

Original Research Article

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Effect of Feeding Safflower Cake with or without Enzymes on Performance of Broiler Chickens

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ABSTRACT

The present study was carried out to evaluate the effect of enzyme supplementation on utilization of Safflower cake safflower cake replacing soybean de-oiled cake and without enzyme on the performance of commercial broiler chicken. Four hundred straight run commercial day-old broiler chicks were equally and randomly distributed into five treatment groups which were subdivided into four replicates containing 20 chicks in each, reared on deep litter. The enzyme-Natuzyme@ 0.035% supplemented groups had non significantly higher body weight in comparison to birds in control groups. The body weight, weight gain, feed intake and feed efficiency in all the treatment groups were comparable with the control group. Better feed efficiency was observed in birds fed 50 % safflower DOC on protein basis with enzyme group. The maximum dressing yield was observed in group fed 25 % safflower DOC on protein basis group T₁. Addition of safflower DOC either at 50 % or 25 % with enzyme was found to be cost effective. Soybean de-oiled cake in broiler diets may be replaced up to 25 % on protein basis by with enzymes for optimum performance in broiler chicken

Keywords

Broilers, Safflower, Enzyme, Performance

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Introduction

Global demand for broiler meat is touching to new heights every day. Though broiler industry is a profitable agro-business increasing cost of feed is a problem faced by the poultry farmers because protein and energy components of poultry diets on tribute

between 80 and 90 % of total value of layer or broiler diet. High protein ingredients are much expensive than low protein ingredients. Among plant protein sources commonly used ingredient in poultry rations is soybean meal. However, soybean seed has anti-nutritional factors such as trypsin inhibitors which need further processing, thus increasing the cost of

feed. Therefore, the focus of scientists has been on utilization of locally available unconventional feedstuffs like safflower cake/sunflower cake by using various feed enzymes. Safflower cake is mostly used as a protein ingredient for animal feeding. Seed and cake of safflower contain high level of non-starch polysaccharides (NSP) and phytic acid which act as anti-nutritional factors (Daffaalla *et al.*, 2015). The exogenous enzymes improved dietary nutrient utilization and digestibility of energy, fat and protein (Adeol and Bed Ford, 2004). The enzymes also lowers feed cost and help in reducing the environmental pollution and thereby minimizing the waste excretion (Sinha *et al.*, 2013). The present experiment was planned to assess the effect of level of safflower cake in diet with and without addition of multienzymes on the performance of broilers.

Materials and Methods

Four hundred Mareks Disease vaccinated day-old broiler straight run commercial chicks were procured from private hatchery. The chicks were equally and randomly distributed into five treatment groups with four replicates having 20 chicks in each replicate. These chicks were reared on deep litter system in pens up to 6 weeks of age and were vaccinated against Ranikhet and Gumboro disease vaccines at 7th and 14th day of age, respectively. Uniform and standard management practices were provided throughout the experimental period i.e. up to 6 weeks of age for all the treatment groups. The dietary treatment groups were: basal diet of soybean DOC without safflower DOC and without enzymes (T₀), diet containing safflower DOC replacing soybean DOC @ 25 % (T₁) and @ 50 % (T₂) on protein basis, diet containing safflower DOC replacing soybean DOC @ 25 % with enzyme (Natuzyme) addition @ 0.035 % (T₃) and @ 50 % with enzyme @ 0.035 & (T₄) on protein basis

groups respectively. Water was provided *ad-lib* to birds of all the treatment groups throughout the experimental period. Pre-starter feed was provided to the broilers up to 7 days, followed by starter and finisher feed in which safflower cake was included by replacing soybean meal from second to third and fourth to sixth weeks of age, respectively. A multiple enzyme preparation, Natuzyme (Bioproton Pvt. Ltd., Sunnybank, Australia) was used as additive.

Birds from each group were weighed individually on day 0 and at weekly intervals. Live body weight gain (g/bird) was recorded in the study. Measured quantity of feed was offered every day and the left over feed was recorded after 24 hrs. The difference between the feed offered and balance feed was worked out to know the actual feed consumed by each group on a particular day. The feed consumption was calculated and expressed as g/bird. On the basis of weekly live weight and weekly feed consumption, the values of FCR of each group were calculated. The feed cost per kg body weight gain in broilers reared under different treatment regimen of the study was calculated based on feed consumption during the 0- 42 day period. The data obtained on various parameters studied during this experimental trial were subjected to statistical analysis (Snedecor and Cochran, 1994).

Results and Discussion

Body weight and weight gain

The highest body weight was observed in group fed diet containing safflower cake replacing soybean DOC @ 25 % on protein basis plus addition of enzyme @ 0.035% (T₃), followed by the diet containing safflower replacing soybean DOC @ 50 % on protein basis with the addition of enzyme @ 0.035% (T₄), while the lowest body weight was noted in group T₂ (Table 1). The results indicated

that there is non-significant difference in all the treatment groups. The diets containing safflower replacing soybean meal @ 25 and 50 % on protein basis (group T₁ and T₂) showed slight growth retardation in broilers that might have been due to presence of more fiber, anti-nutritional factors, phenolic glucosides and bitter taste (Oguz and Oguze, 2007, Malakian *et al.*, 2011). The enzyme supplementation of safflower diets showed slight improvement in live body weights of broilers, which may be due to partial cleavage of non-starch polysaccharides by enzymes, thereby removing anti-nutritive activity by increasing the digestibility of ingredients and availability of nutrient (Alam *et al.*, 2003). These findings are in accordance with the reports of Daffaalla *et al.*, (2015) (Table 2).

Cumulative feed consumption

There were significant differences in cumulative feed consumption among the different treatment groups (Table 1). However, non-significant difference was observed between the safflower dietary (T₃ and T₄) groups, with enzyme supplementation. The birds receiving the control diet had highest cumulative feed consumption which differed significantly from the other groups. The birds fed with safflower diets consumed less feed than control group. However, the present findings are in agreement with Rehman and Malik (1986) who observed that diet containing safflower meal with or without enzyme significantly reduced feed intake. Sawarkar (2000) reported that safflower diet with enzymes could not improve the feed consumption in broilers. The present findings are in contradiction with Lazaro *et al.*, (2003) and Daffaalla *et al.*, (2015), who observed

significant effect of enzyme on feed intake. The possible reason for reduced feed consumption may be that safflower cake has slightly bitter taste and contains more fiber (Oguz and Oguz, 2007).

Feed conversion ratio

There were non-significant differences in FCR among all the treatment groups. Slightly better feed efficiency was shown by T₃ group (25% SFM with enzyme) followed by T₄ and T₁ groups. The present findings are in contradiction to More (1995) and Oguz and Oguz (2007), who observed superior feed efficiency of safflower diet over control group. However, Rehman and Malik (1986) and Malakian *et al.*, (2011) reported significantly reduced feed conversion efficiency in safflower based diet. Daffaalla *et al.*, (2015) reported significantly higher feed conversion ratio (FCR) for chicks fed on diets containing safflower cake with enzyme compared to control group.

Dressing percentage

There were non-significant differences in dressing percentage among all treatment groups. The maximum dressing yield was observed in safflower 25 % on protein basis group T₁ (67.00 ± 0.70%), followed by control group T₀ (66.00 ± 1.52%) and the lowest dressing yield (64.85 ± 0.51 %) was found in group T₄. The present findings are in agreement with Rehman and Malik (1986), Malakian *et al.*, (2011) and Daffaalla *et al.*, (2015) who observed non-significant difference in dressing yield. However, these results are in contradiction to Alam *et al.*, (2003), who observed increased dressing yield by the addition of exogenous enzymes.

Table.1 Ingredient and nutrient composition of experimental diets (% DM basis)

Sr. No.	Ingredients (%)	Prestarter			Starter			Finisher		
		Diet 1	Diet 2	Diet 3	Diet 1	Diet 2	Diet 3	Diet 1	Diet 2	Diet 3
1	Maize, yellow	54.15	53.45	51.65	56.85	55.18	53.63	57.19	58.39	56.64
2	Soybean meal	41.40	30.23	20.26	37.62	28.62	19.92	34.97	24.52	16.32
3	Safflower cake, DOC	0	11.37	22.74	0	10.05	20.1	0	9.25	18.5
4	Veg Oil	0.7	0.8	1.2	1.78	2	2.2	3.8	3.8	4.10
5	Dicalcium phosphate	1.5	1.9	1.9	1.5	1.9	1.9	1.79	1.79	2.19
6	Limestone powder	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
7	Common salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
8	DL-Methionine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9	Vitamin Mixure and feed supplements	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10	Trace Mineral Mixure	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Total	100	100	100	100	100	100	100	100	100
Nutrients										
1	ME, Kcal/kg	3014	3011	3011	3100	3105	3102	3219	3216	3218
	Crude protein,%	23.01	23.03	23.06	22.03	22.07	22.01	20.10	20.12	20.10
2	Calcium, %	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3	Available Phosphorus %	0.56	0.58	0.56	0.56	0.56	0.55	0.56	0.57	0.58
4	L-Lysine,%	1.2	1.1	1.1	1.2	1.1	1.0	1.1	1.0	1.0
5	DL-Meth+Cyst., %	0.76	0.8	0.8	0.78	0.8	0.9	0.77	0.78	0.8

Table.2 Growth performance of broiler chicken fed Safflower DOC based diet with or without enzyme-Natuzyne @ 0.035%

Parameter (0 - 6 Weeks)	Treatment				
	Control- Soybean DOC, basal diet (T ₀)	Safflower DOC replacing soybean DOC @ 25 % (T ₁)	Safflower DOC replacing soybean DOC @ 50% (T ₂)	Safflower DOC replacing soybean DOC @ 25 %+ Enzyme (T ₃)	Safflower DOC replacing soybean DOC @ 50%+ Enzyme (T ₄)
Body weight (g)	1860.0 ± 6.34	1849.0 ± 6.63	1810.75 ± 2.25	1864.50 ± 3.68	1860.25 ± 6.72
Body weight gain (g)	1798.21± 7.86	1798.75± 7.06	1760.5± 7.01	1806.74± 6.49	1816.08± 11.98
Cumulative feed consumption (g)	3722.00 ^c ±26.96	3704.25 ^c ± 21.55	3521.00 ^a ±5.92	3685.75 ^{bc} ±15.20	3614.00 ^b ±44.10
Cumulative feed efficiency	2.06 ± 0.05	2.05 ± 0.03	2.00 ± 0.1	2.04 ± 0.06	1.99 ± 0.02
Dressing percentage	66.00 ±1.52	67.00 ± 0.70	65.66 ± 1.20	65.82 ± 1.52	64.85 ± 0.51

Means bearing common superscripts do not differ significantly (P<0.05).

Economics

Safflower DOC @ 50 % with enzyme and safflower DOC @ 25 % with enzyme groups have given good returns as compared to other experimental groups. profit per kg live body weight of broilers was observed in T₄ group (Rs. 13.93) in which soybean DOC was replaced by safflower cake @ 50 % on protein basis plus addition of enzyme @ 0.035 %, followed by group T₃ (Rs. 13.78) in which soybean DOC was replaced by safflower cake @ 25 % on protein basis plus addition of enzyme @ 0.035 %, while the lowest profit was obtained in control group T₀ (Rs. 9.94).

In conclusions, addition of safflower DOC either at 50 % or 25 % with enzyme was found to be cost effective. Soybean de-oiled cake in broiler diets may be replaced up to 25

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