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## Utilization of toor dal (*Cajanus cajan*) waste with or without enzyme in broiler chicken diet

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### Abstract

Five hundred day old broiler straight run chicks of “Vencobb400Y” strain were procured from private hatchery. The chicks were equally and randomly distributed in to five treatment groups. Each treatment groups were further divided in to four replicates with twenty five chicks in each replicate. The dietary treatment groups were basal diet without toor dal waste and without enzymes (T<sub>0</sub>), diet containing ration containing 10% Toor dal waste without enzyme (T<sub>1</sub>), diet containing 15% Toor dal waste without enzyme (T<sub>2</sub>), diet containing 10% Toor dal waste with enzyme addition @ 0.035 per cent (T<sub>3</sub>) and diet containing 15% Toor dal waste with enzyme @ 0.035 per cent (T<sub>4</sub>) groups, respectively. The birds fed 10% Toor dal waste with enzyme group had shown significantly higher body weights than the control and other feeding groups. The feed consumption improved and feed efficiency found to be similar in birds fed with 10% Toor dal waste with enzyme. Toor dal waste with enzyme fed birds found economically beneficial.

**Keywords:** Broiler, toor dal waste, enzyme, performance

### Introduction

In poultry rearing 65-70% of the recurring expenditure accounts for feed alone. Recently, some studies have shown that the cost due to feeding has increased by 80 per cent. This is mainly due to increase in the cost of feed ingredients, especially the conventional ones like cereal grains (maize, sorghum, wheat and millet), oil seed cakes (groundnut cake and soybean meal) and fish meal. The major energy ingredient used is maize. But, ever increasing price and meager availability of maize necessitates exploring the newer feed resources<sup>[1, 2]</sup>. Maize and soybean meal are the choicest feed ingredients which are extensively used as a sources of energy and vegetable protein respectively. The cost of this feed ingredient is steeply increasing. It is therefore essential to provide alternative source for each of these ingredients<sup>[3, 4]</sup>.

Pigeon pea (*Cajanus cajan*) seeds are currently considered as a non-conventional feedstuff in poultry feeding and as a valuable protein feed resource<sup>[5, 6]</sup>. Pigeon pea occupies 22 per cent of the total pulse production in India and ranks second in both area and production, next only to Chickpea. When pigeon pea seed is processed to make dal its recovery ranges between 65 and 75%. The remainder by-product consists of 3-8% broken cotyledons, 15% powder, and 10% husk. The powder and broken cotyledons are valuable sources of protein for cattle and poultry<sup>[7]</sup>. Chemical analysis indicates that toor dal waste has a wide range in crude protein and crude fibre which varies with varieties. The C.P content in toor dal waste ranged from 17-19% and C.F% ranges from 15 to 22; fat range from 3 to 4% and ME ranges from 2500 to 2600 kcal/kg. Toor dal waste contains certain level of non-starch polysaccharides (NSP). The exogenous enzymes improved dietary nutrient utilization and digestibility of energy, fat and protein<sup>[8]</sup>. With this view a study was undertaken to assess the utilization of toor dal (Pigeon pea) waste with or without enzyme supplementation in commercial broiler diet

### Materials and Methods

The research was conducted at poultry Research Center, Department of Poultry Science, PGIVAS, Akola. Five hundred Marek Disease vaccinated day old broiler straightrun chicks of “Vencobb400Y” strain were procured from private hatchery. The chicks were equally and randomly distributed in to five treatment groups. Each treatment groups were further divided in to four replicates with twenty five chicks in each replicate. These chicks were reared on deep litter system in pens up to 6 weeks of age.

The dietary treatment groups were basal diet without toor dal waste and without enzymes (T<sub>0</sub>), diet containing ration containing 10% Toor dal waste without enzyme (T<sub>1</sub>), diet containing 15% Toor dal waste without enzyme (T<sub>2</sub>), diet containing 10% Toor dal waste with enzyme addition @ 0.035 per cent(T<sub>3</sub>) and diet containing 15% Toor dal waste with enzyme @ 0.035 per cent (T<sub>4</sub>) groups, respectively. The feed was provided as per treatment (Table 1) and water was provided ad-lib to all the treatment groups throughout the experimental period. The broiler pre starter feed was provided up to seven days, later on broiler starter and broiler finisher feed were provided from second to third and fourth to six weeks of age, respectively. A multiple enzyme preparation, Natuzyme (Bioproton Pty Ltd., Sunnybank, Australia) is a powder form composed of xylanase (10,000,000 unit/kg), cellulase (5,000,000 unit/kg),  $\beta$ -glucanase (1,000,000 unit/kg), pectinase (140,000 unit/kg) from *Trichoderma reesei* and *Trichoderma longibrachiatum*. It also contains protease (6,000,000 unit/kg) and phytase (500,000 unit/kg) from *Aspergillus niger*, and  $\alpha$ -amylase (1,800,000 unit/kg) from *Bacillus subtilis*.

The chicks were vaccinated against Ranikhet and Gumboro disease vaccines at 7<sup>th</sup> and 14<sup>th</sup> days of age respectively. Uniform and standard managerial practices were provided throughout the experimental period i.e. up to six weeks of age for all the treatment groups. The broiler birds in all the treatment groups were subjected on full feeding programme. Birds from each group were weighed individually on day 0 and at weekly intervals. Mean live body weight gain (g/ b) was computed at different growth phases of 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 balanced 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/b. On the basis of weekly live weights 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 present study was calculated based on feed consumption during the 0-42 day's period. The data obtained on various parameters studied during this experimental trial were subjected to statistical analysis as described by (Snedecor and Cochran, 1994) [9]

## Results and Discussion

The result reveal in this experiment that the birds fed 10% Toor dal waste with enzyme i.e. T<sub>3</sub> group had shown significantly higher body weights than the control and other feeding groups. Whereas, significantly lowest body weight was observed in 15% Toor dal waste without enzyme i.e.T<sub>2</sub>, group. However, nonsignificant of body weight was observed

in 10% toor dal waste with control group. Reduced body weight and body weight gain with toor dal was also found Ahmad *et al.* (2006) [10], Saeed and Khadiga (2007) [11], Similarly, Igene *et al.* (2012) [12] and Akintunde *et al.* (2013) [13] reported that the body weight and weight gain decrease significantly with increasing levels of Pigeon pea meal(toor dal waste). This might be due to the presence of anti-nutritional factors (ANF) such as protease inhibitors (trypsin and chymotrypsin inhibitors), lectins, tannins and non-starch polysaccharides (NSP) [14, 15]. However, supplementation of enzyme in toor dal waste diet gave higher body weight and weight gain. This might be due to enzyme reduces activity of ANFs or reduces the intestinal viscosity and the nutrient encapsulating effect of cell wall which in turn could result in increase in protein, starch and energy, utilization in birds [16]. Similar results matching with raja *et al.* (2009) [17]; Anuradha and Roy (2015) [18] and Aswar *et al.* (2018) [3] who found beneficial performance when added enzyme in fiber containing diets.

The cumulative feed consumption in 10% Toor dal waste (T<sub>3</sub>) with multi enzyme supplementation showed significant improved cumulative feed consumption among all other dietary treatments. Similar finding observed by Mukhtar *et al.* (2013) [19] and Ahmad *et al.* (2006) [10]. The present results are not agreement with Khadiga Abbas *et al.* (2009) [20] who found feed consumption was similar to that of maize based diet replaced by different processed pigeon pea seeds on broilers performance, diets containing 10% soaked pigeon pea seeds, decorticated with added enzyme, decorticated roasted. Similarly, Igene *et al.*, (2012) [12] and Inorgyer *et al.* (2009) [21] found that there were no significant difference among the Pigeon pea diets. Also Abudabos (2010) [22] who found the addition of enzyme in broiler diet had same effect as other of basal diet.

Non significant difference was observed in cumulative feed efficiency in all the treatment groups. Similar finding reported by Khadiga Abbas *et al.* (2009) [20] when fed 10% soaked pigeon pea decorticated with added enzymes and decorticated roasted pigeon pea fortified in broiler ration. Also, Akintunde *et al.* (2013) [13] found non significant feed efficiency in enzyme supplemented pigeon pea based diet.

Toor dal waste @ 10 per cent with enzyme and Toor dal waste @ 15 per cent with enzyme groups have given good return as compare to other experimental groups. Overall the economics of broilers production, the highest profit per kg live body weight of broilers was observed in T<sub>3</sub> group (7.81) in which Toor dal waste @ 10 per cent with enzyme, followed by group T<sub>4</sub> i.e. (6.78) in which Toor dal waste @ 15 per cent with enzyme .While lowest profit was obtained in group T<sub>2</sub> i.e. (3.32) Toor dal waste @ 15 per cent without enzyme.

**Table 1:** Per cent composition of experimental diets

Feed Ingredients (kg)	Pre starter			Starter			Finisher		
	Diet 1*	Diet 2	Diet 3	Diet 1	Diet 2	Diet 3	Diet 1	Diet 2	Diet 3
Maize, Yellow	53	42.2	39.20	53.7	43.5	40.5	58	47	44
Toor dal waste	0	10	15	0	10	15	0	10	15
Soybean meal, (DOC)	41.35	39.8	38.4	39	37.3	35.9	33.7	31.95	30.55
Edible Oil	2	3.65	3.65	3.55	5	5	4.65	6.41	6.41
Dicalcium phosphate(DCP)	1.4	1.8	1.5	1.5	1.7	1.4	1.45	1.94	1.64
Lime Stone Powder(LSP)	1.5	1.8	1.5	1.5	1.75	1.45	1.5	1.95	1.65
Common Salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
DL-Methionine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Vitamin supplements + Trace minerals*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100	100

\*Vitamin supplements includes (per quintal of feed): Vitamin A, B2, D3, K- 10g, B-care plus -20g,

DOT (coccidiostat) - 50g, Choline chloride - 50g, Antioxidant - 5g, L-lysine and Trace minerals-115g

**Table 2:** Growth performance of broiler chicken fed with or without enzyme on toor dal waste based diet.

Parameter 0 - 6 Weeks	Treatment				
	Control	10% Toor dal waste	15% Toor dal waste	10% Toor dal waste+ Enzyme	15% Toor dal waste+ Enzyme
Initial body weight(g)	49.70 ± 0.19	49.16 ± 0.17	49.85 ± 0.51	49.81 ± 0.55	49.78 ± 0.25
Final Body weight (g)	1853.26 <sup>bc</sup> ± 9.16	1831.65 <sup>ab</sup> ± 13.33	1809.67 <sup>a</sup> ± 7.50	1921.46 <sup>d</sup> ± 17.12	1885.69 <sup>cd</sup> ± 12.63
Cumulative feed consumption	3878.50 <sup>b</sup> ± 25.93	3904.50 <sup>b</sup> ± 4.59	3903.75 <sup>b</sup> ± 79.23	3821.75 <sup>a</sup> ± 14.71	3857.50 <sup>ab</sup> ± 9.63
Cumulative feed efficiency	2.12 ± 0.01	2.19 ± 0.1	2.21 ± 0.03	2.04 ± 0.02	2.10 ± 0.01

Means bearing common superscripts doesn't differ significantly P<0.05

## Conclusions

From the present study it may be concluded that Addition of 10% Toor dal waste with enzyme in broiler diet could be used for the optimum performance in broiler chickens

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