IMPACT OF NUTRISIGMA® ON PERFORMANCE OF YOUNG GAROLE LAMBS

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The aim of the study was to evaluate the effect of “Nutrisigma®” on performance of young Garole lamb. Eighteen young Garole lambs on an average 4.95 ± 0.33 kg body weight were divided into 3 feeding groups (6 Garole lambs each) as per their live weight for 105 days in a growth trial. They were allowed for grazing in the grazing land in the day time and all the treatment groups (Control, T₁ and T₂) were offered 150 gm/animal/day concentrate mixture. In addition to concentrate mixture T₁ and T₂ group was offered 10 g/h/d and 20 g/h/d Nutrisigma® respectively. Initially up to 75 days of experiment period no significant changes had been observed in the body weight among the groups. Afterwards, on day 90 and day 105 of experiment period significant changes ($P < 0.01$) had been observed in body weight within the treatment groups compared to control group. Economically more feasible were obtained in T₁ and T₂ groups compared to control group. Positive body condition score was obtained in treatment groups in comparison to control group. So, it may be concluded that supplementation of Nutrisigma® with concentrate mixture could be used economically up to 20 g/head/day without any harmful effect on growth performance, however; the use of Nutrisigma® 10 g/head/day is economically more viable for Garole lambs.

Key words: Garole lambs, Growth performance, Nutrisigma®

The Indian economy is based on agriculture and allied sectors. Rural people largely depend on agriculture which has great impact on small and marginal farmers as well as landless laborers. The sheep and goat are allowed to graze on pastures, wastelands, fallow lands etc. or on stall fed to satisfy their nutritional demand. However due to rapid reduction of grazing

lands, urbanization, water scarcity, industrialization, land utilization pattern and non availability of cultivable lands, the gap between availability and requirement of nutrients is increasing. Therefore under the prevailing circumstances exploration of new feed resources become necessary to overcome the problem of feed scarcity. Feed resources like

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unconventional feed including agro-industrial by-products and livestock waste either utilized or rarely utilized have a great role providing useful nutrients for existing under nourished livestock population. Bio-Fuel production increased the availability of plant processing by-products, such as dried distiller's grains with soluble (DDGS). DDGS have higher nutritive value and relatively cheaper in cost than other traditional feed ingredients. It is considered as an effective and useful component of concentrate mixtures. It is characterized by high crude protein (about 30%) content, enriched in higher percentage of ruminal bypass protein (about 55%) with higher energy value (Schingoethe *et al.*, 2009). It is an attractive source of energy as well as protein for sheep (Schauer *et al.*, 2008). The component of DDGS is an excellent supplement for ruminants consuming low to moderate quality forages (Stock *et al.*, 2000; Spiels *et al.*, 2002). DDGS can satisfyingly replace the energy and protein value in the concentrate mixture as it contains of higher polyunsaturated fatty acids (PUFA), mainly linoleic acid (C 18:2), it can also change the fatty acid profile of the meat. They can be added in growing or finishing animals and lowering production costs compared with traditional feed ingredients such as sorghum grain and soybean meal (Schauer *et al.*, 2005). Therefore, the use of high amounts of DDGS can be economically justifiable. So, dried distiller's grains with soluble are most widely utilized in sheep nutrition (Schauer *et al.*, 2008; Borzuta *et al.*, 2014). As dried distiller's grains with soluble is most widely used in sheep nutrition that's why 'Nutrisigma®' - a balanced nutrition booster produced by IFB Agro Industries limited, Kolkata is used in this study. Nutrisigma® is developed from rice grain fermentation from ethanol industry. No

previous researches with Nutrisigma® on lambs have been reported.

Thus, the objective of this experiment was to find out the effective levels of 'Nutrisigma®' offered in the ration on growth parameter and body condition scoring (BCS).

MATERIALS AND METHODS

This study was carried out at Department of Livestock Farm Complex, West Bengal University of Animal and Fishery Sciences, Mohanpur campus, Nadia, West Bengal, India, from February, 19 to May, 19.

Selection and distribution of experimental lambs: Eighteen young Garole lambs aged 3-4 months old weighing 4.95 ± 0.33 kg were selected for conducting a growth trial for a period of 105 days. They were randomly distributed into three experimental groups viz., control, T₁ and T₂ each having six animals in a complete randomized block design (CRD) such that the initial body weights were almost similar in all groups. Experimental groups were identified with three different colour applied on the body coat. Red, green and blue colour was used for control, T₁ and T₂ group, respectively.

Housing and management of experimental animals: The experimental animals of all the three groups were kept under uniform housing throughout the experiment period. They were offered clean and fresh drinking water round the clock. The animals were maintained in a semi intensive system. They were allowed for grazing during day time in the grazing land and returned their respective pen in evening. All the three groups were offered commercial concentrate mixture twice daily at 9:00 hours

and 16:00 hours, respectively by weighing in electronic balance at the rate of 150 g/head/day for entire experiment period of 105 days. T₁ group received 10 g/head/day and T₂ group received 20 g/head/day 'Nutrisigma®', respectively in addition to basal diet. Feed was analyzed for proximate analyses (AOAC, 2000) is presented in Table 1. The composition of Nutrisigma® as per product literature has been presented in Table 2.

Table 1. Chemical composition of concentrate mixture

Component	Percentage on DM basis
DM	90.385
CP	13.125
EE	1.1
CF	16.2
Total ash	10.7
Acid insoluble ash	3.13
Ca	0.855

Table 2. Chemical composition of Nutrisigma®

Component	Per 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

Live weight recording: The animals were weighed fifteen days interval using the electronic balance before feeding and watering in the morning. Weights were recorded for two consecutive days and the mean was taken to represent the body weight.

Economic efficiency: The commercial concentrate mixture was procured in reasonable

cost. The cost of concentrate mixture was Rs. 30/kg and Nutrisigma® was Rs. 110/kg. Thus, the total cost of ration was obtained by adding the cost of concentrate mixture along with Nutrisigma® consumed in the entire experimental period (105 days).

The cost of live weight gain per kilogram was obtained by dividing the total cost of concentrate mixture and Nutrisigma® consumed with total body weight gain.

Body condition score (BCS): Body condition scoring of experimental animals was done through visual and tactile evaluation of body fat reserves by using a 5-point scale. Body condition scores (BCS) were an indirect estimate of energy balance. Where through 1 to 5 point was given according to a very thin sheep to excessively fatty sheep and 3 denotes as a healthy sheep. Evaluation performed on the basis of backbone, hip, shoulder, ribs, tail head and body outline of the sheep as described by Michel (2008), is shown in Table 3. To minimize the error the scoring was done by three person panel during sampling. BCS was recorded prior to the experiment followed by fifteen days interval.

Data analysis: The results obtained from the experiment were analyzed by using IBM SPSS version 23 software.

RESULTS

Growth performance: The results in Table 4 showed that inclusion of Nutrisigma® in lambs ration had no significant effect among the groups up to 75 days of experiment period but the results of 90 days and 105 days of experiment period clearly show that treatment groups (T₁ and T₂) had significant ($P < 0.05$) effect on body weight in comparison to control group.

Economic efficiency: The present study indicates that (Table 4) better economic feasibility (cost/kg weight gain) were obtained in T₁ (169.94) and T₂ (202.16) groups compared to control (210) group. Through the entire experiment requirement of Nutrisigma® were @ 1.05 kg/head (T₁) and @ 2.1 kg/head (T₂) and cost were Rs. 115.50 and Rs. 231 in T₁ and T₂

respectively. Total weight gain after 105 days experimental period were 2.25 kg (C), 3.46 kg (T₁) and 3.48 kg (T₂).

Body condition scoring: Average BCS was presented in Table 4. Here, it is clear that initial BCS were almost same. After three and half months of experiment better BCS were

Table 3. Body condition scoring chart for ruminant

Body parts	BCS 1	BCS 2	BCS 3	BCS 4	BCS 5
Backbone	Prominent	Visible	Visible faintly	Not visible	Not visible
Hips and shoulder	Prominent	Visible	Not visible	Not visible	Fat deposit
Ribs	Clearly visible	Visible faintly	Not visible	Well covered	Well covered
Tail head	Recessed	Slightly recessed	Not recessed	Slightly lumpy	Very lumpy
Body outline	Skeletal	Bony	Almost smooth	Rounded	Bulging due to fat
Remarks	Poor	Moderate	Good	Fat	Grossly fat

Table 4. Effect of Nutrisigma® on growth performance and economic efficiency of Garole lambs

Variable	C	T ₁	T ₂	P-value
Day 0	4.95±0.33	4.88 ±0.39	4.93±0.23	0.99
Day 15	5.11±0.25	5.09±0.22	5.16±0.21	0.97
Day 30	5.67±0.25	5.78±0.32	5.87±0.14	0.86
Day 45	5.75±0.24	5.89±0.31	6.07±0.23	0.69
Day 60	6.14±0.27	6.81±0.38	6.97±0.14	0.13
Day 75	6.84±0.44	7.53±0.41	7.66±0.16	0.26
Day 90	7.17±0.25 ^b	8.32±0.30 ^a	8.49±0.26 ^a	0.01**
Day 105	7.20±0.31 ^b	8.34±0.24 ^a	8.41±0.27 ^a	0.01**
Final weight gain	2.25	3.46	3.48	-
Feed cost	472.50	472.50	472.50	-
Nutrisigma®	-	115.50	231.00	-
Total cost	472.50	588.00	703.50	-
Cost/ kg of gain	210.00	169.94	202.16	-
Initial BCS	2.70	2.65	2.68	-
Final BCS	2.72	3.20	3.10	-

** P<0.01, Means with different superscripts in the same row differ significantly

Prices (Rs.): Feed- 30/kg, Nutrisigma® -110/kg

observed in T₁ (from 2.65 to 3.20) and T₂ (from 2.68 to 3.10) but there was no such improvement shows in case of control group (from 2.7 to 2.72).

DISCUSSION

Growth performance: In this experiment it was observed that in initial phase, upto 75 days growth performance had no significant ($P>0.05$) changes among the treatment groups. But there was clear significant changes ($P<0.05$) in performance of the treatment groups and better results were observed due to supplementation of Nutrisigma® after 90 days of the study. All the animals were maintained under grazing condition, only little amount of feed was offered to the animal. The treatment groups were allowed additional supplementation of Nutrisigma® which is the rice based DDGS. DDGS is an ideal supplement for ruminants consuming low to moderate quality forages (Stock *et al.*, 2000). It is an attractive source of energy as well as protein for sheep (Schauer *et al.*, 2008). The present studies confirmed with the studies of Avila stagno *et al.* (2013) reported that a better body weight was obtained in lamb with 40% wheat DDGS as comparison to basal diet.

Yossifov *et al.* (2012) also reported that, final body weight gain were significantly affected by DDGS ($P<0.001$) included diets in lambs.

Economic efficiency: Better economic feasibility was obtained in treatment groups compared to control group in present experiment. This is due to additional supplementation of Nutrisigma®. As control group did not receive Nutrisigma® as a result the feed cost was much less than the T₁ and T₂. Total weight gain was reverse to the feed cost.

Here better weight gain was observed in treatment groups than the control group. Hence better economic feasibility was observed in the T₁ group compared to T₂ and control group. Similar result was found by McEachern *et al.* (2009) who reported that DDGS can reduce feed cost/kg of gain.

Body condition scoring: The result of present study shows that supplementation of 'Nutrisigma®' has positive effect on BCS. Positive BCS changes recorded in this study can be attributed mainly due to the nutrient content of Nutrisigma® which is rich in bypass protein, bypass fat, vitamins and mineral nutrients.

In short, Nutrisigma® is a balanced nutritive booster fortified with bypass protein, bypass fat and fat soluble vitamins in significant quality, with high calcium and phosphorous content with micronutrients. In present study Nutrisigma® was used in growing Garole lamb. Though total weight gain is almost similar in treatment groups but cost per kg weight gain is much better in T₁ group as because the cost of Nutrisigma® used in each animal is half in T₁ (10 g/head/day) group as compared to T₂ (20 g/head/day) group.

So, it may be concluded that supplementation of Nutrisigma® 10 g/head/day is economically viable for Garole lambs.

Conflict of interest: Authors declare that there is no conflict of interest regarding the present research work.

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