UTILIZATION OF VARIOUS FORMS OF HORSE GRAM *(DOLICHOS BIFLORUS)* IN EGG-TYPE LAYER DIETS

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Horse gram (Dolichos biflorus) is cultivated in several parts of South India, mainly as a dry crop in moderate rainfall areas. It is a cheap cereal and hence reduces feed cost if incorporated in poultry feeds. Keeping this in view, an experiment was conducted to explore the nutritional value of raw and germinated horse gram for layers. Raw and germinated horse gram was incorporated at 0, 10 and 20 per cent levels in isocaloric and isonitrogenous diets. Lower hen-day and hen-housed egg production was noticed in layers fed at 20 per cent dietary level of raw horse gram, whereas the values were comparable in other treatments. The yolk color score was influenced by the dietary level of germinated horse gram. No mortality was observed. Results suggested that both raw and germinated horse gram could by utilized in layer ration without any deleterious effect at the levels tested.

Keywords: *Dolichos biflorus,* horse gram, Layers, raw, germinated

Poultry industry in our country is on the threshold of emerging as one of the most rapidly developing agro-industries. Future development of poultry industry will remain handicapped until and unless the production of conventional free ingredients increases and/or alternate feed resources are identified. The increase in price of the cereals and other grains necessitated search of lesser cost ingredient for inclusion in poultry feeds. Among leguminous seeds, horse gram (Dolichos biflorus) appeared to be one of the potential un-conventional feedstuffs for compounding low cost poultry feeds. Hence, the present investigation was undertaken to study the effect of inclusion of raw and germinated horse gram in the diets of egg-type layers.

The chemical composition and metabolizable energy of germinated horse gram is given in Table 1. Two hundred and ten 18 weeks old Meyer strain Single Comb White Leghorn (SCWL) pullets belonging to the same hatch were used in the experiment over 10 x 28 days laying period. The pullets were leg banded, weighed individually to one g accuracy and randomly divided into 15 groups of 14 layers each. They were housed in individual layer cages. Three replicates were randomly allotted to each of five dietary treatments.

For germination, the horse gram was soaked in double the quantity of tap water overnight in a plastic container. Surplus water was drained using a gunny bag and thereafter, the soaked horse gram was spread to a height of one inch over the wet gunny bags and covered with wet gunny bags. They were left undisturbed at room temperature for 48 hours. Once in 12 h, sufficient

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quantity of tap water was sprinkled over the gunny bags to maintain the required level of moisture in the seed for germination. After 48 h, profuse germination of horse gram was noticed when the wet gunny bags over the horse gram was removed. The germinated horse gram was sun dried, ground and then incorporated in experimental feeds.

The ingredient and chemical composition of the experimental layer diets are shown in Table 2. All the diets were isocaloric and isonitrogenous. All the birds were housed in individual cages with a floor space of 900 cm2 per bird with adequate ventilation throughout the experimental period from 21-60 weeks of age. Linear feeders and trough drinkers were provided with sufficient feeder and waterer space per bird. Respective experimental feeds and wholesome drinking water were offered ad libitum throughout. All the birds were provided with uniform photoperiod of 16 h including day light. Other managemental practices followed were uniform for all the treatments. Mortality among the birds during the experimental period was recorded and causes therof were ascertained by detailed necropsy examination. The following data were collected at regular intervals.

1: Individual body weight of all the experimental birds at the end of each 28-day laying period, 2: Feed consumed and the number of eggs laid by each replicate during each period and 3: Age at sexual maturity, first egg weight, body weight at zero, 50 per cent and at peak egg production and respective body weight gain from 21-60 weeks of age. From 1 and 2, hen-day and hen-housed egg production percentages and feed efficiency as kg feed/dozen eggs and kg feed/kg eggs were computed. At the end of each 28 day laying period, all the eggs laid for three consecutive days were collected, weighed individually to 0.5 g accuracy. From these eggs, four eggs per replicate were randomly picked up from each day collection for egg quality studies to assess Shape index (as per Shuttz, 1953), Albumin index (as per Heiman and Carver, 1936), Yolk index (as per Sharp and Powell, 1930) and Haugh unit score (as per Haugh, 1937). The shells were washed to remove the sticking albumin and dried in a hot air oven at 105ºC ± 5ºC overnight. Later, the shell thickness was measured at three places by using a "Screw gauge" to 0.01 mm accuracy. Then the average shell thickness was worked out. Based on the data on egg production, egg weight, feed intake and body weight gain, the NFEI was worked out according to the formula of Narahari et al. (1983). The Performance Efficiency Index (PEI) was calculated using the formula of Morgan and Carlson (1968) based on the data on egg weight, body weight, egg production and feed consumption. Based on the preliminary data collected and prevailing prices of various inputs and outputs, the feed cost per 100 eggs in different dietary treatments were worked out. The data collected were subjected to analysis according the methods described by Snedecor and Cochran (1967).

The age at sexual maturity did not show any significant variations between treatments. The first egg weight was also not significantly influenced by the different dietary treatments.Except for feed intake, feed efficiency and yolk colour, none of the other performance traits, age at sexual maturity, weight of first egg, body weight, weight gain, mortality, egg quality indices and economic indices showed significant effect due to treatments. Similar non -significant effects were reported earlier by Fengler et al 1990 (germinated wheat; body weight in chicken).

Analysis of data on feed intake and feed efficiency revealed significant differences between dietary treatments. The feed intake and feed efficiency was lesser in layers fed 20 per cent dietary level of raw horse gram. All the other treatment groups were comparable (Table 3). This might be due to poorer energy utilization. Germinated horse gram fed groups were comparable with control and 10 per cent raw horse gram fed groups.The mortality and causes thereof indicated that dietary horse gram (raw/germinated) had no adverse effect on the livability and health status of layers. Although no

significant differences were recorded between treatments, due to higher egg production and lesser feed intake in 20 per cent germinated horse gram fed group, the feed cost/100 eggs was slightly but insignificantly lower than the rest of the treatments. Germinated horse gram at 20 per cent level inclusion was found to have 40 paise saving in feed cost/100 eggs over 10 per cent level of raw horse gram. Since, additional labor and time is involved in germination process of horse gram, the results of this experiment reveal that it is better to utilize raw horse gram up to 10 per cent level in the layer diets.

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Table 1 Per cent chemical composition of layer diets

Chemical composition	Control diet	10 % Level of Raw Horse gram	20 % Level of Raw Horse gram	10 % Level of Germinated Horse gram	20 % Level of Germinated Horse gram
Crude Protein	18.16	18.15	18.41	18.27	18.38
Lysine	0.82	0.89	0.96	0.89	0.96
Methionine	0.36	0.35	0.35	0.35	0.35
Calcium	3.22	3.25	3.31	3.25	3.31
Phosphorus	0.43	0.44	0.45	0.44	0.45
ME (Kcal/kg)	2541	2601	2611	2597	2603

Table 2 Per cent ingredient composition* of layer diets

Ingredient composition	Control diet	10 % Level of Raw Horse gram	20 % Level of Raw Horse gram	10 % Level of Germinated Horse gram	20 % Level of Germinated Horse gram
Yellow Maize	53.0	48.0	43.0	48.0	43.0
Raw Horse Gram	-	10.0	20.0	-	-
Germinated Horse Gram	-	-	-	10.0	20.0
De-oiled rice bran	8.0	7.0	6.0	7.0	6.0
De-oiled groundnut cake	15.0	12.0	9.0	12.0	9.0
Sunflower oil cake	8.0	7.0	6.0	7.0	6.0
Fish Meal	8.0	8.0	8.0	8.0	8.0
Shell grit	5.0	5.0	5.0	5.0	5.0
Mineral and Vitamin mixture[1]	3.0	3.0	3.0	3.0	3.0

* Calculated value

1. At the level added supplied: 6.4 g calcium, 1.2 g available phosphorus, 54 mg manganese, 54 mg zinc, 40 mg iron, 4 mg copper, 1 mg iodine, 0.45 mg cobalt, 8250 IU Vitamin A, 1200 IU cholecalciferol, 5 mg riboflavin, 1 mg vitamin K, 10 mg nicotinamide, 25 mg calcium pantothenate and 0.01 mg cyanocobalamine per kg diet

Table 3

Effect of inclusion of raw and germinated horse gram in layer diets (21-60 weeks) on per cent egg production, feed efficiency and yolk colour

Level of Horse gram	Per cent hen-day egg production	Per cent hen-housed egg production	Feed efficiency (Kg feed/dozen eggs)**	Feed efficiency (Kg feed/kg eggs)**	Feed Intake (g/day/ hen)	Yolk color**
0%	65.06^{a} ±1.98	64.23^{a} ±2.05	1.95 ±0.05^{a}	3.15 ±0.8^{a}	103.6 ±1.47^{a}	5.58^{a} ±0.07
10% Raw	63.72^{a} ±2.02	63.72^{a} ±2.02	2.00 ±0.05^{a}	3.22 ±0.08^{a}	103.7 ±1.39^{a}	5.23^{b} ±0.08
20% Raw	54.28^{b} ±1.82	54.48^{b} ±1.99	2.23 ±0.06^{b}	3.63 ±0.11^{b}	99.3 ±1.41^{b}	5.06^{b} ±0.06
10% Germinated	65.74^{a} ±2.05	65.13^{a} ±2.13	1.96 ±0.05^{a}	3.17 ±0.07^{a}	105.4 ±1.38^{a}	5.25^{b} ±0.009
20% Germinated	64.14^{a} ±1.93	63.33^{a} ±1.98	1.93 ±0.04^{a}	3.12 ±0.07^{a}	101.3 ±1.49^{a}	5.80^{a} ±0.06

** Means within each column bearing at least one common letter superscript do not differ significantly (P<0.01)