result, the increase of birds gizzard weights fed on processed *Mucuna* seed based diets don't related to the effects of L-Dopa, but, is probably the expression of the increase muscular work imposed by the higher fibre content of these diets. Moreover, processing rendered seeds hard, which presumably contribute to gizzard muscular development in processed seed diets. The effects of *Mucuna* on liver size were probably partly live weight dependant. But metabolic effects of *Mucuna* seeds can not be excluded.

Mucuna seeds inclusion did not impair meat traits such as pH and water-holding capacity. The ultimate pH (5.7 -5.76) were similar to values accepted in the meat of guinea fowl (Dahouda *et al*., not published) and other birds, e. g. broilers (Quentin *et al*., 2003; Karaoglu *et al*., 2004; Musa *et al.*, 2006) and turkey (Santé and Fernandez, 2000). The ultimate pH values recorded in breast muscles were close to those indicated (between 5.7 and 5.9) by Santé *et al*. (2001) in poultry meat. Drip loss and cooking loss determined in breast muscles were lower than values found in broilers meat (Musa *et al*., 2006). Such difference might be due to factors as rate and extent of pH decline, meat fat content, proteolysis and even protein oxidation (Huff-Lonergan and Lonergan, 2005).

L-Dopa analyses in livers, kidneys and breast muscles samples did not reveal any presence of tissue residues. Hence, the risks of L-Dopa intake when eating meat from guinea fowl fed on *Mucuna* may be considered as null.

Conclusion: *Mucuna* seed processed in a very simple way could contribute to improve feed of guinea fowl in Benin and its could be a considerable opportunity for smallholder farmers in villages where conventional proteins are scarce. The study shown that at level of 20 % in diet, boiled or toasted *Mucuna* seed can suitably replace soybeans in adults guinea fowl feeding but must be avoided in keets. When comparing birds performance in both trials, we can conclude that, antinutritional impacts were higher in keets than in adults guinea fowl. Finally, analysis did not reveal the presence of L-Dopa in tissue. The consumers of guinea fowl meat fed on *Mucuna* could be thus reassured from L-Dopa intoxication.

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