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GROWTH PERFORMANCE OF BROILER STARTER BIRDS FED GRADED LEVELS OF RAW *ALLAMANDA CATHARTICA* (L) SEED MEAL

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ABSTRACT
The response of 120 day-old broiler starter birds to dietary inclusion levels of 0.0%, 2.5%, 5.0%, 7.5% and 10% raw Allamanda cathartica (L) seed meals was investigated. The experiment lasted for 4 weeks, made up of 5 dietary treatments with 2 replicates per treatment and 12 birds per replicate. Feed intake and weight gain decreased progressively as the dietary inclusion level of A. cathartica seed meal increased from 0.0 to 10.0%, while feed conversion ratio decreased ($p< 0.05$). No mortality was recorded for the control diet (with 0.0% dietary inclusion level of A. cathartica seed meal), while mortality increased progressively as the dietary A. cathartica seed meal level increased ($p< 0.05$), with 100% mortality being recorded at 10.0% dietary inclusion level. Hence, A. cathartica is extremely toxic to broiler starter birds at whatever inclusion level. So, there is the need to detoxify the raw seed meal before it can be effectively incorporated into broiler starter diets.

INTRODUCTION
Cost of feed in developing countries is about 60-80% of the total cost of production (Oruwani *et al.*, 1995); it accounts for about 65-75% of the cost of production in monogastric animals (Esonu, 2002). This high cost of feed is due to the cost of conventional energy and protein sources such as groundnut cake, soya bean meal and fish meal and have been the most important factors militating against increased commercial poultry production in developing countries. Hence, there is the intensive search by nutritionists for alternative feed ingredients with comparative nutritive value; with less competition between man and animal, and possibly cheaper than the conventional protein sources.

One of such potential plant protein sources that may be used as a replacement for soya bean meal or groundnut cake in poultry diets is *Allamanda cathartica* (L) seed meal. The plant is also called Golden Trumpet, Yellow Bell or Butter Cup and is used as a common ornamental plant. It belongs to the Dogbane family (*Apocynaceae*). It is a woody, evergreen shrub with vigorous growth and may reach a free standing height of two 2 metres or more. The leathery leaves are lance-like, pointed and may either be opposite or in whorls of three or four, producing blooms which are orange in colour; the seed capsules are oval in shape (Dalziel, 1966). *Allamanda cathartica* (L) has long been used in traditional medicine for different purposes, including, for example, the treatment of liver tumours (Mors *et al.*, 2000). Also, leaf extracts of *A. cathartica* (L) has been found to be an excellent potential fungicide for control of nursery diseases of eggplant such as damping off and seedling blight caused by *Phomopsis vexans*, *Fusarium* sp., *Rhizoctina solani*, , *Scelotium rolfsii* and *Phytophthora capsici*, that cause crop loss up to 30-50% in Bangladesh, affecting 8 million farm families involved in eggplant cultivation (Anon., 2004).

But the nutritional value of the seeds of *A. cathartica* in the diets of broilers has not been explored so far, hence this study was undertaken to investigate the growth performance of broiler starter birds fed graded levels of raw *Allamanda cathartica* (L) seed meal.

MATERIALS AND METHODS
120 Anak 2000 day-old broiler birds obtained from Minna branch office of Avian Specialities Limited, Ibadan, were used for this study. They were randomly allotted to five dietary treatments consisting of 0.0%, 2.5%, 5.0%, 7.5% and 10.0% inclusion levels of *Allamanda cathartica* (L) seed meal (Table 3). It was a completely randomized design experiment made up of 2 replicates per treatment and 12 birds per replicate. The seed meal was obtained by stripping the matured and dried *Allamanda* fruit of its mesocarp and then cracking the stony endocarp to obtain the seeds; this were then incorporated into the experimental diets at different inclusion levels. The experiment lasted for four weeks during which time feed and water were supplied to the birds *ad libitum*. The birds were subjected to a standard vaccination regime recommended for broilers, and records of feed intake, weight gain and mortality were taken.

RESULTS AND DISCUSSION
The proximate composition of *Allamanda cathartica* (L) seed meal is shown in Table 1 while its phytochemical composition is shown in Table 2. *A. cathartica* (L) seed, like most legume seeds, is rarely utilized either in human diets or livestock feeds despite its appreciable crude protein content (about 19%) because of the presence of anti-nutritional toxic components of the seeds such as cardiac glycosides, phenols, terpinoids, oxalates, phytic acids and saponins (Oji and Okafor, 2000).

Feed intake and weight gain decreased progressively as the dietary inclusion level of *Allamanda* seed meal increased from 0.0 to 10.0% while feed conversion ratio decreased ($p< 0.05$, Table 4). This result is similar to the findings of Atteh *et al.* (1995) when he fed increasing levels of raw *Thevetia peruviana* (Dutta, 1964) cake to broiler starter and finisher birds. Due to the bitter taste and low palatability of the diets, there was reduced feed intake as dietary *Thevetia* cake (called Yellow

Oleander) increased, leading to reduced weight gain. Besides, raw *Allamanda* seed meal is extremely toxic to chicken as demonstrated by the high mortality rate observed during the starter phase. Previous work has demonstrated the presence of the bioactive iridoid lactones plumericin, isoplumericin, allamandin, plumieride, plumieride coumarate and plumieride coumarate glucoside in *A. cathartica* seed (Schaab *et al.*, 2006). Birds used in this study reacted to Allamanda-based diets within 48 hours after feeding. Post-mortem examination showed that affected birds died of poisoning. There was gastro-intestinal tract irritation, rapid fluid loss, diarrhoea and dehydration. At a later stage, birds showed dullness, anorexia, wobbling gait and loss of condition which made the birds to stagger about in a drunken fashion and fall over, with the toes flexed and legs outstretched. There was twisting of the neck and twitching of the legs leading to paralysis of the legs and eventual death. The birds died in an extended suspine position and not in crouched prone position, with the sciatic nerves of the thigh muscle unaffected. This ruled out the possibility of Mareks disease attack.

At times, the birds will remain immobile in the same position for several minutes in a crouching posture. When forced to move, they move in a zigzag, jerky manner. The anti nutritional factor present in the seed meal is believed to have a neuromuscular effect on the birds. Also, the eyes were affected as they were droopy and cloudy in appearance, producing a clear watery exudate oozing out of the eyes. It was also observed in about 50% of the mortalities that the birds were already blind before they finally died. This is similar to the findings of Taiwo *et al.* (2004) when he fed diets containing10% and 15% raw *Thevetia peruviana* seed cake to rabbits. He observed diarrhoea, rough dry coat, mydriasis and hyperaesthesia in survivors; with muscle spasm, ataxia, paralysis of hind limbs and severe convulsions preceding death occurred in the mortalities.

In this research study, no mortality was recorded for the control diet with 0.0% dietary inclusion level of *A. cathartica* seed meal, while mortality increased progressively as the *A. cathartica* seed meal level increased ($p < 0.05$), with 100% mortality recorded at 10.0% dietary inclusion level.

CONCLUSION

It is therefore concluded that *Allamanda cathartica* (L) seed meal at whatever inclusion level in broiler starter diets is extremely toxic to broiler birds. It contains powerful and potent non-thermolabile toxins and not just mere anti-nutritional factors. Hence, there is the need to detoxify the raw seed meal using methods such as anaerobic and microbial fermentation or chemical methods before it can be effectively used in broiler starter diets.

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Table 1: Proximate Composition of raw *Allamanda cathartica* (L) seed meal

Nutrient	% Composition
Dry Matter	91.70
Crude protein	18.55
Ether extract	36.50
Ash	2.50
Crude fibre	13.51
Nitrogen-free extract	20.64
Metabolizable Energy{Kcal/kg}	4404.77

Table 2: Phytochemical composition of raw *Allamanda cathartica* (L) seed meal

Antinutritional factor	Composition (mg/100gm)
Saponin	0.092
Oxalate	1.38
Phytate	1.12
Tannin	0.057
Unknown alkaloid	2.81

Table 3: Percentage composition of the experimental diets for broiler starter birds

	Diets				
Ingredients	1	2	3	4	5
Maize	50.00	48.00	48.00	47.00	46.00
Groundnut Cake	30.00	32.00	32.00	31.00	30.00
Maize Offal	5.25	3.05	3.55	2.55	2.55
Fish Meal	4.00	3.00	3.00	3.00	3.00
Bone Meal	5.50	5.50	5.50	5.50	5.50
Palm Oil	3.00	3.00	0.00	0.00	0.00
Salt	0.30	1.00	1.00	1.00	1.00
Limestone	1.20	1.20	1.20	1.20	1.20
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
A. cathartica meal	0.00	2.50	5.00	7.50	10.00
Analysed Composition (%)					
Dry matter	90.19	89.47	89.27	89.16	88.84
Crude protein	23.17	22.68	22.43	22.41	22.28
Ether extract	3.63	3.89	3.93	4.08	4.13
Crude fibre	3.63	3.79	3.83	3.88	3.96
Ash	5.07	5.23	5.36	5.61	5.89

Table 4: Performance of broiler starter birds fed graded levels of *Allamanda cathartica* (L) seed meal (0-4 weeks)

	Inclusion level of *Allamanda cathartica* (L) seed meal (%)					
Parameter	0.0	2.5	5.0	7.5	10.0	SEM
Av. feed intake (g/bird/week)	280.52^{a}	160.20^{b}	90.41^{c}	70.10^{d}	41.30^{d}	31.51
Av. weight gain (g/bird/week)	209.34^{a}	99.50^{b}	53.18^{bc}	38.73^{c}	21.51^{c}	23.59
Feed: Gain	1.34^{c}	1.61^{b}	1.70^{b}	1.81^{ab}	1.92^{a}	0.14
Mortality	0.0^{c}	33.3^{bc}	43.8^{b}	91.7^{a}	100.0^{a}	23.56

Means with different superscripts were significantly different ($p < 0.05$)