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Effect of Dietary Incorporation of Spent Brewer's Yeast on Carcass Characteristics in Three Line Cross Bred Pigs

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A feeding experiment was carried out for a period of 95 days on thirty six weaned cross bred (Large White Yorkshire X Duroc X Desi) piglets to find out the effect of dietary incorporation of spent brewer's yeast on carcass characteristics. The piglets were divided into three identical groups having six replicates in each group with two piglets in each replicate. The three groups were randomly allotted to one of the three dietary treatments T1, T2 and T3 consisting of standard diets with 0, 2.5 and 5 per cent spent brewer's yeast respectively. All the animals were maintained on their respective dietary regimen from weaning to an average slaughter weight of 70 kg.

The experimental pigs attained an early average slaughter weight of 70 kg in 95 days post weaning. Carcass characteristics of pigs maintained on three experimental rations were found statistically similar. On summarizing the overall results of the study, it could be inferred that spent brewer's yeast can be effectively utilized as a protein supplement in pig diet.

KEYWORDS
Spent brewer's yeast, three line cross bred pigs, carcass characteristics.

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INTRODUCTION

Dietary inclusion of yeast cultures have been tried in livestock industry for improving the carcass weight, dressing percentage, weight of internal organs, decreased abdominal fat and significant reduction in subcutaneous and inter muscular fat accumulation.

Inclusion of yeast cultures in ration for improving carcass characteristics, carcass weights, dressing percentage has been tried with varied success in different species of livestock. Li et al. (2011) reported improved the antioxidant status in muscle of pigs with dietary Se-yeast supplementation. Improved carcass weight, dressing percentage was reported in broilers (Sosan et al., 2010)

Present study was carried out to find out the effect of dietary incorporation of spent brewer's yeast on carcass characteristics in pigs.

MATERIALS & METHODS

A feeding experiment was conducted for a period of 95 days to evaluate the effect of dietary incorporation of spent brewer's yeast on carcass characteristics in cross bred pigs. Thirty six, Large White Yorkshire X Desi X Duroc weaned piglets were divided into three groups uniformly with regard to number, age, sex and body weight. Twelve piglets in each group were distributed into six replicates with two piglets in each replicate. Three groups of piglets received three types of dietary treatments - T1, T2 and T3. Piglets of each group were allotted randomly to six pens with one pen for each replicate.

The experimental diet consisted of grower ration containing 18 per cent crude protein and 3265

kcal of metabolizable energy/kg of feed, up to 50 kg body weight and finisher ration with 16 per cent crude protein and 3265 kcal of metabolizable energy/kg of feed from 50 kg onwards (NRC, 1998).

All the three experimental diets and spent brewer's yeast were analyzed for the proximate and mineral composition as per standard procedures (AOAC, 1990). The viability of spent brewer's yeast was assessed by using the dilution plate technique with Sabouraud agar medium incorporating chloramphenicol to prevent bacterial contamination. The sample was ensured to contain dead yeast cells only. Spent brewer's yeast utilized for the study was inactivated yeast biomass (*S. carlsbergensis* / *S. uvarum*)

The ingredient composition and chemical composition of the spent brewer's yeast, grower and finisher ration are given at Tables 1 to 3.

The experimental animals of the three dietary treatments were maintained on their respective dietary regime for a period of 95 days, till they attained an average slaughter weight of 70 kg. On attaining the slaughter weight of 70 kg, six male animals from each group were slaughtered and data on carcass weight, back fat thickness, loin eye area, carcass length and weight of the internal organs were recorded. Dressing percentage and weight of internal organs as percentage of live weight were also calculated.

The head was removed at the atlanto-occipital joint and weight of the carcass without head was recorded, to determine dressing percentage of the hot carcass (carcass weight / live weight x 100). Weight of head was also recorded.

The length of the carcass was measured from the anterior edge of the Os-sacrum to the anterior aspect of the first rib. The back fat thickness was estimated at the 10th rib. Area of Longissimus dorsi muscle between 10th and 11th rib was cut and traced on a transparent paper and the loin eye area was calculated by plotting the traced surface on graph paper.

The data collected on various parameters were statistically analyzed as per the methods described by Snedecor and Cochran (1994).

RESULTS

Data on live weight, carcass weight, dressing percentage, carcass length, loin eye area, and back fat thickness of pigs maintained on the three dietary treatments are depicted in Table 4. Average weight of head, feet and weight of internal organs such as liver, lungs, spleen, kidney and heart of the pigs maintained on the three dietary treatments as percentage of live weight are shown in Table 5. Statistical analysis of the data revealed no significant difference in any of the observed parameters. The lower back fat thickness obtained in the present study indicates better quality of pork with more lean meat.

DISCUSSION

Non-significant difference in the values of carcass weight, dressing percentage, carcass length, loin eye area observed in present trial was in accordance to earlier report of Sekar (2003) ,who observed that supplementation of baker's yeast in pig diet did not affect carcass characters such as dressing percentage, loin eye area and back fat thickness.

Mahan et al. (1999) obtained similar values of 2.66 cm back fat thickness for pigs on standard diet in their experiments on dietary supplementation of different sources of selenium yeast, but observed a comparatively higher loin eye of 35.66 cm2. Chinnamani et al. (2008) obtained a lower carcass length and loin eye area, while similar back fat thickness in their studies in Large White Yorkshire X Desi pigs.

Rekha (2001) and Shyama (2009) reported a higher dressing percentage ranging from 70 to 76 per cent in cross bred pigs maintained on different rations. Shyama (2009) obtained lower loin eye area of 23.33, 23.38 and 18.25 cm2 in her studies with cross bred pigs and Rekha (2001) obtained a much lower values of 17.40, 16.80, 21.4 cm2 in their studies on carcass characteristics of pig when compared to that of the present study.

Park et al. (2003) observed that the pH, cooking loss and colour of loin eye muscle were not affected by dietary supplementation of yeast culture at 0.10, 0.20 and 0.40 per cent in pigs. Li

et al. (2011) found out that dietary Se-yeast supplementation improved the antioxidant status in muscle of pigs.

Paryad and Mahmoudi (2008) and Sosan et al. (2010) found that the inclusion of yeast (*S. cerevisiae*) at varying levels of 0.10 to 2.00 per cent improved the carcass weight, dressing percentage, weight of internal organs and decreased abdominal fat in broilers fed yeast than control diet. Significant reduction in subcutaneous and inter muscular fat accumulation was also reported on feeding yeast by Koraoglu and Durdag (2005) in broilers and Ghally and El-Latif (2007) in Japanese quails, but could not observe any difference in carcass weight, dressing percentage and weight of edible and non-edible offal. Chumpawadee et al. (2008) also reported that there was no significant difference in dressing percentage and weight of wing, breast, liver and gizzard when broilers are supplemented with cassava yeast.

Hennessy and Williamson (1993) and Payandeh and Kafilzadeh (2007) reported that yeast has no effect on carcass characteristics, including hot and cold carcass weights, dressing percentage, rib eye muscle area, non-carcass components and percentage of different cuts of carcass, in steers and lambs respectively. Yeast supplementation in ninety six weaned male rabbits at a level of 0.40 per cent did not affect the mortality rate, growing and carcass characteristics like, perirenal fat, carcass weight, muscle to bone ratio, as well as meat quality (Lambertini, 2004).

From a critical evaluation of the results obtained in the present study, it was found that there is no significant difference in any of the carcass characteristics among the pigs maintained on the three dietary treatments. Thus it could be inferred that spent brewer's yeast can be effectively utilized as a protein supplement for pigs.

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TABLES

Table 1. Ingredient composition of grower and finisher diets.

Ingredients	Grower			Finisher		
	T_1	T_2	T_3	T_1	T_2	T_3
Yellow maize, kg	66.00	67.00	67.00	72.00	71.50	71.00
Soybean meal, kg	18.00	15.00	13.00	16.50	14.50	12.50
Wheat bran, kg	5.50	5.00	5.00	6.00	6.00	6.00
Unsalted dried fish, kg	10.00	10.00	9.50	5.00	5.00	5.00
Spent brewer's yeast, kg	-	2.50	5.00	-	2.50	5.00
Salt, kg	0.50	0.50	0.50	0.50	0.50	0.50
Total	100	100	100	100	100	100
To 100 kg of the above mixture added Nicomix AB_2D_3K, g[8]	10.00	10.00	10.00	10.00	10.00	10.00
Nicomix BE, g[9]	10.00	10.00	10.00	10.00	10.00	10.00
Zinc sulphate, g	20.00	20.00	20.00	7.50	7.50	7.50
Calcite, g	-	-	-	250	250	250

[8] *Nicomix AB2D3K (Nicholas Piramal India Ltd., Mumbai)*
Composition per gram: Vitamin A- 82,500 IU, Vitamin D3-12,000 IU, Vitamin B2-50 mg and Vitamin K-10 mg

[9] *Nicomix BE (Nicholas Piramal India Ltd., Mumbai)*
Composition per gram: Vitamin B1-4 mg, Vitamin B6-8 mg, Vitamin B12-40 mcg, Niacin-60 mg, calcium pantothenate-40 mg and Vitamin E-40 mg

Table 2. Chemical composition[#] of spent brewer's yeast, grower and finisher diets, %.

Nutrient moiety	Spent brewer's yeast	Grower ration			Finisher ration		
		T_1	T_2	T_3	T_1	T_2	T_3
Dry matter	92.77	90.28	90.35	90.44	90.56	90.63	90.69
Crude protein	39.49	18.15	17.94	17.87	15.76	15.88	16
Crude fiber	0.16	4.00	3.12	4.10	4.76	4.09	3.87
Ether extract	0.51	4.56	3.37	3.69	4.26	3.15	3.12
Total ash	6.35	6.55	6.38	6.21	5.00	4.98	4.96
Nitrogen free extract	53.49	66.74	69.19	68.13	70.22	71.9	72.05

[#]*On dry matter basis*

Table 3. Mineral composition[#] of spent brewer's yeast, grower and finisher diets.

Parameters	Spent brewer's yeast	Grower ration			Finisher ration		
		T_1	T_2	T_3	T_1	T_2	T_3
Calcium, %	0.11	0.71	0.69	0.68	0.67	0.64	0.62
Phosphorous, %	1.54	0.87	0.80	0.77	0.75	0.71	0.71
Magnesium, %	0.09	0.18	0.17	0.17	0.20	0.19	0.17
Manganese, ppm	8.10	20.25	18.68	18.09	23.66	22.29	22.19
Copper, ppm	0.93	6.08	5.42	4.95	5.28	4.86	4.44
Iron, ppm	65.73	102.32	102.71	103.00	93.48	88.30	85.62
Zinc, ppm	64.58	100.78	100.61	95.38	82.21	81.87	73.56

[#]*On dry matter basis*

Table 4. Slaughter data of pigs maintained on three dietary treatments.

Parameters	Treatments[#]		
	T_1	T_2	T_3
Live weight, Kg	77.67 ± 2.84	77.67 ± 6.13	78.67 ± 1.87
Carcass weight, Kg	52.17 ± 2.35	53.00 ± 4.91	52.17 ± 1.59
Dressing percentage, %	67.07 ± 0.85	67.96 ± 1.10	66.30 ± 0.97
Carcass length, cm	66.20 ± 0.58	68.17 ± 1.08	67.83 ± 2.10
Loin eye area, cm^2	29.53 ± 1.63	29.43 ± 2.81	27.59 ± 2.17
Back fat thickness, cm	2.63 ± 0.264	2.68 ± 0.331	2.50 ± 0.22

[#]Mean of six values

Table 5. Weight of head, feet and weight of internal organs as percentage of live weight of pigs maintained on three dietary treatments.

Parameters	Treatments[#]		
	T_1	T_2	T_3
Head*, kg	6.93 ± 0.09 [a]	7.05 ± 0.20 [a]	5.96 ± 0.26 [b]
Feet, kg	1.46 ± 0.09	1.39 ± 0.06	1.37 ± 0.03
Heart, %	0.36 ± 0.02	0.35 ± 0.01	0.31 ± 0.2
Kidney, %	0.40 ±0.02	0.47 ± 0.05	0.46 ± 0.02
Lungs, %	1.22 ± 0.18	1.30 ± 0.19	1.27 ± 0.09
Spleen, %	0.28 ± 0.03	0.23 ± 0.03	0.24 ± 0.06
Liver, %	1.96 ± 0.11	1.85 ± 0.08	1.89 ± 0.13
Stomach and intestine, %	13.42 ±0.77	12.95 ± 0.64	13.25 ± 0.66

[#]Mean of five values

a, b - Means with different superscripts within the same row differ significantly.

*- significant ($p<0.01$)