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Effects of Rice Distillers Dried Grains with Soluble on Laying Performance of Khaki Campbell Duck

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ABSTRACT

Background: In present scenario cost of common feed ingredients like maize and soybean are in rising trends due to less availability. Thus, the feed industry is forced to search the way to combat the feed cost. Rice Distillers Dried Grains with Solubles, is one of the best alternative source of feed ingredient. It has good source of energy, protein, vitamins and minerals. Presently, rice as subtract for bioethanol production is increasing due to its relative lower price, higher production and easy availability leads to increased availability of co-product rice distillers dried grains with solubles. In present study Nutrisigma® has been used. 'Nutrisigma®'is rice distillers dried grains with solubles produced by IFB Agro Industries limited, Kolkata. In consideration of the above fact, the present experiment was designed to study the effects of "Nutrisigma®" on productive performance of Khaki Campbell ducks.

Methods: A total of nine hundred female Khaki Campbell ducks of the same genetic background and of comparable body weight at 72 wks of age, were randomly assigned into 3 dietary treatments that is Control (C), Treatment 1 (T_1) and Treatment 2 (T_2) each with 3 replicates of 100 ducks and they were studied for 60 days. All the experimental ducks were fed 120gm/duck/day concentrate mixture. Treatment group received (T_1 group @ 3 gm/duck/day and T_2 group @ 5 gm/duck/day) 'Nutrisigma®' in addition to concentrate mixture.

Result: In our experiment egg production (%), fertile egg production per day, fertility%, hatchable egg weight (gm) and hatchability% were increased significantly ($p<0.05$) in treated groups compared with control group. Better economic efficiency was observed in T_1 group compared to T_2 and control groups. In conclusion, Nutrisigma® with concentrate mixture could be used economically up to 5gm/head/day (T_2) without any harmful effect on productive performance, however, the use of 3 gm/head/day (T_1) is more economical than 5 gm/head/day.

Key words: Economic efficiency, Egg weight, Egg production, Hatchability, Nutrisigma®.

INTRODUCTION

Today in developing country like India, availability of feed ingredient for livestock is gradually decreasing as a result cost of feed for livestock have been increased. One of the main purposes of nutritionals researches is to minimize the cost of poultry production and increase profit by enhancing the utilization of nutrients in feeds. The rising trends in prices of grains and soybean meal are exertingeconomical pressure on poultry producers, thus the feed industry is searching for the ways to reduce feed costs using new feed ingredients (Al-Harthi *et al.*, 2009). With growing demand for food, feed and limited resources, there is no space forlivestock industry to waste anything having nutritive value. Distillers Dried Grains with Solubles (DDGS) is co-product of the ethanol industry produced during dry milling processing. Its availability is increasing due to higher demand for ethanol as bio-fuel. Corn, wheat, sorghum, barley, rice and cereals are commonly used as fermentation substrates for ethanol production.

In the present context, rice as subtract for bioethanol production is increasing due to its relative lower price, higher production and easy availability leads to increased availability of co-product rice DDGS (rDDGS). It contains 65% distiller's grains and 35% distiller's solubles on dry matter basis (AAFCO, 2005). DDGS contain all the nutrients from grain in a concentrated form except for the majority of the starch, which has been utilized in the fermentation process during ethanol production (Babcock *et al.,* 2008). DDGS are good source of energy, protein, vitamins and minerals (Salim *et al.,* 2010). The enhanced availability and potential cost-benefit of DDGS represents a substantial economic value as it is less expensive than other protein sources like soybean meal (He *et al.,* 2013). Several recent studies shown the use of high quality DDGS in layer diets

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supporting that it is an excellent partial substitution for maize and soybean meal and supports high layer performance and egg quality (El-Hack, 2015). Gupta *et al.,* (2015), reported that rDDGS can safely be incorporated in layer diet up to the inclusion level of 10% without affecting egg production and egg quality traits along with improved gut health, immunity and intestinal morphology. Since most of the research work done is limited to corn, wheat, barley and sorghum DDGS. Very scanty researches are available in literature regarding effect of feeding rDDGS in duck. So, there is need to explore effect of feeding rDDGS on productive performance of duck. In present study Nutrisigma® has been used. 'Nutrisigma®' is rice based DDGS produced by IFB Agro Industries limited, Kolkata.In consideration of the above fact, the present experiment was designed to study the effects of "Nutrisigma®" on productive performance of Khaki Campbell ducks.

MATERIALS AND METHODS

The study was carried out at State Livestock Farm, Kalyani, Nadia, West Bengal, India, during the period of August 2019 to September 2019.

Experimental programme

A total of 900 female Khaki Campbell ducks having comparable body weight at 72 wks of age were randomly assigned into 3 dietary treatments that is control (C), treatment 1 (T_1) and treatment 2 (T_2) each with 3 replicates of 100 ducks and they were studied for 60 days.

Table 1: Proximate analysis of concentrate mixture.

Component	Percentage on DM basis
DM	90.38
CP	15.75
CF	16.2
EE	0.28
Total ash	12.09
Acid insoluble ash	4.35

Table 2: Chemical composition of 'Nutrisigma®'.

Component	Nutrient in 250 gm
Protein	80 g
Fat	23 g
Macro & Micro nutrients	126 g
Vitamin A	50000 IU
Vitamin D3	5000 IU
Vitamin E	250 mg

Materials and facilities used in the study

All the experimental ducks were fed weighed quantities of concentrate mixture to meet out the requirements as per feeding standards (NRC, 2001). Here the concentrate mixture was given to control group (C) as well as treatment groups. Treatmentgroup received (T_1 group @ 3gm/duck/day and T_2 group @ 5 gm/duck/day) **'**Nutrisigma®**'** in addition to concentrate mixture.Fresh drinking water was available ad libitum throughout the study period. The daily feed allowance was the maximum without leaving refusals and it was splitted into 3 times feeding, which were provided at 7:00 a.m, 11 a.m. and 3:00 p.m. All ducks were given 120 gm/head /dayconcentrate mixture during entire study period. Chemical composition of concentrate mixture was made as proximate analysis (AOAC, 2005), Table 1. The composition of Nutrisigma® has been presented in Table 2 as per product literature.

Productive performance

The numbers of total eggs were recorded daily by replicate wise. Eggs produced were individually weighed and graded daily. Total egg production, fertile egg production, fertility (%) and hatchable egg weight were calculated daily on a per replicate basis and then presented as the averages for the complete 60 days study period. Per cent of fertility was calculated by evaluation of total eggs and percentage of hatchability was calculated by evaluation of fertile eggs.

Economic efficiency

The experimental treatments were economically evaluated based upon the local market prices during the period of experiment (2019), in terms of feed cost consumed during experiment and the total no. of table egg production and day old ducklings.

Data analysis

The results obtained from the experiment were analyzed by using statistical analysis system software "IBM SPSS version 23".

RESULTS AND DISCUSSION

Productive performance

Productive performance of Khaki Campbell ducks were presented in Table 3. The results showed that inclusion of

Table 3: Effect of Nutrisigma® on productive performance of Khaki Campbell duck.

Variable	C	T_1	T_2	Significance
Egg production (%)	61.92±0.24^c	68.58±0.24^b	70.07±0.24^a	S
Fertile egg produced /day	46.68 ±0.24^c	55.69±0.24^b	58.00±0.24^a	S
Egg weight (gm)	66.99±0.03^c	67.50±0.03^b	68.28±0.03^a	S
Fertility (%)	75.46±0.23^c	81.19±0.23^b	82.75±0.24^a	S
Hatchability (%)	60.47±0.17^b	64.68±0.38^a	66.08±0.63^a	S

Means with different superscripts in the same row differ significantly (P <0.05). S means Significant.

Table 4: Effect of Nutrisigma® on the economical efficiency of Khaki Campbell Ducks.

Items		C	T_1	T_2
Basal Feed cost (Rs)	A	68472	68472	68472
Nutrisigma Cost (Rs)	B	0	5940	9900
Total Feed Cost (Rs)	C=A+B	68472	74412	78372
Total Egg Production	D	11146	12344	12613
Fertile Egg Production	E=D*Fertility% of respective group	8410	10022	10437
Table Egg Production	F=D-E	2735	2322	2176
Revenue Earned from Table egg (Rs)	G=F*5	13676	11610	10878
DOD Production	H=E*Hatchability% of respective group	5086	6483	6897
Revenue Earned from DOD sale (Rs)	I=H*25	127145	162063	172418
Total Revenue Earned (Rs)	J=G+I	140821	173672	183296
Net Revenue Earned (Rs)	K=J-C	72349	99260	104924
Economical Efficiency	L=K/C	1.06	1.33	1.34
Relative Economical Efficiency	REE	100	126.24	126.71

Cost of feed:-Rs. 31.7/kg; Cost of Nutrisigma®: Rs. 110/kg; Cost of table egg: Rs. 5/egg; Cost of day old duck: Rs. 25/duckling.

Nutrisigma® in duck ration had significant ($p<0.05$) effect on egg production (%), fertile egg production per day and hatchable egg weight (gm) in treated groups compared to control group. Improved productive performance may be due to supplementation of Nutrisigma® in the basal diet as it is good source of energy, protein, vitamins and minerals (Salim *et al.,* 2010). The present study was confirmed with the finding of Shalas *et al.,* (2010). They reported that inclusion of 5% DDGS in laying diets significantly increased egg production%, egg number, egg weight and egg mass compared to control group. Similar results were obtained by Shurson (2003), Loar *et al.,* (2010), Sun *et al.,* (2012) with laying hens.

Reproductive performance

Reproductive performance of Khaki Campbell ducks were presented in Table 3. The results showed that inclusion of Nutrisigma® in duck ration had significant ($p<0.05$) effect on fertility% and hatchability% in treated groups compared to control group. This result was agreed with the observation of Józefa *et al.* (2012). They reported that better hatchability obtained by Greenleg Partridge and Rhode Island Red hen in the groups fed the DDGS diet. Similar results were obtained by Abousekken (2014) with laying Quails.

Economic efficiency

The Economical Efficiency (E.Ef.) and the Relative Economical Efficiency (REE) values are presented in Table 4. Ducks fed diet containing Nutrisigma® 3gm/head/day (T_1) were economically the better treatment which had economical and relative efficiency values of 1.33 and 126.24%, respectively, followed by ducks fed diet containing Nutrisigma® 5gm/head/day had values of 1.34 and 126.71%, respectively. In the present study Economical Efficiency (E.Ef.) and the Relative Economical Efficiency (REE) values were almost similar in T_1 and T_2. But when it is consider with the cost effective, T_1 has achieved this value with less input (Rs. 74412) compare with T_2 (Rs. 78372).

CONCLUSION

Therefore, it may be recommended for the use of Nutrisigma® with concentrate mixture for enhancing the productive performance of Khaki Campbell ducksup to 5 gm/head/day without deleterious effect but 3 gm/head/day dose rate is economically more viable.

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