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Inclusion of different level of dried rumen digesta on growth and performance efficiency of broilers

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Abstract

An experiment was conducted at Poultry Research and Training Center of Sardar Vallbbhbhai Patel University of Agriculture and Technology Modipuram Meerut to determine effect of dietary supplementation of Dried Rumen Digesta (DRD) on growth performance of broilers. A total 300 day old (Cobb- 400) divided into five experimental groups viz., T₁ (basal ration without DRD), T₂ (basal ration plus 5 % DRD), T₃ (basal ration plus 10% DRD), T₄ (basal ration plus 15 % DRD) and T₅ (basal ration plus 20 % DRD) with three replications and each replication had 20 chicks. Results showed that inclusion of 20 per cent DRD in diets of broilers significantly (p<0.5) improved body weight gain (2270.23±1.17 g), feed conversion efficiency (1.45) and performance index (366.55). Therefore, it can be concluded that addition of DRD at small level in broilers diet more profitable for commercial broiler farming.

Keywords: broiler, dried rumen digesta, growth performance and performance index

1. Introduction

Developing countries are suffering from a shortage of animal feed ingredients, daily increasing in price and competition for this feedstuff between humans and livestock, has greatly reduced the rate of expansion of poultry industry. Shortage and volatility in price of feed ingredients motivated to search for alternative feed source to solve this problem. In recent years, researchers tended to look for traditional and inexpensive sources of feedstuff for inclusion in animal and poultry diets and one source is the abattoir waste. One of such source is from abattoir wastes comprising rumen content, a potential alternative protein source [1]. Rumen content is substantial wastes generated daily at abattoirs [2]. It is a material from the rumen of cattle which is the first stomach compartment of the ruminants. The rumen is account for about 80 per cent of the capacity of the adult ruminant stomach [3]. Rumen content is plant material at various stage of digestion, rich in protein and other micro-flora such as fungi, protozoa and bacteria [4, 5]. Rumen digesta is an important source of energy and vitamins especially vitamin B complex. Its utilization as animal feed will also alleviate and mature the economic environmentally benign disposal of slaughter house by products [4]. Therefore, present experiment was conducted to determine the effect of dried rumen digesta on growth performance and economics analysis.

2. Materials and methods

2.1 Experiment site

The present experiment was carried out at the Poultry Research and Training Centre, Sardar Vallbbhbhai Patel University of Agriculture and Technology, Meerut during 1st June to 12th July 2016.

2.2 Experimental birds and design

The experiment was conducted for a period of 42 days on broilers chicks and chicks were purchased from Venktershwara hatchery Meerut and fresh buffalo rumen digesta was collected from Ali Faheem Meatex Pvt. Ltd Factory, Alipur, Dhikoli, Hapur Road, Meerut-250002 (U.P.) India. Feed ingredients were procured in one lot for the whole experiment, and its proximate principles were determined [6] before compounding experimental rations and feed

formulation was done [7]. Different ingredients used in the experiment were yellow maize, soya bean meal, fish meal, vitamin, mineral mixture and experimental diet (rumen digesta). All day-old 300 chicks were individually weighed and distributed into five experimental groups having sixty birds in each. Each group was further sub-divided into triplicates having twenty birds in each. Experimental group T₁ served as control and rest groups T₂, T₃, T₄ and T₅ as treatment groups.

2.3 Birds and their Husbandry

All the standard management practices were followed during whole experimental period including vaccination schedule. Birds were vaccinated routinely against infectious New Castle Disease (*lasota*), Infectious Bursal Disease at day 8 and day 18, respectively through the eye drop and drinking water. The experimental diets and drinking water were provided *ad libitum* throughout the experimental period of six weeks. All the chickens were maintained at a uniform temperature and lighting control system during the whole period of study.

2.4 Dietary treatments

Birds in experimental group (T₁) were fed basal ration only. However, T₂, T₃, T₄ and T₅ groups were fed basal ration mixed with 5, 10, 15 and 20 per cent rumen digesta, respectively. Diets were isonitrogenous and isocaloric. Composition of feed is mentioned in Tables 1-3.

2.5 Data collection

Feed intake was calculated weekly for each treatment group. At the end of the week, the residual amount of feed was weighed and subtracted from the weight of feed offered at the beginning of the week. Difference in weight was divided by the total number of birds. During the initial phase of the experiment body weight (BW) of individual chicks were recorded. Thereafter, BW change was observed at weekly interval up to 6 weeks. Live weight gain was calculated by subtracting the live weight at the beginning of the week from the live BW of the next week and whole body weight gain (BWG) at the end of 6th week from the initial BW. FCR was calculated every week as the amount of feed consumption per unit of the body gain (average weekly feed consumption (g)/average weekly gain (g)). Performance index (PI) was also calculated weekly. PI was calculated by using the formula [8].

2.6 Statistical analysis

The data was analysed using Op Stat-Statistical Package for Agricultural Research Workers to determine the descriptive characteristics of the parameters between the various treatment groups. Duncan Multiple Range test (DMRT) of DSAASTAT, Perugia-Italy was used to determine the significant difference of the parameters between groups. The results are given as means, standard error and $p < 0.05$ was considered to be statistically significant difference.

3. Results and discussion

The data of different dietary treatments on growth performance and economics analysis are presented in Tables 4-5.

3.1 Feed intake (g/bird)

A good fluctuation was observed in feed intake in every week among different groups. On the whole experiment average

total feed intake of experimental birds T₁ group was significantly ($P < 0.05$) followed by T₃ (3352.69±1.31g), T₄ (3333.25±5.65g), T₂ (3332.76±3.44 g) and T₅ (3251.05±2.54 g), respectively. It has shown that there is adverse effect of smell and/or taste of dried rumen digesta on the palatability of feed in the diets of broilers. The statistical analysis revealed that differences in total feed consumption due to different treatments were highly significant ($P < 0.05$). The results of present experiment are in agreement with different workers who has that reported that dried rumen digesta in the broiler's diets had a significant positive effect on feed consumption [4, 9, 10, 11].

3.2 Body weight gain of birds

Total body weight gain (g), daily body weight gain and weekly body weight gain (g) of experimental birds supplemented with 20 per cent of DRD (T₅) showed significantly ($p < 0.05$) higher values as compared to T₁ (2176.21±2.07g), T₂ (2209.09±7.83g), T₃ (2231.59±2.84g) and T₄ (2258.09±1.20 g), respectively. The results are in agreement with different workers who has that reported that when the broilers supplemented with DRD [13, 12, 11].

3.3 Average feed conversion ratio (FCR)

Experimental birds in T₁ group showed significantly ($p < 0.05$) higher average FCR as compare to T₂, T₃, T₄ and T₅ groups (Table 4). While, treatment group (T₅) was recorded superior feed conversion ratio (1.45) than control (1.60). The results of present study are comparable with [13] who reported 2.79, 2.84, 2.9, 2.95, 3.36 per cent FCR after supplemented by fermented dried bovine blood and rumen digesta at 0, 5, 10, 15 and 20 per cent level, respectively

3.4 Mortality and Survivability rate

The average mortality rate in present experiment higher recorded in T₂ (8.33%) as compared to T₁ (5.00%), T₃ (3.33%), T₄ (6.66%) and T₅ (1.66%), respectively. However, the percentage was within the standard range. Hence, better survivability rate found in T₅ (98.33%) as compared to T₁ (95.00%). The results are consistent with those of [14] and [15] indicated that supplementation of additive decreases the mortality rate in broiler than control group but [16] and [17] who did not observe any positive affect of additive supplementation on mortality rate of broilers.

3.5 Broiler performance index (BPI)

By analysing the calculated values for performance index (Table 4) it can be seen that the best value was recorded in T₅ group supplemented by 20 per cent DRD, while, for chickens in the control (T₁) were lower. BPI is used in many countries of the world as a tool for measuring growing performances to broiler chicken [18, 19]. Therefore, the factors involved in the BPI are BWG, FCR and viability and are considered universal measures for evaluating broilers performance.

4. Conclusion

It can be concluded from the present study that dried rumen digesta have a positive effect on growth performance of broilers. Hence, feeding of above additive in broiler ration may be helpful in better performance. The inclusion of dried rumen digesta as feed ingredient in broiler finisher diets 20 per cent dietary level is recommended since it enhanced production, reduced cost of production and control environmental pollution and hazards accrue from inadequate waste disposal.

Table 1: The compositions of the different ingredients

Sr. No.	Ingredient	CP%
1	Fish Meal	60.3
2	Ground nut cake	40.5
3	Maize	10.2
4	Rice polish	8.2
5	Dried rumen digesta	8.5

Table 2: Composition of the different ingredients in the ration of 100 kg

Sr. No.	Ingredient	Kg/100kgm feed	Total CP (Kg)
1	Fish Meal	16.00	9.648
2	Ground nut cake	16.058	6.503
3	Maize	32.2155	3.286
4	Rice polish	32.7265	2.618
5	Mineral Mixture	2	-
6	Salt	1	-
	Total	100	22.05

Table 3: Nutrient content of the dry rumen digesta.

Sr. No.	Ingredient	Nutritional value
1	Moisture	15.45%
2	Crude fibre	34.10%
3	Crude protein	8.50%
4	ash	14.53%
5	Ether extract	7.55%
6	Nitrogen free extract	35.32%
7	Metabolized energy (Kcal/kg)	1800

Table 4: Effect of dried rumen digesta (DRD) on body weight gain, feed consumption, FCR and mortality rate of broilers.

Weeks	Treatment details				
	T ₁ (0.0% DRD)	T ₂ (5.0% DRD)	T ₃ (10.0% DRD)	T ₄ (15.0% DRD)	T ₅ (20.0% DRD)
DOC weight (g)	40.45±0.19 ^a	40.01±0.48 ^a	39.99±0.62 ^a	39.77±0.53 ^a	40.39±0.28 ^a
Average body weight (g)	2176.21±2.07 ^e	2209.09±7.83 ^d	2231.59±2.84 ^c	2258.09±1.20 ^b	2270.23±1.17 ^a
Final body weight gain (g)	2135.76±1.88	2169.08±7.35	2191.60±2.22	2218.32±0.67	2229.84±0.89
Average daily BW gain (g)	51.81±0.04	52.59±0.18	53.13±0.06	53.76±0.02	54.05±0.02
Average weekly BW (g)	362.70±0.34	368.18±1.30	371.93±0.47	376.34±0.20	378.37±0.19
Average feed intake (g)	3424.08±4.55 ^a	3332.76±3.44 ^c	3352.69±1.31 ^b	3333.25±5.65 ^c	3251.05±2.54 ^d
Feed conversion ratio	1.60 ^d ±0.002	1.53 ^c ±0.005	1.52 ^{bc} ±0.004	1.49 ^b ±0.003	1.45 ^a ±0.001
Mortality (no.)	3/60	05/60	02/60	04/60	01/60
Mortality rate (%)	5.00	8.33	3.33	6.66	1.66
Survivability rate (%)	95.00	91.66	96.66	93.33	98.33
Broiler performance index	307.64	315.10	337.79	336.10	366.55

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