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Effect of Bread Waste Feeding on Growth Performance and Carcass Traits of Crossbred Pigs

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ABSTRACT

The study was conducted at Pig farm of AICRP on Pigs, Livestock farm, Adhartal, College of Veterinary Science & A.H., Jabalpur (M.P.) for a period of three months. A total of 36 Large White Yorkshire crosses (LWY X Desi) were randomly assigned to six different groups and diets were formulated as per ICAR (1998) standard. All the diets were isoproteinous except group-6, which was formulated as per farmers practice. Composition of the diets (Table-1) are as follows; G-1(Control); concentrate mixture-1, G-2; concentrate mixture-2 (75%)+ bread waste (25%), G-3; concentrate mixture-3 (50%) + bread waste (50%), G-4; concentrate mixture-4 (25%) + bread waste (75%), G-5; wheat bran (19.5%) + bread waste (66%) + GNC (10%) + fish meal (3%) + mineral mixture (1%) + common salt (0.5%), G -6; rice bran (50%) + bread waste (50%). At the end of the experiment, the two animals from each group were slaughtered for carcass evaluation. Daily feed intake was significantly ($P<0.05$) varied among the groups. Highest daily feed intake (kg/pig/day) was observed in G3 group (1.647) and lowest value observed in G6 group (1.219). Average daily gain (ADG) were significantly ($P<0.01$) different and highest ADG (kg/pig/day) was observed in group G2 (0.377) and lowest ADG (kg/pig/day) observed in G6 group (0.171). Carcass characteristics were not significantly varied among the experimental groups. Finally, the study concluded that bread waste could be fed to the growing crossbred pigs without affecting performance.

Keywords: Crossbred pigs, bread waste, average daily gain, carcass traits

Pig rearing is one of the most important occupations of rural society, especially the tribal masses of India. The share of pork to the total meat production is about 10% of the total meat production of India (NRC on Pig, 2011). According to FAO records, India's pig population is 10.29 million (Livestock census, 2012) and it constitute 0.97% of world's pig population. Pork (pig meat) is considered as nutritious food due to its high biological value proteins, essential fatty acids, vitamin-B complex and mineral content (Singh *et al.* 2014; Verma *et al.* 2015). Pig industry contributes substantially to the Indian economy. Feeding constitutes the greatest cost (about 70%) in raising pigs and affects the pig's performance and sustainability of the sector. Increasing demand of feed ingredients has led to a constant rise in their price and, even their unavailability (FAO, 2007). In this context the pig producer must look for alternatives to reduce the cost of feeding. Unconventional feed sources like; food waste, leftovers bakery, and tea factory waste, brewery waste, sugar industry waste, dairy industry waste, agriculture wastes of culled potatoes, unmarketable fruits and vegetables can be used pig feeding. The biscuits and bread industry in India comprises of organized and un-organized sectors. Bakery industry in India is the largest of the food industries with an annual turnover of about Rs.3000 crores. India is the second largest producer of biscuits after USA (Anonymous, 2010). Large numbers of bread factories are operated in the urban and peri-urban areas. These factories generate a sizable amount of bread waste during processing and marketing of the bread. Stale bread and bakery crumbs are rich in carbohydrate and thus, they are considered as high-energy feeds. As waste bread has no other definite use, it could be economically used in the pig ration. There is paucity of information regarding use

Table 1. Gross composition (%) of concentrate mixture/diet used in the experiment

Ingredients (%)	Concentrate mixture/diet					
	1	2	3	4	5	6
Maize	45.00	45.00	33.00	15.00	—	—
Wheat Bran	24.00	21.00	30.00	29.00	19.50	—
Rice Bran	—				—	50.00
Rice polish	12.00	11.00	8.00	7.00	—	—
GNC	11.00	15.00	20.00	32.00	10.00	—
Fish meal	6.00	6.00	7.00	15.00	3.00	—
Mineral mixture	1.00	1.00	1.00	1.00	1.00	—
Salt	1.00	1.00	1.00	1.00	0.50	—
Bread waste	—	—	—	—	66.00	50.00
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 2. Effect of bread waste feeding on growth performance and carcass traits of crossbred pigs

Groups	G1	G2	G3	G4	G5	G6
Feed intake and growth performance						
Average daily feed intake (kg/pig/day)	1.613^{a}±0.062	1.636^{a}±0.068	1.647^{a}±0.060	1.392^{ab}±0.049	1.333^{b}±0.059	1.219^{b}±0.081
Average daily gain (kg/pig/day)	0.371^{A}±0.015	0.377^{A}±0.016	0.375^{A}±0.014	0.273^{B}±0.010	0.271^{B}±0.012	0.171^{C}±0.012
Feed conversion ratio (FCR)	4.36^{A}±0.03	4.35^{A}±0.01	4.41^{A}±0.02	5.12^{B}±0.01	4.93^{C}±0.03	7.13^{D}±0.07
Carcass traits						
Fasting weight (kg)	67.40±5.00	66.17±5.93	65.45±8.05	59.20±6.00	63.61±9.11	56.75±5.35
Hot carcass weight (kg)	45.59±3.08	44.10±4.59	44.02±4.86	39.77±5.09	41.33±5.64	39.08±3.91
Dressing per cent	67.68±0.45	66.55±0.97	67.72±0.36	66.88±0.36	65.04±0.45	68.83±0.41
Carcass length (cm)	65.72±3.51	66.45±2.20	63.41±3.16	57.49±6.04	63.88±4.00	53.89±3.65
Back fat thickness (mm)						
First ribs	46.50±2.50	47.50±5.50	48.50±7.50	41.00±1.00	41.00±2.00	41.50±0.50
Last ribs	28.00±1.00	28.00±3.00	28.50±4.50	23.00±1.00	25.00±1.00	22.50±0.50
Last lumber	23.00±2.00	21.50±2.50	19.00±2.00	15.00±0.00	16.00±1.00	15.50±0.50

Means bearing different superscripts within same row differ significantly (^{ab}, P<0.05, ^{ABCD}, P<0.01)

of bread waste in the diet of crossbred pigs. Hence, the present study was designed to evaluate the effect of bread waste feeding on growth performance and carcass traits of crossbred pigs.

MATERIALS AND METHODS

The study was conducted at Pig farm of All India Coordinated Research Project (AICRP) on Pigs,

Livestock farm, Adhartal, College of Veterinary Science and A.H., Jabalpur (M.P.) for a period of three months. A total of 36 Large White Yorkshire crosses (LWY X Desi) were randomly assigned to six different groups, with six animals in each group. The pre-experimental period of 15 days was allowed to get the experimental animals adjusted before actual start of experiment. Diets were formulated as per ICAR (1998) standard.

All the diets were iso-proteinous except group-6. Diets were formulated (Table-1) with CP 16% except group-6, which was formulated as per farmers practice. Composition of the diets (table-1) are as follows; G-1(Control); concentrate mixture-1, G-2; concentrate mixture-2 (75%) + bread waste (25%), G-3; concentrate mixture-3 (50%) + bread waste (50%), G-4; concentrate mixture-4 (25%) + bread waste (75%), G-5; wheat bran (19.5%) + bread waste (66%) + GNC (10%) + fish meal (3%) + mineral mixture (1%) + common salt (0.5%), G -6; rice bran (50%) + bread waste (50%). Body weight of all animals was recorded fortnightly basis in the morning before feeding with use of platform type electronic weighing balance. At the end of the experiment, the two animals from each group were slaughtered for carcass evaluation. Proper fasting one day prior to slaughter was done. The weight before slaughter and ante-mortem examinations was carried out. The fallowing measurements were taken after slaughter of the animals. Carcass traits like dressing percentage, carcass length, backfat thickness were measured. Data were analysed, using ANOVA described by Snedcor and Cochran (1994). Means showing significant differences in the ANOVA table were compared using the Duncan Multiple Range Test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Daily feed intake was evaluated indicated table 2. Overall daily feed intake was significantly ($P<0.05$) varied among the groups. Highest daily feed intake (kg/pig/day) was observed in G3 group (1.647) and lowest value observed in G6 group (1.219). Feed intake was lowest in the G6 group which might be due to the low palatability and protein deficient diet. It was also observed in the present study that as the inclusion of bread waste in the diet increases above 50 percent level, the feed intake starts declining. In G5 group, 66% bread waste was included in the diet and significantly ($P<0.05$) lower feed intake was observed in G5 group in comparison to the G1, G2 and G3 groups. Higher feed intake was observed in G5 group (1.333) in comparison to the G6 group (1.219), however difference was non-significant.

The result of the present study was similar as reported (Kwak and Kang 2005) and found that supplementing a corn-soy diet with food waste mixture (50%) significantly ($P<0.05$) increased feed DM intake. In contrast to the present study, Paola *et al.* (2008) reported that the voluntary feed intake of sows supplemented with bakery waste was 10% lower than that of the control group, although, productive performances of the bakery waste supplemented groups were not different from those of the control group. In the present study mild form of constipation was found in the G4 and G5 groups, where more than 50 percent bread waste was included in the diet. As bread waste contains less fibre (Omole *et al*. 2011) which may cause constipation and the animals are maintained in confinement, where pigs did not have any access to other sources of fibre.

Average daily gain (ADG) of crossbred growing pigs was presented in Table 2. Statistical analysis of the parameter revealed that they were significantly ($P<0.01$) different. Highest ADG (kg/pig/day) was observed in group G2 (0.377) and lowest ADG (kg/pig/day) observed in G6 group (0.171). Initial average body weights (kg/pig) of the experimental groups were almost similar and ranges from 23.73 to 25.62. At the end of the experiment lowest average body weights (kg/pig) was found in the G6 group (40.02) and highest in the G1 group (58.83). As the diet of the G6 group were deficient in protein content and subsequently the intakes were also lower in the G6 group. Besides this, the diet of the G6 group was not balanced unlike other groups. In agreement with the present findings, Sirtori *et al.* (2007) reported higher average daily gain in the bread waste supplemented groups when the ration was in accordance with the standard. However, Iwamoto (2005) reported significantly lower average daily gain in the breadcrumbs supplemented group.

Efficiency of utilisation of feed was measured through feed conversion ratio and protein conversion ratio. In the present study, overall FCR was significantly ($P<0.01$) varied among the experimental groups. Lowest FCR value was reported in G2 group (4.35) and highest in G6 group (7.13). FCR value indicated that how efficiently the feedstuffs are utilised for the production purpose. Chae

et al. (2000) reported that the feed consumption, weight gain, and average daily gain decreased in pigs maintained on a diet of 40% dried food waste. In contrast, Kwak and Kang (2005) reported that neither the body weight gain nor the average daily gain was affected in pigs maintained on a food waste mixture and that the feed efficiency decreased when larger amounts of the food-waste mixture were incorporated into the diet. In the present study, the FCR was significantly ($P<0.01$) lower in G6 group. The diet of the G6 group did not fulfil the protein requirement of the animals due to its dietary composition, thus, growth rate was severely affected. This was reflected in the FCR which was significantly lower in the G6 group.

Carcass characteristics were determined after slaughter of experimental pigs. Two animals from each group having higher body weight were slaughter after completion of experimental period. To evaluate the carcass characteristics, parameters like hot carcass weight, dressing per cent, carcass length and back fat thickness were observed. Back fat thickness was measured in three points namely; first ribs, last ribs and last lumber. Carcass characteristics are presented in table 2. Dressing per cent were 67.68±0.45, 66.55±0.97, 67.72±0.36, 66.88±0.36, 65.04±0.45and 68.83±0.41, respectively for the G1, G2, G3, G4, G5 and G6 groups and the values were not significantly varied. Carcass length and back fat thickness was also not significantly varied among the groups. Similar findings were observed in other studies (Nam *et al*. 2000; Kwak and Kang, 2005) with the feeding of food waste. However, Myer *et al*. (1999) reported a linear decrease in backfat thickness with 80% of food waste meal (FWM) feeding in growing pigs.

CONCLUSION

Finally, the study concluded that bread waste could be fed to the growing crossbred pigs without affecting performance.

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