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Effect of feeding fermented guar meal *vis-à-vis* toasted guar meal with or without enzyme supplementation on carcass traits of broiler quails

O. P. Dinani*, Pramod K. Tyagi,A.B.Mandal,Praveen Kumar Tyagi And Sudhir Kumar Jaiswal
Central Avian Research Institute, Izatnagar, Bareilly, U.P. 243122
***E-mail:** dr_dinani@rediffmail.com

ABSTRACT
A five weeks (0 to 5 weeks of age) feeding trial was conducted as per CRD design involving six dietary inclusion levels (0, 7.5 and 15%) of toasted guar meal (TGM) with or without enzyme and two levels of (7.5 and 15.0%) fermented toasted guar meal (FTGM) in a standard broiler quail diet as per NRC (1994). Each dietary treatment was replicated four times having 15 chicks in each replication. The study envisaged that incorporation of 7.5% TGM without enzyme supplementation and 15 % TGM with enzyme supplementation or 15% FTGM showed no adverse effect on carcass traits. Dressing and eviscerated percentage were significantly (P<0.05) lower in 15% TGM without enzyme group as compare to control and other dietary groups. Liver, pancreas, small intestine and caeca weight was significantly higher (P<0.05) as the level of TGM without enzyme increased in the diets due to presence of gum (galactomannon) in guar meal.
Key words: Broiler quail diet, carcass traits, fermented toasted guar meal,feeding

INTRODUCTION

Guar meal (GM) is the by product of guar seed which is obtained after the mechanical separation of endosperm from both hull and germ of guar seed. The crude protein contents of germ, hull and endosperm (gum) are 45, 35, 5-6% and they contribute 44, 21, 29-35% of the guar bean respectively [1].These fractions contain residual gum in different concentrations. Guar gum is a highly viscous galactomannan polysaccharide. Guar gum is composed of 65% mannose and 35% galactose. According to [2], GM contains various antinutritional factors which include gum 6-18%, saponin 9-14%, hydrocyanic acid 5-20 mg /100gm and variable proportion of trypsin inhibitor, haemagglutinin and tannins. Various treatments had been used for alleviation of deleterious factors including heat treatment [3],water and alcohol treatment [4], hot water and acid treatment [5], cooking [6],toasting and steam pelleting [7], enzyme supplementation [8] and solid substrate fermentation using *Aspergillus niger* [9]. Effect of feeding fermented guar meal *vis-à-vis* toasted guar meal with or without enzyme supplementation on carcass traits of broiler quails has been done in this study.

MATERIALS AND METHODS

Experimental design

Biological experiment was undertaken in a completely randomized design (CRD) with day old quail chicks (n = 480) assigned to eight dietary treatments (i.e. one control + 7 test diets) in such a way that each treatment had 4 replicates of 15 quail chicks, each accommodating 60 chicks per treatment. The layout of experimental diets is shown in the table 1.

Experimental diets

Prior to diet formulation, all the ingredients were procured at one time and analyzed for proximate analysis [10], calcium and phosphorus [11] contents. Eight experimental diets were prepared by incorporating TGM at 0, 7.5% and 15% levels (Diet D1, D2, D3); enzyme supplemented TGM at 0, 7.5% and 15% level (Diet D4, D5, D6) and fermented TGM at 7.5 % and 15% levels (Diet D7 and D8) respectively (Table 1). All diets were kept isocaloric and isonitrogenous in nature while CP was maintained at 24% and ME 2900 kcal /kg of feed in broiler quail diet as per NRC (1994). Optimum conditions for better growth of *Aspergilus niger* on TGM and economic fermentation were found to be

with TGM and water ratio of 50:50 and *Aspergillus niger* spores inoculation at the rate of one lac spores/kg of substrate at 37°C incubation for a period of 60 hrs during the experiment. Ingredients composition of experimental diets (%) has been given in the table no.2.

Table 1: Layout of experimental diets

Experiment diet	Level of guar meal (%)	Treatment
D-1	**0**	**-**
D-2	**7.5**	**-**
D-3	**15**	**-**
D-4	**0**	**Multienzyme**
D-5	**7.5**	**Multienzyme**
D-6	**15**	**Multienzyme**
D-7	**7.5**	**Fermented toasted guar meal (FTGM)**
D-8	**15**	**Fermented toasted guar meal (FTGM)**

Table 2: Ingredients composition of experimental diets (%)

FEED	D1	D2	D3	D4	D5	D6	D7	D8
MAIZE	**59.12**	**57.2**	**55.2**	**59.12**	**57.2**	**55.2**	**60.52**	**61.2**
SBM	**33.5**	**27**	**20.5**	**33.5**	**27**	**20.5**	**24.23**	**15.2**
FISH MEAL	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
TGM	**-**	**7.5**	**15**	**-**	**7.5**	**15**	**-**	**-**
FTGM	**-**	**-**	**-**	**-**	**-**	**-**	**7.5**	**15**
ANI.FAT	**-**	**0.83**	**1.73**	**-**	**0.83**	**1.73**	**0.2**	**0.78**
M.MIX(ISI)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
LIMESTONE	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
DCP	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**
DL-MET.	**0.02**	**0.02**	**0.06**	**0.02**	**0.02**	**0.06**	**0.05**	**0.08**
LYSINE	**-**	**-**	**0.15**	**-**	**-**	**0.15**	**0.14**	**0.28**
SALT	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
TM PREMIX*1	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
VIT.PREMIX*2	**0.15**	**0.15**	**0.15**	**0.15**	**0.15**	**0.15**	**0.15**	**0.25**
B COMPLEX*3	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
CHOLIN CHL.	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
TOXIN BINDER	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.02**	**0.02**
MULTIENZYME	**0**	**0**	**0**	**0.05**	**0.05**	**0.05**	**0**	**0**

TM.PREMIX*1(10g/100Kg):FeSO4.7H2O=8g;ZnSO4.7H2O=10g;MnSO4.H2O=10g;CuSO4.5H2O=1g;KI=30 mg.VIT PREMIX*2(A,B2D3K) each gram contains:VitA-82500 IU;Vit B2-50mg;VIT.D3-12000 IU and Vit.K-10 mg.B Complex*3 each gram contains;Vit B1=8 mg;Vit.B 6=16 mg;Vit. B12=12 mg;Niacin=120 mg;Cal.Pantothenate=80mg;Vit E50%=160mg;L-Lysine=10 mg and DL-Methionine=10mg Multienzyme@ 50gm/100Kg of feed(.05%) contains= alpha amylase 7×10^5,protease 3×10^6,cellulase 6×10^6,beta glucanase 7×10^5,pectinase 7×10^4,phytase 4×10^5 and xylanase10×10^6 and lipase 5×10^3 units per kg.

Carcass characteristics

On 35th day of age, two birds from each replicate per dietary treatment were randomly selected and allowed to 12 hours fasting. The birds were then weighed and sacrificed by a standard procedure for evaluating carcass characteristics in terms of dressed weight, eviscerated weight, debleeded weight and weight of different organ like liver, spleen, bursa, gizzard, heart *etc.* were recorded immediately and calculated in percentage.

RESULTS AND DISCUSSION

Results of carcass traits, organ weight parameters and intestinal parameter have been presented in the table no. 3,4 and 5 respectively.

Carcass traits

Dressing and eviscerated percentage were significantly ($P<0.05$) lower in 15% TGM without enzyme group as compared to control and other dietary treatment groups. Blood loss percentage did not differ significantly ($P>0.05$) between different groups. Liver weight was significantly higher ($P<0.05$) in 15% TGM with or without enzyme supplemented groups as compared to control and other dietary treatments while, pancreas weight was significantly higher ($P<0.05$) in 15% TGM without enzyme supplemented

group as compared to control and other groups. However, other organ weights *viz.* gizzard, heart, spleen and bursa of fabricious did not differ significantly (P>0.05) between different dietary treatments. Weight and length of small intestine and caeca was significantly (P<0.05) higher in 15% TGM without enzyme group as compared to other groups. TGM at 0 and 7.5% level with or without enzyme supplement did not differ significantly (P>0.05). Weight and length of intestine and caeca in 7.5% FTGM (Fermented toasted guar meal) group was significantly (P<0.05) lower than 15% FTGM group. As level of TGM increased above 7.5% with or without enzyme supplementation or FTGM weight and length of intestine and caeca were increased.

The present results are in accordance with the findings of [12] who reported significantly (P<0.05) lower dressed and eviscerated yield due to 15% guar meal in broiler diet. [13] reported that chickens fed 2.5% guar gum had similar measures of carcass weight as compared to control group. [8] Reported that inclusion level of TGM up to 10% in broiler quail ration with or without enzyme did not significantly (P<0.05) effect the dressed and eviscerated weight. Our results are in line with [14] reported that addition of soluble NSP in broiler diets significantly increased caeca fermentation which might be the possible reason of increased weight and length of different segment of GIT. Similar results had also been reported by [8] that TGM at 7.5% and 10% without enzyme supplement showed higher weight and length of caeca.

Table 3: Effect of different levels of FTGM and TGM with or without enzymes on carcass traits in quails

Group	TGM (%)	Treatment	Blood loss (%)	Dressing percentage (%)	Eviscerated Percentage (%)
D-1	0	—	4.70 ±0.32	82.03^{b}±0.65	70.27^{b} ±0.37
D-2	7.5	—	4.69±0.28	81.95^{ab}±0.64	69.95^{ab}±0.38
D-3	15	—	4.42 ±0.26	80.01^{a}±0.69	68.84^{a}±0.39
D-4	0	Multienzyme	4.65±0.29	81.91^{b}±0.58	70.38^{b}±0.32
D-5	7.5	Multienzyme	4.52±0.31	81.55^{ab}±0.72	69.60^{ab}±0.43
D-6	15	Multienzyme	4.45±0.28	81.46^{ab}±1.07	69.79^{ab}±0.51
D-7	7.5	(FTGM)	4.45±0.24	81.59^{ab}±0.67	70.08^{ab}±0.47
D-8	15	(FTGM)	4.46±0.27	81.11^{ab}±0.62	69.77^{ab}±0.43

Means bearing different superscripts in a column differ significantly (P <0.05)

Table 4: Effect of different levels of FTGM and TGM with or without enzymes on different organ weight in quails

Group	TGM (%)	Treatment	Liver weight (%)	Pancreas weight (%)	Gizzard weight (%)	Spleen weight (%)	Bursa of fabricious (%)	Heart weight (%)
D-1	0	—	1.81^{a}±0.00	0.23^{a}±0.01	1.95±0.06	0.078±0.00	0.18±0.00	0.97±0.00
D-2	7.5	—	1.83^{ab}±0.06	0.35^{ab}±0.07	1.95±0.06	0.082±0.00	0.18±0.01	1.02±0.01
D-3	15	—	2.05^{c}±0.07	0.43^{c}±0.05	1.95±0.06	0.080±0.00	0.19±0.02	1.01±0.02
D-4	0	Multienzyme	1.80^{a}±0.02	0.24^{a}±0.02	1.94±0.06	0.083±0.01	0.19±0.01	1.02±0.02
D-5	7.5	Multienzyme	1.81^{a}±0.00	0.34^{ab}±0.01	1.94±0.06	0.079±0.02	0.19±0.01	1.02±0.01
D-6	15	Multienzyme	1.95^{bc}±0.05	0.37^{ab}±0.03	1.96±0.06	0.080±0.00	0.18±0.01	1.01±0.01
D-7	7.5	(FTGM)	1.80^{a}±0.02	0.28^{a}±0.08	1.96±0.01	0.083±0.01	0.18±0.00	1.00±0.02
D-8	15	(FTGM)	1.80^{a}±0.05	0.30^{ab}±0.07	1.97±0.01	0.084±0.00	0.20±0.00	1.01±0.01

Means bearing different superscripts in a column differ significantly (P <0.05)

Table 5: Effect of different levels of FTGM and TGM with or without enzymes on weight and length of small intestine and caeca in quails

Group	TGM (%)	Treatment	Small intestine length (cm % live wt.)	Small intestine weight (% live wt.)	Ceca length (cm % live wt.	Ceca weight (% live wt.)
D-1	0	—	33.81^{ab}±0.15	1.90^{a}±0.01	5.51^{a}±0.05	0.71^{a}±0.01
D-2	7.5	—	34.61^{bc}±0.13	2.17^{c}±0.01	5.71^{ab}±0.04	0.80^{b}±0.01
D-3	15	—	37.15^{e}±0.08	2.27^{c}±0.01	6.28^{c}±0.04	0.91^{c}±0.02
D-4	0	Multienzyme	33.43^{a}±0.16	1.89^{a}±0.02	5.50^{a}±0.01	0.70^{a}±0.01
D-5	7.5	Multienzyme	34.07^{ab}±0.18	1.92^{a}±0.02	5.98^{b}±0.06	0.81^{b}±0.03
D-6	15	Multienzyme	36.07d±0.81	2.24c±0.01	5.98b±0.07	0.83b±0.04
D-7	7.5	(FTGM)	34.20^{ab}±0.17	2.06^{b}±0.03	5.70^{ab}±0.15	0.72^{a}±0.03
D-8	15	(FTGM)	35.28^{cd}±0.06	2.21^{c}±0.01	5.92^{b}±0.19	0.80^{b}±0.01

Means bearing different superscripts in a column differ significantly (P <0.05)

CONCLUSION

Toasted guar meal (TGM) 15% without enzyme leads to decreased dressed and eviscerated weight; increased liver and pancreas weight; increased weight and length of intestine and caeca. Thus, it is concluded that toasted guar meal (TGM) is potential alternate and economical protein source at the inclusion level of 7.5% TGM without enzyme supplementation or 15% TGM with enzyme supplementation or 15% fermented TGM has no adverse affect on carcass traits.

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