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 (T₁) and Treatment 2 (T₂) 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 (T₁ group @ 3 gm/duck/day and T₂ 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 T₁ group compared to T₂ and control groups. In conclusion, Nutrisigma® with concentrate mixture could be used economically up to 5gm/head/day (T₂) without any harmful effect on productive performance, however, the use of 3 gm/head/day (T₁) 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 of 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 exerting economical 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 for livestock 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 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 (T₁) and treatment 2 (T₂) 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             |

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

| Variable               | C                     | T₁                     | T₂                     | Significance |
|------------------------|------------------------|------------------------|------------------------|--------------|
| Egg production (%)     | 61.92±0.24c            | 68.58±0.24b            | 70.07±0.24a            | S            |
| Fertile egg produced /day | 46.68 ±0.24d          | 55.69±0.24c            | 58.00±0.24a            | S            |
| Egg weight (gm)        | 66.99±0.03c            | 67.50±0.03b            | 68.28±0.03a            | S            |
| Fertility (%)          | 75.46±0.23c            | 81.19±0.23b            | 82.75±0.24a            | S            |
| Hatchability (%)       | 60.47±0.17b            | 64.68±0.38a            | 66.08±0.63a            | S            |

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

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 was 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 (T1) 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 T1 and T2. But when it is consider with the cost effective, T1 has achieved this value with less input (Rs. 74412) compared with T2 (Rs. 78372).

CONCLUSION

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

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| Table 4: Effect of Nutrisigma® on the economical efficiency of Khaki Campbell Ducks. |
|-----------------|-----------------|-----------------|-----------------|
| Items           | C               | T1              | T2              |
| Basal Feed cost (Rs) | A               | 68472           | 68472           |
| Nutrisigma Cost (Rs)     | B               | 0               | 5940            |
| Total Feed Cost (Rs)      | C=A+B           | 68472           | 74412           |
| Total Egg Production      | D               | 11146           | 12344           |
| Fertile Egg Production    | E=D*Fertility% | 8410            | 10022           |
| Table Egg Production      | F=D-E           | 2735            | 2322            |
| Revenue Earned from Table egg (Rs) | G=F*5 | 13676           | 11610           |
| DOD Production            | H=E*Hatchability% | 5086           | 6483            |
| Revenue Earned from DOD sale (Rs) | I=H*25 | 127145          | 162063          |
| Total Revenue Earned (Rs) | J=G+I           | 140821          | 173672          |
| Net Revenue Earned (Rs)   | K=J-C           | 72349           | 99260           |
| Economical Efficiency     | L=K/C           | 1.06            | 1.33            |
| 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.
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