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Ground *Prosopis juliflora* Pods as Feed Ingredient in Poultry Diet: Effects on Growth and Carcass Characteristics of Broilers

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Abstract: Three hundred and ninety six Hubbard Classic commercial day old chicks were used to determine the performance of broilers fed ration containing ground *Prosopis juliflora* pods (GPJP) at inclusion levels of 0 (T1), 10 (T2), 20 (T3) and 30% (T4) of the total ration. The experiment was arranged in a completely randomized design with four treatments and three replications with 33 birds per replicate. Birds were weighed in group every 7 days to determine Average Daily Gain (ADG). Feed offered and refusals were recorded every day and Feed Intake (FI) was calculated as the difference between the two. Data on ADG, FI and Feed Conversion Ratio (FCR) were analyzed for starter (1-21 days) and finisher (22-45 days) phases separately as well as for the entire experiment period (45 days). At the end of the experiment, four randomly selected birds from each replicate were slaughtered and dressed to determine carcass characteristics. Feed Intake (FI) during finisher phase [3386, 3340, 3336 and 3280 g (SEM = 29.54)] and the entire experiment period [4369, 4321, 4313 and 4248 (SEM = 27.41)], final live weight at the end of starter, finisher and the entire experiment period, ADG [40.8, 41.2, 39.9 and 36.4 (SEM = 1.41)] for T1, T2, T3 and T4, respectively and FCR for the entire experiment period were significantly lower ($p<0.05$) in T4 than T1 and T2. Among carcass traits, drum stick weight was significantly lower ($p<0.05$) in T4 than T1 and T2, but esophagus and crop weight were higher ($p<0.05$) in T4 than other treatments. Ration consisting 20% GPJP resulted to the lowest feed cost per weight gain (10.58, 10.67, 10.53 and 10.60 for T1, T2, T3 and T4, respectively). The results of this study indicated that 30% GPJP inclusion negatively affected feed intake and growth and inclusion of GPJP at 10 and 20% level reduced feed cost without negative effect on biological performance as compared to the control. Therefore, about 20% of conventional broilers diet can be substituted by GPJP to reduce feed cost.

Key words: *Prosopis juliflora* pod, broilers, growth, carcass characteristics

INTRODUCTION

The average intake of animal protein in developing countries is as low as 15 g per person per day, compared with almost the 60 g in developed countries (FAO, 2011). Consequently, efforts were geared towards increasing animal production, especially of poultry as a way to meet the critical animal protein need of the Africa's growing human population (Gueye, 2000). Although success have been recorded in many countries in this regard, the per capita egg and chicken meat consumption in Ethiopia remains low (ILRI, 2000; Halima *et al*., 2009). Poultry production in Ethiopia is constrained by many factors, of which inadequate supply of feed because of the scarcity of conventional feed ingredients is a major one (El Boushy and Van Der Poel, 2000). Therefore, any attempt to improve commercial poultry production and increase its efficiency needs to focus on the use of locally available new ingredients (Kamalzadeh *et al*., 2008) that can reduce the competition that exists between human and poultry for conventional ingredients and reduce feed cost. As a result, there is a worldwide interest in the search for new plant species capable of supplementing traditional poultry dietary ingredients (Jurgen *et al*., 1998). This requires evaluation of the new feed and determination of optimum level of inclusion in diet formulation to achieve acceptable level of animal performance without jeopardizing animal wellbeing. In this context, ground *Prosopis juliflora* pod (GPJP) has been considered as one of the potential feed ingredient in poultry ration formulation.

In Ethiopia, *Prosopis juliflora* is considered as an invasive weed (Sertse and Pasiecznik, 2005), which is rapidly invading the traditional agro-and silvo-pastoral land making the rangelands inaccessible to livestock. Eradication of the plant by cutting as well as burning has proven to be difficult and its exploitation as a resource was proposed as an approach to reduce its invasiveness (Pasiecznik, 2002). Accordingly, the use of the pod with the seed after grounding as animal feed was designed as one of the strategy to reduce its propagation. *Prosopis juliflora* pods have been used in

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livestock as well as poultry diets and produced encouraging results. For example, Zein Elabdin and Mukhtar (2011) reported that soaked *Prosopis juliflora* seed flour replaced 50% of sesame meal in broiler diets without negative effect on performance. AL-Beitawi *et al.* (2010) noted heavier body weight, faster growth and better feed conversion efficiency in broilers fed ration containing 20% GPJP as a substitute for corn without causing significant change on dressing percentage and carcass cut. Furthermore, replacing maize up to 20% with GPJP (Choudhary *et al.*, 2005) and inclusion at a rate of 10% of GPJP in the ration (Vanker *et al.*, 1998) resulted in no adverse effects on performance of broilers. *Prosopis juliflora* bears its pods during the driest months of the year making it possible to use its pods in animal ration when availability of other ingredients is scarce. However, information on the use of GPJP in broilers ration in general is limited and is non-existent in Ethiopia to convince feed manufacturers and farmers to use it. Therefore, this study was conducted with the objective of evaluating the effect of graded levels of GPJP inclusion in broilers ration on performance and carcass characteristics.

MATERIALS AND METHODS

Experimental rations and treatments: The study was conducted at Haramaya University Poultry Farm, Ethiopia located at 42° 3` E longitude, 9° 26`N latitude and at an altitude of 1980 meter above sea level. The mean annual rainfall of the area is 780 mm and the average minimum and maximum temperatures are 8 and 24°C, respectively (Samuel, 2008). Dietary ingredients used for this study were GPJP, corn, wheat short, soybean meal, noug seed cake, methionine, salt, vitamin premix, limestone and dicalcium phosphate (Table 2). Except wheat short, vitamin premix, dicalcium phosphate, methionine and soybean meal, the rest ingredients were ground to pass 5 mm sieve at the University feed mill before mixing to formulate the ration. *Prosopis juliflora* pods were hand broken and sun-dried and hammer milled to pass through 5 mm sieve size to produce GPJP. The ground pods were hand sieved and intact seeds and large sized pods that did not pass through the sieve were reground. Representative samples of GPJP, corn, wheat short, soybean meal and noug seed cake were taken for chemical analysis (Table 1). Based on the chemical analysis result, four treatment rations containing GPJP at the level of 0% (T_1), 10% (T_2), 20% (T_3) and 30% (T_4) were formulated. The rations were formulated to be isocaloric and isonitrogenous and to contain about 3060 kcal ME/kg DM and 22% CP and 3100 kcal ME/kg DM and 18% CP to meet the nutrient requirements of broiler during the starter (1-21 days of age) and finisher (22-45 days of age) phases, respectively (Leeson and Summers, 2005).

Management of experimental birds: Three hundred ninety six unsexed day old Hubbard Classic chicks with weight of 45.98±0.553 g (mean±SD) were randomly divided into four dietary treatments and three replications per treatment in a completely randomized design experiment, thus having 33 chicks per replicate or pen. The birds were vaccinated against Marek's disease at hatching by injection. Vaccination for Newcastle disease was given through an eye drop at the age of three days and a booster dose was given at 24 days of age in drinking water. Birds were also vaccinated for Infectious Bursal Disease (Gumboro) through drinking water at seven days of age and a booster at 18 days of age.
Before the commencement of the actual experiment, the experimental pens, watering and feeding troughs were thoroughly cleaned, disinfected and sprayed against external parasites. The chicks were brooded using 250 watt infrared electric bulbs with gradual height adjustment as sources of heat and light in a deep litter house covered with sawdust litter material. Feed was offered *ad libitum* and clean tap water was available all the time throughout the experiment.

Measurements: The experiment lasted 45 days. The amount of feed offered and refused per pen was recorded daily. The amount of feed consumed was determined as the difference between the feed offered and refused. Feed offered and refused per pen were

Table 1: Chemical composition of ingredients used for ration formulation

Parameters	GPJP	Maize	Wheat short	Noug cake	Soybean meal
DM (%)	89.15	90.06	90.06	92.68	90.51
CP (% DM)	15.43	12.01	11.80	26.19	38.10
EE (% DM)	6.01	6.20	6.00	8.91	2.79
CF (% DM)	14.60	2.44	6.71	13.00	12.33
Ash (% DM)	6.13	3.29	5.29	13.46	12.20
Ca (% DM)	0.26				
P (% DM)	0.13				
Mg (% DM)	0.12				
K (% DM)	1.31				
Na (% DM)	0.001				
Beta-carotene (µg/100 g)	82.31				

DM = Dry Matter; CP = Crude Protein; EE = Ether Extract; CF = Crude Fiber; Ca = Calcium; P = Phosphorus; Mg = Magnesium; K = Potassium; Na = Sodium; GPJP = Ground *Prosopis juliflora* pod

Table 2: Composition of ingredients in the experimental rations and chemical composition of the rations containing graded levels of ground *Prosopis juliflora* pod

	Treatments							
	T_1		T_2		T_3		T_4	
Ration composition	Starter	Finisher	Starter	Finisher	Starter	Finisher	Starter	Finisher
Corn grain	29.55	28.25	31.30	37.00	26.00	32.00	25.70	31.00
Wheat short	17.55	22.75	6.50	5.00	4.50	7.00	0.50	2.25
GPJP	0.00	0.00	10.00	10.00	20.00	20.00	30.00	30.00
Noug Seed Meal	18.95	23.00	24.85	24.00	24.00	17.00	20.78	16.09
Soybean Meal	32.14	23.92	26.14	22.00	24.50	22.00	21.97	19.08
Vitamin premix**	0.35	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Salt	0.48	0.50	0.48	0.50	0.48	0.50	0.48	0.50
Limestone	0.48	0.58	0.48	0.50	0.48	0.50	0.48	0.50
Dicalcium phosphate	0.30	0.50	0.30	0.50	0.30	0.50	0.30	0.50
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Chemical composition								
DM (%)	91.50	91.80	91.40	91.80	91.40	91.00	91.30	91.30
CP (% DM)	22.00	20.00	22.00	20.00	21.70	19.00	21.40	19.00
CF (% DM)	5.00	5.00	5.30	5.90	6.90	6.70	7.20	7.20
EE (% DM)	7.10	6.30	6.90	6.40	7.00	6.50	6.80	6.80
NFE (% DM)	48.60	49.60	48.50	48.40	47.40	48.20	47.50	48.30
Ash (% DM)	8.80	10.90	8.70	11.10	8.40	10.60	8.40	10.00
Ca (% DM)	1.05	0.98	1.01	0.98	1.03	0.95	1.07	1.13
P (% DM)	0.47	0.42	0.43	0.49	0.44	0.43	0.43	0.52
ME (kcal/kg DM)	3097.00	3130.30	3066.70	3112.00	2997.60	3066.40	2968.80	3037.40

GPJP = Ground *Prosopis juliflora* pod; T1 = diet containing 0% GPJP; T2 = diet containing 10% GPJP; T3 = diet containing 20% GPJP; T4 = diet containing 30% GPJP; DM = Dry Matter; CP = Crude Protein; CF = Crude Fiber; EE = Ether Extract; NFE = Nitrogen Free Extract; Ca = Calcium; P = Phosphorus; ME = Metabolisable Energy.

**(Vitamin premix) 50 kg contains, Vit A 1000000iu, Vit D_3 200000iu, Vit E 10000 mg, Vit K_3 225 mg, Vit B_1 125 mg, Vit B_2 500 mg, Vit B_3 1375 mg, Vit B_6 125 mg, Vit B_{12} 1 mg, Vitpp (Niacin) 4000000 mg, Folic acid, 100 mg, Choline chloride 37500 mg, Anti-oxidant (BTHT) 0.05%, Manganese 0.60%, Zinc 0.70%, Iron 0.45%, Copper 0.05%, Sodium 0.01%, Selenium, 0.004%, Calcium 2.7%

sampled daily and pooled per treatment for the entire experimental period for chemical analysis. Birds were weighed every week by a sensitive balance in a group per pen and pen average was calculated. Body weight change was calculated as the difference between the final and initial body weight. Feed conversion ratio was calculated as the proportion of gram feed consumed per gram weight gain. Mortality was registered as it occurred and general health status was monitored throughout the experiment. At the end of the experiment, four randomly selected broilers from each replicate (12 per treatment group) were starved for 16 h, weighed immediately before slaughter and exagguinated, by severing the neck and dressed. Dressed and eviscerated weights were calculated following the method of FAO (2001) as:

Dressed weight = Thighs + Wings + Breast + Ribs + Back + Heart + Liver + Gizzard + Neck + Feet + Head + Viscera (inedible offal)

Eviscerated weight = Dressed weight - Viscera

Dressed and eviscerated percentages were determined following the method of FAO (2001) as:

$$\text{Dressing (\%)} = \frac{\text{Dressed weight}}{\text{Pre-slaughter weight}} \times 100$$

$$\text{Eviscerated (\%)} = \frac{\text{Eviscerated weight}}{\text{Pre-slaughter weight}} \times 100$$

Laboratory analysis: Samples of the ration ingredients and the mixed ration were analyzed for Dry Matter (DM), Crude Protein (CP), Ether Extract (EE), Crude Fiber (CF) and ash following the procedure of AOAC (1995). Calcium and magnesium content were analyzed by atomic absorption spectrophotometer, total phosphorus content by SP75 UV/vis spectrophotometer, sodium and potassium by flame photometer (AOAC, 1995) and beta-carotene by spectrophotometer (AOAC, 1995). Nitrogen Free Extract (NFE) was determined by the difference as 100 - (% moisture + % CP + % EE + % CF + % Ash). Metabolisable Energy (ME) content of the experimental diets was determined by indirect method according to Wiseman (1987) as follows:

ME (Kcal/kg DM) = 3951 + 54.4 EE - 88.7 CF - 40.8 Ash

Statistical analysis: Data were analyzed using the general linear model procedure of SAS software (SAS, 2002) with the model containing treatments. Differences between treatment means were separated using Tukey Test.

Table 3: Feed intake, body weight gain, feed conversion ratio and mortality of broiler fed ration containing graded levels of ground *Prosopis juliflora* pods

	Treatments				
Parameters	T_1	T_2	T_3	T_4	SEM
Feed intake (g)					
Starter (1-21 days)	982.30	980.50	975.80	967.60	13.010
Finisher (22-45 days)	3386.90^{a}	3340.00^{ab}	3336.80^{ab}	3280.40^{b}	29.540
Entire experiment period	4369.30^{a}	4320.50^{ab}	4312.70^{ab}	4248.00^{b}	27.410
Initial live weight (g/bird)					
Starter	46.01	46.01	45.68	46.23	0.553
Final live weight (g/bird)					
Starter	505.00^{ab}	523.60^{a}	465.00^{ab}	427.80^{b}	27.610
Finisher	1883.60^{a}	1900.10^{a}	1843.90^{ab}	1685.80^{b}	63.570
Live weight change (g/bird)					
Starter	459.00^{ab}	477.60^{a}	419.00^{ab}	381.00^{b}	25.610
Finisher	1378.50	1376.40	1379.00	1258.00	62.210
Entire experiment period	1837.60^{a}	1854.10^{a}	1798.20^{ab}	1639.50^{b}	63.550
Average daily gain (g/day)					
Starter	21.80^{ab}	22.70^{a}	19.90^{ab}	18.10^{b}	1.310
Finisher	57.40	57.30	57.40	52.40	2.590
Entire experiment period	40.80^{a}	41.20^{a}	39.90^{ab}	36.40^{b}	1.410
FCR (g feed/g weight gain)					
Starter	2.10^{ab}	2.00^{b}	2.30^{ab}	2.50^{a}	0.150
Finisher	2.40	2.40	2.40	2.60	0.100
Entire experiment period	2.30^{b}	2.30^{b}	2.40^{ab}	2.50^{a}	0.070
Mortality, number	3/33	3/33	2/33	2/33	-

^{a,b}Means within a row with different superscripts differ ($p<0.05$); SEM = Standard Error of the Mean; GPJP = Ground *Prosopis juliflora* pod; T1 = diet containing 0% GPJP; T2 = diet containing 10% GPJP; T3 = diet containing 20% GPJP; T4 = diet containing 30% GPJP; FCR = Feed Conversion Ratio

RESULTS

The chemical composition of GPJP and other feed ingredients used in this study is presented in Table 1. The result shows that crude fiber content of GPJP is higher than all other ingredients. Beta carotene content (82.31 µg/100 g) of GPJP is very high as compared to Golden Whole Kernel and White Shoepeg corn which contain 15.697 and 0.827 µg/100 g, respectively (Scott and Eldridge, 2005).

The ration compositions and nutrient contents of the starter and finisher broiler experimental diets are presented in Table 2. As the inclusion level of GPJP increases, the percentage composition of wheat short decreases indicating that GPJP has similar nutrient content with this ingredient than the rest ingredients used to formulate the rations. The four rations, as planned, are almost isocaloric and isonitrogenous and the calculated crude protein and Metabolisable energy contents for the treatment diets ranged 21.4-22% and 2968.8-3097.0 kcal/kg for the starter, 19-20% and 3037.4-3130.3 kcal/kg for finisher phases. The nutrient contents of the experimental rations including calcium and phosphorous contents were within the recommended values for starter and finisher broiler diets (Leeson and Summers, 2005).

Feed intake, live weight gain, average daily gain, feed conversion ratio and mortality of chicks are presented in Table 3. The highest level of GPJP inclusion (30%) reduced ($p<0.05$) feed intake during the finisher phase and the whole experimental period as compared to T_1, while values for T_2 and T_3 were similar with other treatments. Final live weight at the end of starter phase was lower for T_4 as compared to T_2, while at the end of finisher phase, body weight for T_4 was lower ($p<0.05$) than T_1 and T_2 and value for T_3 was similar with all other treatments. Average Daily Gain (ADG) during the starter phase and the entire experimental period was significantly affected by treatment ($p<0.05$) and followed a similar trend like that of the starter and finisher phase final weight, respectively.

Effects of treatment on feed conversion ratio was also significant ($p<0.05$) both for starter phase and the entire experimental period with similar results like that of ADG. There were no significant differences ($p>0.05$) among treatments in feed intake during starter phase, live weight change, ADG and feed conversion ratio during finisher phase. Graded levels of GPJP inclusion in broilers ration did not significantly impact ($p>0.05$) carcass yield characteristics except for drum stick weight which was heavier in T_2 than T_4 and crop and esophagus weight was greater in T_4 than T_1 (Table 4 and 5). The economics of weight gain determined from ratios of cost of the total feed consumed and the weight gain produced from that amount of feed indicated that the ration containing 20% GPJP is the least cost ration (Table 6).

Table 4: Carcass yield characteristics of broiler fed graded levels of ground *Prosopis juliflora* pod

	Treatments				
Parameters	T_1	T_2	T_3	T_4	SEM
Slaughter weight (g)	1948.00	1950.60	1953.90	1864.00	93.580
Dressed carcass weight (g)	1793.30	1811.80	1810.80	1708.00	86.730
Dressing percentage (%)	92.00	92.90	92.60	91.60	0.600
Eviscerated weight (g)	1406.60	1428.80	1409.50	1340.60	73.210
Eviscerated percentage (%)	72.10	73.20	72.10	71.90	1.000
Breast weight (g)	485.50	484.00	480.00	459.30	42.150
Breast (%)	24.90	24.70	24.50	24.60	1.140
Thigh weight (g)	213.10	221.80	214.10	204.40	13.420
Thigh (%)	10.90	11.30	10.90	10.90	0.420
Drum-stick weight (g)	201.80^{ab}	206.70^{a}	197.40^{ab}	187.40^{b}	6.060
Drum-stick (%)	10.30	10.60	10.10	10.00	0.560
Wing (%)	4.30	4.50	4.40	4.30	0.100
Abdominal fat (%)	0.36	0.37	0.36	0.37	0.017
Heart (%)	0.36	0.37	0.37	0.38	0.045
Liver (%)	2.54	2.51	2.45	2.63	0.167
Gizzard (%)	2.04	2.05	2.12	2.41	0.136
Feather (%)	3.85	3.84	3.80	3.61	0.364
Head (%)	3.37	3.32	3.32	3.39	0.209
Skin (%)	5.37	5.38	5.35	5.36	0.239
Spleen (%)	0.16	0.15	0.16	0.16	0.030
Lung (%)	0.42	0.43	0.45	0.45	0.020
Shank (%)	4.73	4.92	4.94	4.98	0.130
Wing length (cm)	14.55	14.38	14.38	14.22	0.369
Shank length (cm)	14.83	14.77	14.94	14.44	0.250
Keel length (cm)	6.72	7.00	6.77	6.83	0.229

^{a,b}Means within a row with different superscripts differ ($p<0.05$); SEM = standard error of the mean; T1 = diet containing 0% GPJP; T2 = diet containing 10% GPJP; T3 = diet containing 20% GPJP; T4 = diet containing 30% GPJP

Table 5: Gastro intestinal tract weight and length of broiler fed ration containing graded levels of ground *Prosopis juliflora* pod

	Treatments				
Parameters	T_1	T_2	T_3	T_4	SEM
Esophagus and crop weight (g)	12.60^{b}	13.10^{ab}	13.00^{ab}	14.10^{a}	0.450
Proventriculus weight (g)	8.70	8.70	8.80	9.00	0.530
Small intestine weight (g)	56.80	58.20	58.60	59.00	1.540
Caeca weight (g)	7.80	8.10	8.10	8.20	0.490
Cloaca weight (g)	3.50	3.50	3.70	3.60	0.240
Esophagus and crop length (cm)	14.05	13.94	14.00	14.11	0.299
Small intestine length (cm)	179.30	179.50	176.60	181.30	8.090
Caeca length (cm)	20.10	20.50	21.10	21.20	1.220
Cloaca length (cm)	10.50	10.60	10.70	11.30	0.680

^{a,b}Means within a row with different superscripts differ ($p<0.05$); SEM = Standard Error of the Mean; GPJP = Ground *Prosopis juliflora* pod; T1 = diet containing 0% GPJP; T2 = diet containing 10% GPJP; T3 = diet containing 20% GPJP; T4 = diet containing 30% GPJP

Table 6: Cost of feeding ration containing graded levels of ground *Prosopis juliflora* pod

	Treatments			
Parameters	T_1	T_2	T_3	T_4
Total feed intake (kg/bird)	4.36	4.32	4.31	4.24
Feed cost/kg (Birr)	4.60	4.64	4.39	4.24
Total feed cost (Birr)	20.05	20.04	18.92	17.97
Feed cost per weight gain mass	10.58	10.67	10.53	10.60

Birr = Ethiopia's unit of currency; US$1.00 = Birr 17.44; T1 = diet containing 0% GPJP; T2 = diet containing 10% GPJP; T3 = diet containing 20% GPJP; T4 = diet containing 30% GPJP

DISCUSSION

The chemical composition of GPJP (Table 1) such as DM, CP, ash and CF were within the range reported in previous studies (Choge *et al*., 2007; Abedelnoor *et al*., 2009), but EE content was higher in this study. Choge *et al*. (2007) reported the chemical composition of *Prosopis juliflora* pods to be 7.4-18.0% preformed water, 7.1-16.2% CP, 0.4-4.0% EE, 12.3-28.0% CF and 1.4-6.0%

ash. The calcium and phosphorus content of GPJP used in this experiment were lower than the range of value given by Shukla *et al*. (1984), which were 0.3-0.5% for calcium and 0.40-0.44% for phosphorus.

The starter and finisher rations contains about the same values of ME, CP, calcium and phosphorus across the treatments. But, CF content tends to increase as the level of GPJP increased and for T_3 and T_4 the CF level was above the maximum limit 5-6% recommended in broilers ration (Mirnawati *et al*., 2011). Increased fiber in poultry ration is known to hinder protein and energy digestibility and depresses feed intake as well as enzymatic activity that assist in carbohydrate, protein and fat digestion (McDonald *et al*., 2002; Mirnawati *et al*., 2011).

The lower feed intake and growth performance of chicks fed ration containing higher level of GPJP may be attributed to the high fiber content of the diet. The presence of heat labile anti-nutritional factors, such as trypsin inhibitor and hemagglutinin has also been reported in *Prosopis juliflora* (Del Valle *et al*., 1983), which could affect feed intake and consequently growth performance of chicks at high level of GPJP inclusion. Lower average daily gain and poor feed utilization efficiency at higher level of GPJP inclusion observed in the current experiment is in line with the finding of Yusuf *et al*. (2008) and Choudhary *et al*. (2005). At 30% GPJP inclusion, there was moist, sticky droppings and wet litter, which created sanitation problem. This could be due to the presence of insoluble non-starch polysaccharides in *Prosopis juliflora* pods (Bhatt *et al*., 2011). Insoluble non-starch polysaccharides at higher proportion were shown to cause moist and sticky droppings and resulted in wet litter (Pottguter, 2008).

Similar to previous work (Vanker *et al*., 1998), 10 and 20% GPJP inclusion did not have detrimental effect on broiler performance as compared to the control in this study. Improved live body weight and body weight gain in broiler fed diet containing 10 and 20% pods in replacement for maize was noted by previous studies (Choudhary *et al*., 2005; AL-Beitawi *et al*., 2010). In the present experiment, 10 and 20% GPJP inclusion did not improve biological performance as compared to diet without it, except the low feed cost per weight gain. Thus, the advantage of GPJP inclusion in the diet of broilers can be partly due to sparing effect of conventional energy rich diets and in part associated to reduction in cost of the ration thereby improving the profitability of the enterprise.

Carcass yield recorded in the present experiment is within the range reported for Hubbard Classic breed (Abdullah *et al*., 2010; Islam *et al*., 2010). Significant differences were not noticed in dressing percentage, carcass cut and organ weight among the various treatments. In accordance with the current finding, Choudhary *et al*. (2005) and AL-Beitawi *et al*. (2010) did not found significant difference in these parameters between groups fed ration containing *Prosopis juliflora* pods and the control.

Conclusion: Although carcass yield parameters was not negatively affected by inclusion of GPJP up to 30% in the ration of broilers, feed intake and live weight gain was reduced and feed conversion ratio was increased at 30% level. But, inclusion of GPJP at 10 and 20% level reduced feed cost without negative effect on biological performance as compared to the control. Therefore, GPJP can be included in broiler ration up to a maximum of 20% to reduce feed cost.

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