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Effect of graded level of sugarcane press mud in ration on carcass characteristics of crossbred (Landrace × *Desi*) pigs

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ABSTRACT

The present study determined the effect of graded levels of sugarcane press mud (SPM) in the diet on carcass traits of crossbred Landrace pigs. Crossbred (Landrace × *desi*) piglets (28) randomly divided into 4 treatment groups, viz. T_0: Control diet without SPM inclusion, T_1: concentrate with 5% SPM inclusion, T_2: concentrate with 10% SPM inclusion, T_3: concentrate with 15% SPM inclusion, maintaining 3 barrows: 4 females under each group were used in this experiment. Iso-caloric and iso-proteinic diets were formulated for weaner (10–20kg), grower (20–50kg) and finisher (50–80kg). After the end of finisher stage, 2 barrows: 2 females from each group were slaughtered for carcass traits. All the major carcass traits were found non-significant among the treatment groups, but dressing % marginally variable among the treatment groups. Back fat thickness followed a linear trend from control to graded level of SPM supplementation while loin eye area did not follow any particular trend. Carcass length (cm) was lowest in T_0 and highest in T_2. All the parameters were comparable among the treatment groups. Similarly, SPM did not influence any carcass traits including primal cuts (%) as-well as edible and in edible offals. Chemical composition of loin eye muscle did not show any variation among the treatment groups. It can be concluded that inclusion of SPM up to 15% in swine ration did not cause any adverse effect on carcass traits.

Key words: Carcass traits, Pig, Ration, Sugarcane press mud

With increment in the rearing cost due to high ingredient price and non-availability, farmers get discouraged in pig farming. Maize is one such conventional ingredient widely used in swine ration but it is costly. Hence, agro-industrial by-products which can readily substitute a portion of the energy, protein or other nutrients in a complete feed as alternate source of feed for pigs are constantly in search. Recently, many researchers attempted to include the sugarcane press mud in sheep (Suresh *et al.* 2006), layers (Suma *et al.* 2007), broilers (Budeppa 2004, Suresh and Reddy 2011) and in kids (Ankita 2013). Sugarcane press mud (SPM) is one such agro-industrial by-product available sufficiently in sugarcane factories while making sugar and generally an organic waste for the agricultural field. It is very clearly evident that SPM has more scope in pig ration with higher portion as pig being omnivorous animal. But, there are no references available on feeding of SPM to pig up to slaughter weight and its effect on carcass traits. Therefore, the present study was carried out to study the effect of SPM on different carcass traits of crossbred landrace pigs.

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MATERIALS AND METHODS

Crossbred (Landrace × *desi*) piglets (28) about 14 kg body weight (around 8 wks of age) were randomly distributed in 4 different groups, viz. T_0: control diet without SPM inclusion, T_1: concentrate with 5% SPM inclusion, T_2: concentrate with 10% SPM inclusion, T_3: concentrate with 15% SPM inclusion, maintaining 3 barrows: 4 females under each group. Proper hygienic conditions including healthy surroundings were maintained in the shed throughout the experimental trial. All the piglets were de-wormed 15 days before the start of experiment and the proper castration methods were followed with post-operative care for the male piglets before the start of experiment. Iso-caloric and iso-nitrogenous diet was fed according to the NRC (1998) standards besides maintaining the minimum requirement for lysine and other minerals by adding lysine, limestone powder and mineral mixture with vitamin premix purchased from local market.

At the end of finisher stage (nearly 80 kg body weight), 4 pigs (2 barrows: 2 females) from each group were slaughtered as per the standard procedure (Anonymous 1970). The following parameters were analysed, viz. dressed carcass weight with and without head, dressing percentage,

carcass length, back fat thickness and loin eye area (LEA). Similarly weights of edible and inedible offal were measured. Besides, proximate composition of loin eye muscle of thoracic region was sampled as per Lawrie *et al.* (1963) and analysed according to AOAC (2000). The data were analysed by one-way ANOVA by using SPSS (1996) with 7.5 version soft ware.

RESULTS AND DISCUSSION

The values for different carcass traits in pigs of different treatment groups obtained during the end of experiment are given in the Table 1. Live weights 12 h prior to slaughter were comparable among different treatments and the values ranged from 80.88±0.94 to 81.96± 1.70 kg. The fasting weight ranged from 77.22 ±0.97 kg to 78.69±1.80 kg and found to be non-significant. As all the animals were slaughtered after reaching the nearly 80 kg body weight, the mean values of said parameters were found to be the same.

Carcass weight (with or without) in our study was non-significant (P>0.05) among treatment groups though carcass weight with head followed a linear decrement value from control to T_3. Highest carcass weight (without head) was 58.93±1.16 kg for T_0 while the corresponding value for T_3 was 55.88± 1.19 kg. The similar trend was also observed for dressing % with or without head. Value for carcass length ranged from 75.00±2.74 cm in T_2 to 72.25±3.59 cm in T_0. Carcass length did not show any significant difference among treatments. Comparable value for the above said parameters between the treatment groups might be due to the nearly similar body confirmation and body growth performance of SPM supplemented groups with that of control groups. Our results showed a higher dressing percentage (with and without head) than the value reported by Jha *et al.* (1999) while non-significant difference between the treatments in dressing % was in agreement with Budeppa (2004) and Suresh (2007) but among broiler birds fed graded levels of SPM. Carcass length in our result showed an upper value as compared to Kumar *et al.* (1974) who slaughtered the animal at 70 kg body weight and reported carcass length was 68.37 cm. Longer carcass length was obtained by Sinha *et al.* (1993) in pigs by feeding hotel wastes and Patel *et al.* (2009) by feeding JFC with concentrate which was not in accordance with our result. Conversely, Jha *et al.* (1999) reported that carcass length was less in pigs maintained on hotel wastes with concentrate than those maintained on concentrate only. This might be due to the different ingredients and their composition used in their experiment.

Our results regarding back fat thickness were comparable between different treatments, though the value was relatively higher for T_3 (3.79±1.55cm) than the other groups and followed a marginal increasing trend from control to T_3. Nonsignificant result in the said parameter might be

Table 1. Major carcass traits and cuts of parts of pork of experimental pigs reared under different treatments

Parameters	Treatments					Significance
	T_0	T_1	T_2	T_3	P value	
Major carcass traits						
Live weight (kg)	81.96± 1.70	81.23±1.10	80.88±0.94	81.03±0.83	0.917	ns
Fasting weight (kg)	78.69±1.80	78.27±1.14	77.26±3.43	77.22±0.97	0.927	ns
Carcass wt (without head) (kg)	58.93±1.16	57.57±0.63	55.75±1.95	55.88±1.19	0.272	ns
Carcass wt (with head) (kg)	63.55±1.20	62.30±0.59	60.56±1.97	60.51±1.30	0.312	ns
Dressing % (without head)	74.95±1.35	73.60±0.92	72.27±1.42	73.28±0.62	0.465	ns
Dressing % (with head)	80.82±1.54	79.66±0.93	78.52±1.50	78.37±1.57	0.599	ns
Carcass length (cm)	72.25±3.59	73.50±2.33	75.00±2.74	74.40±2.38	0.915	ns
Back Fat Thickness (cm)	2.61±0.29	2.67±0.08	2.71±0.18	3.79±1.55	0.710	ns
Loin Eye Area (cm^2)	34.26±4.17	38.59±4.60	32.87±3.03	34.51±4.27	0.781	ns
Primal cuts (% of carcass weight without head)						
Jowl	1.93±0.20	1.76±0.12	1.95±0.17	2.61±0.59	0.3	*ns*
	(1.14±0.12)	(1.01±0.06)	(1.09±0.11)	(1.47±0.34)	–0.361	
Boston butt	10.44±0.82	10.97±0.97	10.15±0.30	11.18±0.92	0.84	*ns*
	(6.14±0.46)	(6.31±0.55)	(5.65±0.15)	(6.25±0.55)	–0.799	
Picnic shoulder	12.27±0.91	13.45±0.73	13.19±0.74	12.41±1.19	0.753	*ns*
	(7.24±0.58)	(7.74±0.40)	(7.37±0.56)	(6.92±0.65)	–0.724	
Total shoulder	22.72±0.50	24.43±0.59	23.34±0.48	23.59±0.49	0.196	*ns*
	(13.38±0.34)	(14.05±0.28)	(13.01±0.56)	(13.17±0.22)	–0.158	
Ham	20.18±1.27	20.44±0.49	20.27±0.56	20.67±0.88	0.976	*ns*
	(11.86±0.57)	(11.78±0.37)	(11.32±0.65)	(11.51±0.25)	–0.841	
Loin	28.97±2.80	32.34±2.75	35.26±1.15	31.68±1.20	1.098	*ns*
	(17.16±2.00)	(18.65±1.68)	(19.71±1.27)	(17.67±0.58)	–0.687	
Belly	15.44±1.06	14.72±1.09	14.25±0.33	13.54±0.94	0.602	*ns*
	(9.08±0.54)	(8.45±0.55)	(7.93±0.12)	(7.58±0.59)	–0.273	

Values are presented as mean±standard error. Values in parenthesis are weight in kg.

due to the iso-caloric feed provided to all the treatment groups and similar digestibility of energy value of feed in all the groups which led to almost same conversion of energy into fat during the finishing period among pigs in the different treatments. This finding disagreed with the reports by Jha *et al.* (1999) that back fat thickness was less in pigs maintained on hotel wastes and concentrate than those maintained on concentrate alone.

Loin eye area varied from 38.59±4.60cm^2 in T_1 to 32.87± 3.03 cm^2 in T_3. Value obtained was comparable among all the groups and no definite trend was obtained. The reason might be due to the comparable digestibility of protein between SPM supplemented groups and control groups. Our findings were in accordance with Patel *et al.* (2009) who also found a comparable loin eye area by feeding JFC along with concentrate to the pigs.

Cut-up parts of carcasses as weight basis and percentage of dressed carcass weight have been presented in Table 1. Major primal cuts in our experiment were found non significant between the treatment groups. Jowl % were marginally more for T_3 (2.61±0.59) and the value for T_0, T_1 and T_2 were 1.93±0.20, 1.76±0.12 and 1.95±0.17, respectively. Similar to the above parameter, T_3 showed a comparable more buston butt % (11.18±0.92), but remained statistically non-significant with the other groups. Both ham and loin were found non significant between SPM supplemented groups and control groups. Further share of belly also did not differ for these groups. Our data related to major primal cuts was not in accordance with Patel *et al.* (2009) who reported that addition of JFC in increasing level in the diet reduced the boston butt %, picnic shoulder %, ham % and belly %. Also, Jha *et al.* (1999) reported a reduction in ham % and shoulder % due to feeding of kitchen waste in pigs. Non-significant data in our result might be due to the proportionate growth for all the animals fed with either graded level of SPM in the diet or the control diet which were reflected on the all major primal cuts.

Different edible and inedible offal measured for the experimental groups are presented in Table 2. Total edible offal (kg) for T_0, T_1, T_2 and T_3 groups were 15.66±0.33, 16.18±0.54, 17.70 ±1.05 and 16.73± 0.42. All the individual edible offal weight was comparable between the treatment groups and no particular trend was observed for the above parameters. Similarly, all the inedible offal were non-significant among the treatment groups. Blood value (kg) was marginally more for T_3 (2.61±0.13) and lower for T_2 (1.97±0.21), while spleen weight (kg) ranged between 0.17±0.01 in T_0 to 0.14±0.02 in T_2. None of the parameters followed a regular trend among the treatments. Our results were in agreement with Patel *et al.* (2009) who reported a comparable value for most of the edible and inedible offal by feeding JFC in increasing level in the swine diet. But our result was not in accordance with Pathak and Ranjhan (1981) who found reduction in heart size and spleen weight

Table 2. Edible and Inedible offal (kg) from experimental pigs

Parameters	Treatments					Significance
	T_0	T_1	T_2	T_3	P value	
Edible offal						
Head	4.61± 0.08	4.74 ±0.12	4.81 ±0.07	4.63 ±0.12	0.609	NS
Trotters	1.86 ±0.11	1.89± 0.12	2.01± 0.20	1.93± 0.11	0.878	NS
Liver	1.25± 0.04	1.24± 0.06	1.19± 0.06	1.23± 0.05	0.883	NS
Heart	0.26± 0.02	0.25± 0.01	0.24± 0.01	0.27± 0.02	0.782	NS
Kidney	0.32± 0.03	0.25± 0.2	0.21± 0.01	0.25± 0.03	0.080	NS
GIT full	7.16± 0.29	7.62± 0.33	9.08± 0.78	8.21± 0.41	0.071	NS
Tail	0.19± 0.01	0.19± 0.01	0.21± 0.03	0.21± 0.01	0.765	NS
Total	15.66± 0.33	16.18± 0.54	17.70± 1.05	16.73± 0.42	0.198	NS
Inedible offal						
Blood	2.42± 0.37	2.42± 0.15	1.97± 0.21	2.61± 0.13	0.254	NS
Lungs	0.64± 0.03	0.61± 0.02	0.69± 0.07	0.59± 0.02	0.352	NS
Spleen	0.17± 0.01	0.16± 0.02	0.14± 0.02	0.15± 0.01	0.845	NS
Trachea	0.14± 0.02	0.23± 0.08	0.39± 0.29	0.14± 0.02	0.579	NS
Leaf fat	1.36± 0.40	1.17± 0.36	1.07± 0.37	1.30± 0.47	0.965	NS

Values are presented as mean±standard error; NS, Nonsignificant.

Table 3. Chemical composition of pork under different treatments

Parameters	Treatments					Significance
	T_0	T_1	T_2	T_3	P value	
Moisture (%)	73.49±1.05	74.44±1.34	72.04±1.62	73.04±0.61	0.589	NS
CP (% DM)	85.72±3.55	90.00±1.88	83.73±3.18	84.79±1.40	0.438	NS
EE (% DM)	10.73±1.50	9.10±1.07	8.91±1.19	9.36±0.66	0.505	NS

NS, Nonsignificant.

on feeding of *ad lib* molasses. Comparable value for all the edible and inedible parameters in our study indicated that SPM in the diet up to 15 % level had not any adverse effect on the vital organs as is evident from the table with control fed animals.

Chemical composition value was presented in Table 3. Proximate components of pork did not differ among the groups and did not follow a regular trend on the treatment groups fed with graded level of SPM. The value obtained was not in accordance with Patel *et al.* (2009) who reported that feeding of JFC with or without concentrate reduced the moisture % of pork nonsignificantly and also a significant increase in ether extract value in the groups fed on JFC with concentrate. The reason of comparable value in our result might be due to the iso-caloric and iso-nitrogenous diet to all the treatment groups during feeding trial and comparable digestibility of various nutrients during digestion trial might have made the muscle composition nearly same for all the groups under study.

The present study revealed the comparable value for most of the carcass traits under study which were at par with the control diet fed animals. It can be concluded that inclusion of up to 15% SPM in the pig's diets achieved the slaughter weight without causing any undesirable effect.

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