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Full Length Research

Effects of Inclusion of Ground Prosopis juliflora Pod on Egg Quality of White Leghorn Hens

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A study was conducted to evaluate the effect of inclusion of ground Prosopis juliflora pod on quality of white leghorn layers in Haramaya University poultry farm. One hundred sixty eight white leghorn hens with similar initial body weight of 1077± 6 g and 27 weeks of ages were randomly distributed to 12 pens. The ingredient used for formulate layer ration were maize grain, noug seed cake, soybean meal, wheat short, ground P. juliflora pod, vitamin premix, lime stone and salt. The four treatment rations used in this study were 0% GPJP inclusion (T1) control group, 10% GPJP (T2), 20% GPJP (T3), and 30% GPJP (T4). The eggs qualities were measured during the experiment. Roche color reading revealed that eggs from hens fed T4 is yellowish (3.2±0.19) than T2 (2.6±0.19) and control diet (1.7±0.19; P<0.001). The result of the present study showed that GPJP can be used in formulation of layers ration up to 20%.

Key words: Egg, ground, leghorn, pod, prosopis juliflora, quality, white

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INTRODUCTION

Chickens are kept in many parts of the world irrespective of climate, traditions, life standard, and there is no religious taboo related to consumption of eggs and chicken meat like those for pig meat (Tadelle, 2003). To the poor majority people of rural areas, chickens serve as an immediate source of meat and income when money is needed for urgent family requirement (Ekue *et al*., 2002). It renders a significant contribution to human livelihood and contributes significantly to food security (Gondwe, 2004), particularly in providing animal protein to the people. Animal protein requirement in developing countries is becoming critical due to rapid population growth. In most developing countries, the daily animal protein consumption per capita is below that recommended by FAO (2008). Poultry production is the shortest means in filling the gap on animal protein deficiency as compared to other livestock species, because of the fact that it has short generation intervals, good environmental adaptation and requires small farming system. But, availability, quality and cost of feed ingredients are the major constraints to poultry production regardless of the system of production and geographical location (Etalem, 2006).

One other manifestation of the feed problem is the competition for feeds between human and poultry, such as for maize, sorghum, soybean, and groundnut (Iyeghe

et al., 1992). Consequently, there is a worldwide interest in the search for new feed resource capable of substituting traditional crops and staple foods used as poultry feed (Jurgen *et al*., 1998). It is in the light of this that ground *Prosopis juliflora* seed and pod was considered as a potential feedstuff for poultry in many countries. Therefore, the use of *P. juliflora* pods as feedstuff for animals must have two main purposes. These are reducing the use of stable food grains for animal feed, and reducing the dissemination of the plant through reduction of seed transport by animals. Therefore, the current study answered the objectives of to evaluate the effect of different levels of ground *Prosopis juliflora* pod inclusion in white leghorn layers ration on egg quality.

MATERIALS AND METHODS

Study area

The experiment was conducted Haramaya University located at 42° 3' E longitudes, 9° 26' N latitude and at an altitude of 1980 meter above sea level. The mean annual rainfall of the area is 780 mm and the average minimum and maximum temperatures are 8 and 24 °C, respectively (Samuel, 2008).

Expérimental Animal Management

A total of one hundred sixty eight hens (1077±6g) and twenty four cocks (2300±3 g) with similar body weight were randomly distributed in to four experimental rations for 90 days of feed trial. Birds were offered twice a day at 8:00 Am and 4:00 Pm hours throughout the experimental period in *adlibitum* feeding system.

Data collection and measurements

Egg quality parameters, such as yolk height and color, albumen height, shell weight and thickness were determined at interval of seven days on freshly laid 3 eggs per replicate for seven consecutive experimental weeks. Egg Shell thickness were measured using micrometer gauge. The measurement was taken from three site; the top (pointed part), bottom (round part) and the middle part of the egg. The yolk color was determined by comparing the yolk color with Roche color fan measurement strips, which consist 1-15 strips that ranges from pale to deep yellow color**.** The albumin and yolk height was determined by using tripod micrometer.

Statistical Analysis

Analysis of variance (ANOVA) in (CRD) using SAS 9.1.3 version of statistical software package used to analyze the data (SAS, 2004), LSD and logistic regression.

RESULTS AND DISCUSION

Egg Quality Parameters

Yolk color

The yolk color is presented in Table 1 and Figure 1. Yolk color of the hens fed diet containing different proportion of GPJP were significant (P<0.001) among the treatments. The yolk color of hens fed diet consisting 30% GPJP (T4) was more yellowish than diet without GPJP (T1), and 10% GPJP (T2). Diet consisting 20% GPJP (T3) has also yellowish yolk color than T1, indicating that increasing GPJP increased intensity of yellow color. The color, mostly affects the preference of the customer's rather its nutrient content. The shell weight and shell thickness have directly relationship with egg quality.

Yolk and albumen weight

Yolk and albumen weights are presented in Table 2. Albumin weight recorded in the present study is lower than the standard set (32-35 g), but yolk weight (14-17) is within the standard (Etches, 1996). Akhtar *et al*. (2007) and Skrivan *et al.* (2006) reported yolk weight of 15.55 g in layers fed commercial layer ration, but higher albumin weight than the present value.

Yolk and albumin height

Albumin height of T1 was significantly (P<0.05) higher than that of T2, but the yolk height was not significantly different among the treatments. Albumen heights tend to decrease with increasing level of GPJP inclusion in the ration. Hens fed diet containing 30% GPJP was significant (P< 0.05) lower that hens fed diet without GPJP. The yolk height of the present study is lower than that reported by Skrivan *et al*. (2006; 17.76 mm) in hens fed commercial layer ration.

Haugh unit

Haugh unit is presented in Table 2. In the present experiment, Haugh unit (HU) among the treatments is statistically similar (P>0.05). However, Haugh unit of 30% GPJP (T4) was numerically lower than the other treatments. This could be attributed to the short albumen height recorded in T4. The value of HU obtained in the current experiment is within the range of international standard, which is between 79-100 (Lewko and Gornowicz, 2009). This indicates the excellent albumen quality of eggs produced in the present experiment, regardless of the treatment ration.

Table 1. Yolk color points of egg samples from different experimental diets

Treatments	RPS*							
	1	2	3	4	5	6	7	Total
T1	27	30	6	1	0	0	0	64
T2	9	21	22	11	0	1	0	64
T3	6	26	17	9	4	2	1	65
T4	1	17	21	24	6	3	2	74
Total	43	94	66	45	10	6	3	267

**RSP = Roche scale points (Roche yolk color points; 1 = light yellow;*

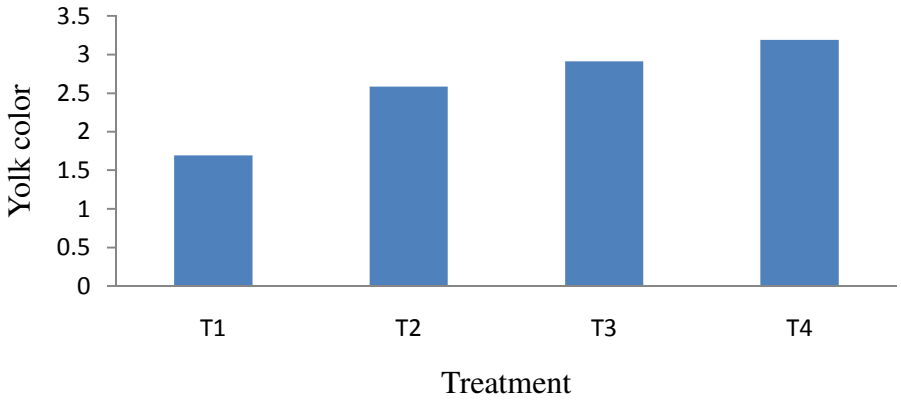

Figure 1. Yolk colors of eggs for different proportions of *Prosopis juliflora* pod inclusion in white leghorn chickens ration

Table 2. Effect of *Prosopis juliflora* pod inclusion on egg quality parameters

Parameters	Treatment				SEM	SL
	T1	T2	T3	T4		
Sample egg weight (g)	53.3	51.5	50.3	51.5	0.48	Ns
Yolk weight (g)	15.0^{a}	14.5^{ab}	14.1^{b}	14.4^{b}	0.12	*
Yolk height (µm)	15.8	15.7	15.3	15.5	0.07	Ns
Yolk diameter (cm)	3.5	3.5	3.5	3.5	0.01	Ns
Yolk index	4.6	4.5	4.4	4.4	0.03	Ns
Yolk color (RSP*)	1.7^{c}	2.6^{b}	2.9^{ab}	3.2^{a}	0.19	***
Albumin height (mm)	8.8^{a}	8.6^{ab}	8.5^{ab}	8.3^{b}	0.09	*
Albumin weight (g)	30.4	29.2	28.7	29.4	0.33	Ns
Haugh unit	95.3	94.7	93.7	92.0	0.5	Ns
Shell weight (g)	6.5^{a}	6.4^{ab}	5.9^{c}	6.0^{bc}	0.09	*
Shell thickness (µm)	0.32^{a}	0.32^{a}	0.31^{ab}	0.30^{b}	0.03	*

$^{a, b, c}$ means within the row with different superscripts differ at * = *(P<0.05)*; ** = *(P<0.01)*; *** = *(P<0.001)*; *Ns = none significant at (P>0.05); SEM = Standard Error of the Mean; SL = Significant Level; RSP* = Roche Scale Points; GPJP = Ground Prosopis juliflora pod*

Shell thickness

Shell thickness of Egg is présente in Table 2. Egg Shell thickness of hen Fed dièt containing différent level of grounds P. juliflora pod was signifiant (P<0.05) différent. The Shell thickness of the control (T1) and 10% GPJP (T2) was higher than, 30% GPJP (T4). The result indiçâtes that more than 20% grounds P. juliflora pod inclusion in white leghorn layer ration affects Egg Shell quality.

SUMMARY

An experiment was conducted to evaluate the effect of inclusion of graded levels of ground *Prosopis juliflora* pods (GPJP) on egg quality in white leghorn layers. One hundred sixty eight white leghorn chickens were used for the feeding trial on litter housing system. The hens were randomly distributed in to four dietary treatments that were replicated three times each with 14 hens and 2 cocks in a completely randomized design. The experimental treatments were containing different proportion of ground *prosopis juliflora* pods which, levels without GPJP (T1), 10% GPJP (T2), 20% GPJP (T3) and 30% GPJP (T4).

Among the egg quality parameters, only yolk color and weight and shell weight and thickness, and albumen height seem to be affected by inclusion of GPJP. Yolk color in T4 (3.2±0.19) is more yellowish compared to T1 and T2, but this value is not comparable with the standard (7-8 Roche scale point) said to be preferred by consumers. This means still the color of this experiment not meet the standard of the consumer's preferences. Shell is lighter and thinner in T4 than the control indicating the probable effect of high level of GPJP feeding.

The result indicated that inclusion of *Prosopis juliflora* pods up to 20% do not negatively affect egg quality, but due to low weight of eggs 30% inclusion tend to numerically decreases this parameters and significantly improvement in yolk color. Therefore, *Prosopis juliflora* pod could be used in poultry ration up to 20% is recommended.

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