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Detoxifying effect of palm nut (*Elaeis guineensis*) shells' charcoal on peanut meal used as main source of plant protein in broiler feed.

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Abstract

The study of the detoxifying effect of charcoal from palm nut shells on peanut meal used in broiler feed was carried out at the Teaching and Research Farm of the University of Dschang, within main objective the valorisation of available local food resources. Frequently contaminated by Aspergillus flavus, a mould that secretes aflatoxins harmful to animals, peanut meal is therefore less used as an ingredient in chicken feed. In order to ensure an aflatoxin contamination required in this study, a useful quantity of peanut meal was infested by A. flavus, during one and two months. Thereafter, peanut meal was sun-dried, ground and incorporated in the poultry diet. Results showed that including, at the same time, 0.4 % of charcoal from palm nut shells as a detoxifier in the broiler diet led to a successful substitution of soybean meal by peanut meal as the main source of plant protein.

Keywords: *Detoxifying effect, Plant charcoal, Peanut meal, Broiler feed.*

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INTRODUCTION

In poultry production, as well as any other animal production, two kinds of factors mainly interact throughout the animal growing. There are endogenous factors related to the animal (species, breed, sex, age and physiological state) and exogenous factors depending on the environment (especially feeding, housing and climate) (Lamy et *al.*, 2012; Diack, 2015). Aside from other factors, feeding alone accounts for about 60 %, being though the highest cost in animal production.

Basically, the nutritional components required by animals are water, energy, amino acids (proteins), vitamins and minerals (Adamou, 2010). Peanut meal should be used for this purpose as source of plant protein in broiler feed but is often contaminated by *Aspergillus flavus* and *Aspergillus parasiticus*. These moulds are aflatoxin producers, a particular kind of mycotoxins that are highly harmful to animals fed with such contaminated feed (Dulmelis, 2023).

Among their chemical and toxicological characteristics, it should be noted that aflatoxins are non-protein organic compounds and aflatoxin B1 ($C_{17}H_{12}O_6$) has been recognized as being the most toxic occurring in foodstuffs. It is a heat-resistant compound, stable even at temperature up to 250°C for 30 minutes in its crystallised state (Magnin et *al.*, 2016). Damages caused by aflatoxins in poultry include liver dysfunction and loss of immunity that exposes the birds to diseases due to secondary infections. These infections also result in liver atrophy, reduced feed intake and final body weight, haemorrhage, anaemia and sometimes death (Robens and Richard, 1992; Dulmelis, 2023). A dosage of 5-ppm aflatoxins is enough to stop growth in chickens (Mabbett, 2004).

In order to avoid these adverse effects on animals, some natural or synthetic substances are added to indecent foods so that they may produce or induce either one favourable impact. Among them, toxin captors or fixers are the most used in animal production. When added to animal feed, they reduce the intestinal absorption of toxins by binding them or converting them into less toxic products (Lafond, 2010). The main types of toxin fixers are clays and plant charcoals. Clays (such as aluminosilicates, zeolites, bentonites, kaolin, etc.) have molecules on their surface that are highly able to absorb water and toxins (Mabbett, 2005). Concerning plant charcoals, they are considered to be growth promotors and powerful pumps for poisons like toxic gases, venoms, bacterial toxins and mycotoxins, particularly aflatoxins found in food (Dogna, 2007). In a broiler feed containing soybean meal as the main source of plant protein, Kana et *al.* (2011) found that the inclusion of 0.2, 0.4 and 0.6% of charcoal from maize cob or seed of *Canarium schweinfurthii* Engl in the diets improved the body weight gain and final body weight of the birds.

With regard to detoxifying capacity of charcoals, a toxicity study in broilers fed a diet containing 6 mg aflatoxin B1 and 200 mg of activated charcoal per kg of feed showed that the charcoal protected the liver against the toxin (Ademoyero and Dalvi, 1983). From an experimental diet containing 10-ppm aflatoxin B1 and 0.1% charcoal, Dalvi and McGowan (1984) recorded an improvement in feed consumption of about 10 % and a weight gain of about 28 % compared to chickens fed 10-ppm aflatoxin B1 without charcoal. Using peanut meal as the source of plant protein instead of half or entire soybean meal in broiler feed, Kana et *al.* (2010) agreed that the inclusion of 0.2% charcoal (from *Canarium schweinfurthii* seeds or maize cobs) in diets increased the feed intake, body weight gain and final body weight compared to similar diets without charcoal.

For the purpose of accessibility to more sources of natural charcoal and highlight its detoxifying effect, this study focused on charcoal from palm nut shells, which are very abundant in tropical oil palm (*Elaeis guineensis*) growing areas. Within the concern of local resources valorisation in broiler feeding, peanut meal was used as total substitute to soybean meal in the diets. Furthermore, to ensure an aflatoxin contamination, some peanut meal purchased from an animal food seller was moistened and infested with *A. flavus* during one and two months. After suitable sun drying followed by grinding the clots instantly formed, these peanut meals were incorporated in broiler finisher diets instead of soybean meal. Lastly, 0.4% of palm nut shells' charcoal powder was included to these diets for a detoxifying issue.

MATERIALS AND METHOD

1. Study site

This study was carried out at the Teaching and Research Farm (F.A.R.) of the University of Dschang, in the highlands of western Cameroon. The F.A.R. is located at about 1420 m above sea level, between 05°26' Northern latitude and 10°03' Eastern longitude. The climate in the region is a Sudano-Guinean type of higher altitude, with two main seasons: a dry season, which is shorter, running from mid-November to mid-March; and a rainy season, which is longer, from mid-March to mid-November. It has an annual rainfall range of 1500 mm to 2000 mm while the relative humidity fluctuates between 40 and 97%. Annual insolation averages 1870 hours and the temperature of the area ranges between 14°C and 25°C. The primary vegetation was a shrub savannah with some gallery forests (IRAD 2000, cited by Mube, 2011).

2. Preparation of charcoal

Palm nut shells collected from local palm oil farmers were burned until carbonization (Photo 1). Meanwhile, burning embers were gradually removed from the fire and burned out with water. The extinguished charcoals were sun-dried to 8-10% humidity, then ground and sieved through a 1 mm mesh sieve to get a fine charcoal powder.

Photo 1. Burning palm nut shells

3. Preparation of peanut meal

Peanut meal purchased from an animal food seller was shared into three experimental sets: seller provided meal (Photo 3), one month infested meal (Photo 4) and two months infested meal (Photo 5). Infestation consisted of inoculating with *A. flavus* spores (Photo 2), some hydrated peanut meal at a rate of 5 litres of water per 4 kg of meal. The spore inoculum diluted in 1 litre of water was sprayed on 50 kg of peanut meal spread on a 6 m^2 plastic sheet in an

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enclosed space throughout the infestation period. At the end of the infestation period (one or two months), the lumpy peanut meal was dried, then ground and sieved through 2 mm mesh.

Photo 2. Spore inoculum of *A. flavus* (into a Petri Dish)

Photo 3. Seller provided peanut meal

Photo 4. One month infested peanut meal

Photo 5. Two months infested peanut meal

4. Experimental diets and design

Taking care of an eventual chicks' vulnerability to aflatoxin contaminated feeding, diets containing peanut meal were only fed to broiler chickens at finisher phase (21 to 49 days of age). Diet containing soybean meal (Table 1) served as a control (T0) and basal diet. Three other diets (T1, T2 and T3) were likewise formulated using peanut meal as the main plant protein source to substitute soybean meal. Except for the control, 0.4 % of palm nuts shells' charcoal powder was also incorporated into each diet. All the diets were lastly assigned to four experimental treatments (designated as T0, T1, T2 and T3) of 80 chickens each one (Figure 1) in a completely randomized device with 4 replicates per treatment and 20 birds (10 males and 10 females) per replicate.

Table 1. Control diet composition for the broiler finisher phase

Ingredients	**%**
Maize	58
Wheat meal	12
Cotton seed cake	8
Soybean meal	13
Fish meal	3
Shellfish	1
[1]Premix 5 %	5
Total	**100**
Chemical composition value	
Metabolizable energy (kcal/kg)	3002.22
Crude proteins-CP (%)	20.23
Calcium (%)	1.03
Phosphorus (%)	0.48
Lysine (%)	1.12
Methionine (%)	0.42

[1]**Premix 5%:** CP=40%, Lysine=3.3%, Methionine=2.40%, Ca=8%, P= 2.05%, Metabolizable energy=2078 kcal/kg.

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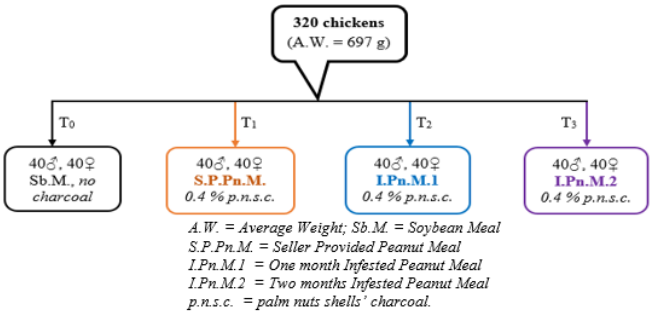

Figure 1. Diagram of the experimental treatments

5. Experimental birds, housing and veterinary care

In this study, 320 chicks used were of *Arbor Acres* strain. Throughout the entire experimental period (4 weeks of finisher diet feeding), chickens were raised on white wood shaving litter. The poultry house was 15 m x 10.5 m sized, built with durable material only at half-wall height (about 1,40 m) over which a wire mesh up to the roof enabled natural ventilation and sun lighting. Building inside was divided into 16 equal huts randomly assigned to the different experimental replicates. For each replicate, the birds were provided with feed and water *ad libitum* respectively in a 20-litre plastic feeder (Photo 6) and a 10-litre plastic water trough (Photo 7).

As prophylactic and sanitary management, birds received vaccines through drinking water against Newcastle disease (Hitchner B1® vaccine) and infectious bronchitis (H120® vaccine) on the 23rd day of age (as a recall to the 8th day vaccination). Gumboro disease was prevented by using IBA Gumboro® vaccine on the 10th day of chicks' age. Following each vaccination, weighing session and the transfer process from the starter to finisher building, an anti-stress (Aliseryl®) was administered to the birds for three days. An anti-coccidial medication (Vetacox®) was given to the birds at the dosage indicated by the product manufacturer whenever symptom of coccidiosis appeared.

Photo 6. A 20-litre plastic feeder

Photo 7. A 10-litre plastic water trough

6. Data collection

6.1. Growth performance assessment

- **Feed intake**

Weighed feed was daily provided to the chickens and at the end of each week, the feed leftover was weighed. A digital LAVAL® brand scale with a maximum capacity of 15 kg was used for these weight measures. In each experimental unit, weekly feed intake was calculated by subtracting the feed leftover weight from the feed weight supplied to the birds per week.

- **Live body weight and weight gain**

The initial live weights of the birds were recorded at the beginning of the experiment and every 7 days thereafter, between 6:30 am and 7:30 am, using a QUIGG® brand digital scale of a maximum capacity of 5 kg. Before each weighing, the birds were overnight fasted. Weekly body weight gain was evaluated by subtracting the body weight in the preceding week from the current weekly live weight.

- **Feed conversion ratio**

The weekly feed conversion ratio was obtained from dividing the feed intake by the weight gain per week.

6.2. Carcass and organ characteristics assessment

At the end of the finisher phase (at 49 days of age), two chickens per replicate (one male and one female) meaning 8 birds per treatment, were randomly selected, fasted for 24 hours, weighed and slaughtered in order to assess carcass and organ characteristics. Carcass yield relative to the ready-to-cook carcass, head, legs, liver, heart, pancreas, abdominal fat, gizzard and intestine were weighed and expressed as percentage of the live weight of birds. The intestinal length was measured (in centimetres) with the cut done from the start of the duodenal loop to the end of the cloaca. The intestine density was then calculated as the ratio consisting of dividing the weight by the length of the intestine.

7. Statistical analysis

The collected data were subjected to one-way analysis of variance (ANOVA) using SPSS 20.0 software. Differences between the treatment means were compared using the Duncan's test at the 5% significance level.

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RESULTS

1. Aflatoxin contents in peanut meal feed

Samples of experimental feeds (containing seller provided and infested peanut meal) were analysed at the Animal Health Laboratory of the University of Dschang to evaluate their aflatoxin contents. The analyses were done by ELISA (Enzyme Linked Immuno-Sorbent Assay) method with a Celer AFLA MA211 enzyme kit. The results of these analyses are presented in Table 2.

Table 2. Aflatoxin contents per kg of peanut meal feed

Sample	*Absor-bance value*	*Aflatoxin content (ppb*)*
Feed with seller provided peanut meal	0.758	50
Feed with 1-month infested peanut meal	0.414	80
Feed with 2-months infested peanut meal	0.329	> 80

(*): parts per billion

It can be noticed from these results that seller provided peanut meal was already naturally contaminated by *A. flavus*, although to a lower level than the peanut meal inoculated with *A. flavus* spores. In the feed samples containing inoculated peanut meal, the aflatoxin content increased with the duration of infestation.

2. Effect of diets containing peanut meal and palm nut shells' charcoal on the growth performance of broilers at the finisher phase

The effect of diets containing "seller provided" and "infested" (by *A. flavus*) peanut meal as the main source of plant protein and 0.4% charcoal from palm nut shells as a detoxifier, on feed intake, live weight, weight gain and feed conversion ratio of broilers at the finisher phase is shown in Table 3.

Table 3. Growth performance of broilers fed finisher diets containing peanut meal and palm nut shells' charcoal (p.n.s.c.)

	Treatments			
Parameters	**T0**	**T1**	**T2**	**T3**
Feed intake (g)	3698.02±172.81^{a}	3453.27±163.70^{b}	3522.72±74.34^{ab}	3525.64±119.92^{ab}
Initial weight (g)	701.63±30.20^{a}	698.75±36.93^{a}	671.19±41.65^{a}	719.03±13.55^{a}
Final weight (g)	2685.99±70.17^{a}	2465.49±161.61^{a}	2426.22±79.90^{a}	2528.99±293.21^{a}
Weight gain (g)	1984.36±60.65^{a}	1762.74±136.99^{a}	1755.03±68.39^{a}	1809.97±295.75^{a}
Feed conversion ratio	1.86±0.04^{a}	1.96±0.17^{a}	2.01±0.11^{a}	1.98±0.32^{a}

a, b: Means with different superscripts in the same row are significantly different ($p<0.05$).
T_0: control diet, containing soybean meal.
T_1: diet containing seller provided peanut meal and 0.4% of p.n.s.c.
T_2: diet containing one month infested peanut meal and 0.4% of p.n.s.c.
T_3: diet containing two months infested peanut meal and 0.4% of p.n.s.c.

In the light of these results, peanut meal generally tended to reduce feed intake, average final live weight and average weight gain compared to the control diet (T0). However, it tended to increase non-significantly ($p>0.05$) the feed conversion ratio. Meanwhile, diets T2 and T3 were statistically similar ($p>0.05$) for feed intake and slightly more consumed than T1. Thus, T1 was significantly ($p<0.05$) the least consumed diet and T0 the most consumed.

3. Effect of diets containing peanut meal and palm nut shells' charcoal on the development of digestive organs in broilers

The development of digestive organs (gizzard and intestine) as evaluated from broilers fed diets containing peanut meal (as a main source of plant protein) and 0.4% charcoal from palm nut shells (as a detoxifier) at finisher phase are below presented in Table 4.

Table 4. Evaluation of digestive organs of broilers fed finisher diets containing peanut meal and palm nut shells' charcoal (p.n.s.c.)

	Treatments			
Parameters	**T0**	**T1**	**T2**	**T3**
Gizzard (%)	1.46±0.12^{a}	1.35±0.12^{a}	1.37±0.21^{a}	1.50±0.25^{a}
Intestinal weight (g)	74.75±15.67^{a}	86.37±29.87^{a}	71.62±12.15^{a}	76.75±8.27^{a}
Intestinal length (cm)	195.50±32.84^{a}	199.75±19.45^{a}	200.12±16.28^{a}	201.25±9.95^{a}
Intestine density (g/cm)	0.38±0.02^{a}	0.42±0.11^{a}	0.36±0.04^{a}	0.38±0.04^{a}

a, b: Means with different superscripts in the same row are significantly different ($p<0.05$).
T_0: control diet, containing soybean meal.
T_1: diet containing seller provided peanut meal and 0.4% of p.n.s.c.
T_2: diet containing one month infested peanut meal and 0.4% of p.n.s.c.
T_3: diet containing two months infested peanut meal and 0.4% of p.n.s.c.

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The substitution of soybean meal by peanut meal and the inclusion of 0.4% charcoal from palm nut shells as a detoxifier in the diet did not significantly influence ($p>0.05$) the development of digestive organs of broilers across the treatments. However, they tended to increase the intestinal length.

4. Effect of diets containing peanut meal and palm nut shells' charcoal on the carcass and organ characteristics of broilers

Results for carcass yield, cut parts and internal organ weights (head, legs, liver, heart, pancreas and abdominal fat) of broilers fed finisher diets containing peanut meal (as a main source of plant protein) and charcoal from palm nut shells (as a detoxifier) are presented in Table 5.

Table 5. Carcass yield, cut parts and internal organs weights of broilers fed finisher diets containing peanut meal and palm nut shells' charcoal (p.n.s.c.)

	Treatments			
Parameters (%)	**T0**	**T1**	**T2**	**T3**
Carcass yield	73.55±2.44^{a}	71.62±1.19^{b}	73.06±1.82^{ab}	71.47±0.98^{b}
Head	2.25±0.16^{a}	2.33±0.15^{a}	2.36±0.16^{a}	2.30±0.19^{a}
Legs	3.76±0.49^{a}	3.59±0.33^{a}	3.73±0.38^{a}	3.65±0.38^{a}
Liver	1.60±0.19^{a}	1.82±0.30^{ab}	1.67±0.67^{ab}	1.96±0.46^{b}
Heart	0.42±0.05^{a}	0.43±0.04^{a}	0.48±0.08^{a}	0.45a±0.07^{a}
Pancreas	0.21±0.04^{a}	0.20±0.02^{a}	0.21±0.07^{a}	0.16±0.03^{a}
Abdominal fat	0.90±0.45^{a}	1.58±0.28^{b}	0.82±0.27^{a}	1.03±0.41^{a}

a, b: Means with different superscripts in the same row are significantly different ($p<0.05$).
T_0: control diet, containing soybean meal.
T_1: diet containing seller provided peanut meal and 0.4% of p.n.s.c.
T_2: diet containing one month infested peanut meal and 0.4% of p.n.s.c.
T_3: diet containing two months infested peanut meal and 0.4% of p.n.s.c.

The results above show that better carcass yield ($p<0.05$) was recorded with T0, but comparable ($p>0.05$) to T2. Birds on T1 diet got a significant higher ($p<0.05$) abdominal fat deposition. The least liver weight ($p<0.05$) was recorded with the T0 whereas the most heavy ($p<0.05$) was with T3. Finally, no significant effect ($p > 0.05$) was observed for the head, legs, heart and pancreas weights across the treatments.

DISCUSSION

● Aflatoxin contents in peanut meal feed fed to finisher broilers

Results from this study obviously show that peanut meal is a very good substrate for *A. flavus*, whether it should be natural or handled infestation; the highly humid environment and temperature in tropical climate being more favourable to mould development. Infestation due to inoculation with *A. flavus* spores merely enhanced a pre-existing natural contamination of the seller provided peanut meal. Aflatoxin content increases over time; as highlighted by the results from analysis of peanut meal feed samples, which are 50 ppb, 80 ppb and >80 ppb respectively for seller provided, one month and two months infested peanut meals.

In this regard, Magnin et *al.* (2016) indicate that the maximum levels of aflatoxins allowed or recommended in complete poultry feed are 0.005 mg/kg (5 ppb) for younger and 0.01 mg/kg (10 ppb) for older poultry. These authors assert that repeated exposure to aflatoxins results in decreased feed intake and weight gain as well as an increase of the feed conversion ratio.

Since the aflatoxin contents in chicken feed prepared with peanut meal are highly elevated compared to the recommended levels, such diets for this study are not suitable for feeding chickens unless they are safely protected. That is why palm nut shells' charcoal as a detoxifier was incorporated in these diets and their use only in broiler finisher feeding.

●● Growth performance characteristics of broilers

Throughout this study, higher feed intake ($p<0.05$) was found in birds fed with the control diet and the lower ($p<0.05$) in those fed diet containing seller provided peanut meal while the two other diets containing infested peanut meal were simultaneously comparable ($p>0.05$) to them. However, no significant difference ($p>0.05$) was observed for the average live weight, average weight gain and feed conversion ratio across all the treatments. In a similar study, Kana et *al.* (2010) found the lowest feed intake ($p<0.05$) in birds fed peanut meal diet without charcoal, while the peanut meal diet containing 0.2% charcoal (from *Canarium schweinfurthii* seeds and maize cobs) was comparable ($p>0.05$) to the soybean meal control diet. Likewise, the lowest final live weight and average weight gain ($p<0.05$) were obtained in chickens fed peanut meal diets (with or without charcoal) compared to the soybean meal control diet. These weight values are not in agreement with those of the present study in which no significant difference ($p>0.05$) was observed between the peanut meal and soybean meal diets for final live weight and weight gain. In addition to the nature of charcoal, that gap could likely be attributed to the higher dose of charcoal used in this study and therefore greater efficiency. Within the same context and taking into account both the high levels of aflatoxin contents (≥ 50 ppb) in the peanut meal feed and better growth performance somehow obtained in broilers, it may be deducted that most quantity of aflatoxins have been probably adsorbed by the palm nuts shells' charcoal. Thereafter, those aflatoxins were ejected through chicken droppings, granting thereby a protection to the birds from aflatoxins' harmful impact.

Moreover, results from diverse studies on the growth performance of broilers, as reported by Kouzoukende (2004), indicate an average live weight ranging from 1.800 g to 2.010 g at 50 days of broiler age. Meanwhile, a feed conversion ratio of 1.9 to 2.3 was recorded in the *Hubbard* strain raised on a feeding program consisting of starter (up to 7 days), grower (8-28 days) and finisher

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feed in accordance with unrestricted breeding standards. These previous results are partially in agreement with those from the present study especially the feed conversion ratio that varied from 1.96 to 2.01 for birds fed with peanut meal diets. The average final live weight ranging from 2.426 g to 2.685 g across the experimental diets is much higher than that reported by Kouzoukende (2004). This difference could be attributed to the chicken strain experimented (*Arbor Acres* for the present study and *Hubbard* for the previous studies mentioned). In fact, breed or strain is an endogenous factor interacting with other factors (both endogenous and exogenous) in animal production. On this issue, Giordani et *al.* cited by Enede (2005) reported that significant body weight differences were recorded at 8 weeks of age in a comparison study of three commercial chicken strains, namely Cobb 500, Ross 208 and Ross 308. The respective live weight values obtained by these authors were 2.63 kg, 2.80 kg and 2.92 kg for females while they were 3.23 kg, 3.36 kg and 3.45 kg for males.

●●● Carcass characteristics, development of digestive organs and internal organ weights of broilers

The carcass yield relative to the ready-to-cook carcass of birds fed with peanut meal diets decreased ($p<0.05$) except that containing one month infested peanut meal whose carcass yield was comparable ($p>0.05$) to those of other diets including the control (containing soybean meal). These results are, apart from one month infested peanut meal, similar to those obtained by Coulibaly (2019) who reported a significant decrease ($p<0.05$) in carcass yield of chickens fed peanut meal diets compared to the control containing soybean meal. However, peanut meal diets increased ($p<0.05$) the relative weight of the liver with a significant difference ($p<0.05$) only between the control and the 2-months infested peanut meal which had the highest aflatoxins content (> 80 ppb). In this regard, AFSSA[1] (2009) certified that the main target of aflatoxins is the liver; long lasting exposure for several weeks (often more than 10) leads to liver fibrosis accompanied by tumours. Briefly, carcass yield and relative liver weight recorded from broilers in the present study did not systematically show a significant difference ($p<0.05$) between all the peanut meal diets and the control. This could be attributed to both the presence of palm nut shells' charcoal in the feed as a detoxifier and a relatively short duration of exposure to aflatoxins: 4 weeks for the finisher phase of "standard" broilers.

Finally, no significant difference ($p>0.05$) was recorded between the control (containing soybean meal) and the other experimental diets (containing peanut meal and charcoal from palm nut shells) about the feed conversion ratio, digestive organs (gizzard and intestine), relative weight of head, legs, heart, pancreas and abdominal fat. These results are similar to those reported by Kana et *al.* (2010) who observed that peanut meal, with or without charcoal, had no significant effect ($p>0.05$) on the mentioned parameters, except for relative weight of gizzard and intestine. These authors recorded the heaviest gizzard and intestine with birds fed peanut meal feed without charcoal inclusion. This would further support the hypothesis that the lack of charcoal in the peanut meal feed exposed the chickens to possible presence of aflatoxins inside the diet that led to a long digestion time, resulting in a significant increase ($p<0.05$) of the digestive organ weights; in contrast with the results from the present study. In fact, at the end of their study, Kana et *al.* (2010) suggested that poor growth performance of broiler chickens fed peanut meal diets compared to the control containing soybean meal, should be attributed to expected presence of aflatoxins in peanut meal because of its susceptibility to toxin-producer moulds, although the contamination was presumed to be slight.

Overall, results recorded at the end of this study revealed that peanut meal and palm nut shells' charcoal as detoxifier constitute an alternative substitute to soybean meal in the broiler finisher feed. In this perspective, Bouvarel et *al.* (2014), Diack (2015) and CELAGRI[2] (2021) have already advocated a greater use of locally grown oilseeds and protein crops, given that soybean meal, despite its high content in protein and essential amino acid making it the better feed response to poultry dietary requirements, was mainly imported. At last, while formulating broiler diet, the main weaknesses identified against peanut meal should be taken into account. According to INRA[3] (1989) and Diack (2015), these are the presence of mycotoxins, including aflatoxins, and the low content of threonine, an essential amino acid whose adequate intake improve the lysine utilisation by the chickens fed, optimising thereby the poultry growth.

CONCLUSION

The results from this study on using peanut meal as the main source of plant protein and the inclusion of charcoal from palm nut shells as a detoxifying agent in broiler chicken diets show that:

- Without any detoxification measure, it would be risky or even counter-productive to use peanut meal in broiler feed, given its high susceptibility to toxicity due to aflatoxins especially secreted by *A. flavus*.
- The inclusion of 0.4% palm net shells' charcoal as a detoxifier in the diets enables successful use of peanut meal as a substitute for soybean meal in broiler finisher feeding.

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