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REPRODUCTIVE RESPONSE TO INCLUSION OF GRADED LEVELS OF *Ipomoea purpurea* LEAF MEAL (MORNING GLORY) IN DIETS OF LAYING CHICKENS

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ABSTRACT

Reproductive responses of laying birds fed *Ipomea purpurea* leaf meal (IPML) were investigated. A total of 40, 25-weeks old birds grouped into four treatments of 0, 2.5, 5.0 and 7.5% inclusion levels of IPML were used for this experiment in a completely randomized design layout. The birds were artificially inseminated with semen from cockerels on controlled diet thrice in a week. A total of 400 eggs were collected and set in an incubator. There were no significant differences ($p>0.05$) in Hen day production, feed/dozen eggs and the egg characteristics investigated. The blood glucose levels significantly decreased ($p<0.05$) while level of progesterone significantly increased ($p<0.05$) with increase in level of IPLM inclusion. The percentages of fertility and hatchability were high while the survivability was 100%. It can be concluded that IPLM inclusion level of up to 7.50% supports high fertility, hatchability and survivability and could be used in breeder diets for the production of fertile eggs.

Keywords: *Ipomoea purpurea*, laying hens, egg fertility, hatchability

INTRODUCTION

The ability of animal to attain its full reproductive potential depends on a number of factors among which the plane of nutrition is the most important. Profitable livestock enterprise depends on availability and affordability of feedstuffs. Surprisingly, the cost of producing conventional feed that supports improved reproductive performance has been on the increase in Nigeria over the last three decades. This is attributed to inadequate production of grains coupled with stiff competition between man, industry and livestock over the available foodstuffs which are not sufficient for its sustainability (Fetuga, 1984). With increasing interest in foliage plant as feed ingredient, some plants have been assessed with respect to their reproductive effects. *Mucuna pruriens*, *Tinospora cordiofolia* improved male sexual disorder in male primates (Kaphle *et al*, 2006).The powdered seed of *Myristica fragrans* is said to have aphrodisiac properties (Tajudeen *et al*.,(2005).The extract from *Tribulus terrestris* improves male sexual performance through stimulation of androgen receptor (Rogerson *et al.*, 2007).With the current emphasis on improvement on animal

reproduction without compromising nutrition, foliage plants have found an application in animal reproduction. In the list of possible alternatives are *Leucaena leucocephala, Lablab purpureus, Tithonia diversifolia,* to mention but a few (Ekenyem *et al*., 2003). *Ipomoea purpurea* (Morning glory) leaf meal is among plant leaves with potential for improving animal reproductive performance. It is an indigenous tropical plant available all-year round in Nigeria. The plant is of medicinal importance and readily consumed by non-ruminant herbivore animal (e.g. rabbit). Hence this research work is carried out to evaluate the effects of graded level of *Ipomoea purpurea* leaf meal on reproductive performance, fertility and hatchability of laying hens.

MATERIALS AND METHODS

The experiment was carried out at the Animal Pavilion Unit, Department of Animal Production, University of Ilorin, Ilorin, Kwara State, Nigeria. Feedstuffs were obtained commercially while the leaf meal was obtained from *Ipomoea purpurea* plant. Fresh and blooming leaves were harvested green from the plant. They were spread on clean concrete floor for air drying for three days and oven dried at 60^{o}c. The dried leaves were ground in a hammer mill with sieve size 2mm to produce the leaf meal.

The phytochemical analysis of the leaf such as saponin, tannin, alkaloids and flavonoids were determined using the method of Bohm and Kocipai (1994). The energy of the leaf meal was determined using a bomb calorimeter.

The leaf meal was then incorporated at different levels in the diets (Table 1).

Table 1: Composition (g/kg) of the experimental diets

Ingredients	level of inclusion of *Ipomoea purpurea* leaf meal (IPLM)			
	0.00	2.50%	5.00%	7.50%
Maize	43.00	43.00	43.00	43.00
Full fat soya	9.50	9.50	9.50	9.50
Groundnut Cake	8.75	8.50	7.80	7.20
Brewer dry grain	6.25	4.00	2.20	0.30
IPLM	0.00	2.50	5.00	7.50
Palm kernel cake	15.00	15.00	15.00	15.00
Wheat offal	4.80	4.80	4.80	4.80
Fish meal	2.00	2.00	2.00	2.00
Oyster Shell	8.00	8.00	8.00	8.00
Bone meal	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.20	0.20	0.20	0.20
Calculated M.E (kcal/kg)	2,700.00	2,700.00	2,700.00	2,700.00
CRUDE PROTEIN (%)	17.40	17.40	17.40	17.40

To provide the following per kg of feed: Vitamin A, 10000 iu; Vitamin D , 2000iu; Vitamin B , 0.75mg; Nicotinic acid, 312.5mg; Calcium pantothenate, 12.50mg; Vitamin B , 2.5mg; Vitamin K , 2.3mg; Vitamin E, 2.5mg; Cobalt, 0.40mg; 123 Biotin, 0.50mg; Folic acid, 1.00mg; Choline chloride, 25mg; Copper, 8.00mg; Manganese, 64mg; Iron, 32mg; Zinc,40mg; iodine, 0.8mg; Flavomycin, 100mg; Spiromycin, 5mg; DL-Methionine, 50mg; Selenium, 0.16mg and L-Lysine,120mg.

The experimental diets consisted of four (4) inclusion levels of *Ipomoea purpurea* leaf at 0.0%, 2.5%, 5.0% and 7.5% for treatment 1,2,3 and 4 respectively. The diets were formulated to be isocaloric (2700 cal/kg) and isonitrogenous (17.4% protein).

A total of forty (40), 25-week-old "Isa-brown" laying hens and Twelve (12) twenty four-week-old cockerels were housed separately inside two battery cages under the same conditions with feed and water supplied *ad libitum*. Prior to the housing of the birds, the poultry cages were thoroughly cleansed and disinfected with Izal. The forty (40) laying hens were randomly distributed into four (4) treatments consisting of ten (10) hens per treatment per diet. Each treatment consisted of five replicates with two birds per replicate. Birds were weighed at the commencement of the experiment and subsequent weighing was recorded at weekly intervals for eight (8) weeks. The twelve (12) cockerels were placed on control diet. Semen was collected from the Twelve (12) cockerels at alternate days through massaging the dorsa lateral lumbosacral region of the birds gently that cause the erection of the male copulatory organ (papilla). The semen was squeezed out into a test-tube and pooled together before used for the insemination. The collected semen was immediately withdrawn using 2ml Syringe and inserted into the left opening (cervices) of the reproductive tract. Two (2) drops (0.2ml) of the semen was released into the uterus of laying hens in each insemination. Records for quality and fertility commenced at fifth week. A total of four hundred (400) eggs of an average weight of 58.00 ± 0.2 (g) were collected and set in a 500 capacity incubator. Blood samples were also collected from the wing vein of four laying birds per treatment into a test tube and allowed to stand for some time before centrifuging at 2500 rpm to obtain clear sera. Progesterone and glucose were then determined according to the methods of Thakur (2009).

Sample of the leaf meal was subjected to proximate analysis to determine the nutrient levels of the meal using standard methods (AOAC, 1990) (Table 2).

Egg shell weight, albumin weight and yoke weight were determined using sensitive balance and shell thickness was determined using a micrometer gauge.

The fertility of eggs was determined at the 5th and 18th day of incubation using a candling machine. The percentage fertility and hatchability were determined as follows:

$$\% \text{ Fertility} = \frac{\text{Number of fertile egg}}{\text{Number of egg set}} \times \frac{100}{1}$$

$$\% \text{ Hatchability of egg set} = \frac{\text{Number of Chicks hatched}}{\text{Number of egg set}} \times \frac{100}{1}$$

All data collected were subjected to analysis of variance (ANOVA) using complete randomized design. Significant differences among treatment were assessed using Duncan's Multiple Range Test DMRT (Duncan, 1955). A probability level of $P< 0.05$ was used to determined the statistical significant of differences among the dietary treatments. While, descriptive statistics (percentile) was used for fertility, hatchability and survivability of chickens.

RESULTS

Table 2: Proximate composition and phytochemical parameters of *Ipomoea purpurea* leaf meal (IPML)

Nutrient	Percentage Composition
Dry mater	93.17
Ash	11.19
Crude fibre	21.00
Crude proteins	21.83
M.E (Kcal/kg)	1836.13
Fat	1.00
Saponin	1.98
Tannin	0.44

Table 3: Performance and egg quality characteristics, glucose and progesterone of birds on IPLM based diet

Parameters	0.00%	2.50%	5.00%	7.50%	SEM
Initial weight/ bird (g)	1370	1380	1370	1380	60.0
Final weight/ bird (g)	1810	1680	1690	1610	50.0
Weight gained/ bird (g)	440	300	320	230	2.20
Feed intake (g/bird/day)	110.10	105.40	102.50	99.90	4.16
Feed/dozen egg (g)	1770	1790	1907	1897	84.10
Hen day production (%)	71.40	68.90	63.60	69.70	2.44
Egg weight (g)	58.12	56.30	57.16	56.96	0.77
Shell thickness (mm)	0.30	0.32	0.35	0.34	0.44
Albumin weight (%)	55.97	51.42	59.71	62.15	1.4
Yolk weight (%)	22.28	24.42	23.76	23.38	0.88
Shell weight (%)	7.40	7.09	7.55	8.95	0.30
Glucose mol/L	0.69^{b}	0.38^{b}	4.43^{a}	3.34^{a}	1.09
Progesterone (u/ml)	78.64^{a}	78.92^{a}	91.25^{b}	91.30^{b}	0.99

Table 4: Percentage fertility and hatchability of egg and survivability of chicken from day old to 14 weeks.

Parameter	0.00%	2.50%	5.00%	7.50%	SEM
Fertility (%)	96.04	96.06	82.61	92.68	5.83
Hatchability (%)	66.78	70.20	74.11	64.68	4.80
Survivability (%)	100	100	100	100	4.15

DISCUSSION

Table 2 shows the proximate composition and phytochemical profile of the *Ipomoea purpurea* leaf meal. The result showed that the nutrients in *Ipomoea* leaf meal especially crude protein and energy compares fairly with that of wheat offal which has 19-25% crude protein and 1900 kcal/kg energy (Aduku,1993). However the level of saponin is high as found in most plant leaf meal (Lopez, 1989).

Table 3 shows the performance and egg quality characteristics of birds fed IPLM based diet. The feed intake decreased numerically with an increase in inclusion level of IPLM. Although significant difference was not recorded thus suggesting that the plant is not toxic and it is acceptable at the levels of inclusion. However the dull colour (green) of the feed as a result of IPLM could be responsible for low feed intake of birds on IPLM diet compared with the controlled because, birds response positively to bright coloured feed. More importantly, decline in feed consumption with increase level of IPLM may be related to both physical characteristic (colour, texture and bulk density) and presence of compounds such as saponin and alkaloid which may affect appetite (Lopez, 1989, Akande, *et al* 2007). The inclusion of IPLM at different levels resulted in delay of egg onset. It is possible that IPLM contain some follicular suppressant at a particular threshold level capable of causing a delay in ovulation. However, IPLM did not present any toxic or deleterious effect on body and egg forming tissue following onset as revealed by comparable hen day production, hen house production, egg weight , yolk and albumen weight as well as egg shell thickness. This finding corroborates the work of Akande, *et al.* (2007) whereby tephrosia leaf meal was fed to laying hens without detrimental effects.

There was a significant ($P<0.05$) increase in glucose and increase in progesterone levels with increase in IPML. It is possible that IPLM influences the production of progesterone. Progesterone is follicular suppressant and its presence above a certain threshold (Brown, 1978) could cause delay in egg development.

Table 4 shows the percentage fertility, hatchability of egg and survival rate of the chicks from day old to 14 weeks. The percentage fertility, hatchability of eggs and survivability were high. This suggests that components of *Ipomea purpurea* are not detrimental to the reproductive potential of laying birds.

It can therefore be concluded that *Ipomea purpurea* inclusion in laying birds' diet at 7.5% inclusion level supports high fertility, hatchability and survivability and has potential for

inclusion in breeders' diet for the production of fertile eggs.

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