COMPARATIVE STUDY OF CARCASS CHARACTERISTICS OF CROSSBRED, INDIGENOUS AND EXOTIC PIGS

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ABSTRACT

An experiment was conducted to compare the merits and demerits of crossbred pigs over indigenous and exotic pigs with respect to growth and to study the economic feasibility of rearing crossbred pigs. Three groups of twelve weaned female piglings each belonging to indigenous (Desi), Large White Yorkshire (LWY) and crossbred (CB) (LWY \times Desi) of Centre for Pig Production and Research, Mannuthy were selected as uniform as possible with regard to age and body weight. Animals in each breed group were randomly divided into two equal dietary treatment groups of six. Treatment group one was fed with a ration specified by ICAR and treatment group two with a ration containing 10 per cent less crude protein than ICAR ration. All the pigs were fed iso - caloric ration as per ICAR recommendation.

Protein levels used in the ration do not seem to exert any significant influence on the various carcass characteristics studied. In carcass traits like dressing percentage, carcass weight, carcass length, back fat thickness and loin eye area the two levels of protein in the ration did not cause any significant difference (P>0.05) between them. A clear breed difference was noticed with respect to carcass traits such as carcass weight, carcass length, back fat thickness and loin eye area except dressing percentage in both the treatment groups. Dressing percentage of Large White Yorkshire was significantly (P<0.05) higher than Crossbreds and Desi igs in treatment group I but it was no significant in treatment group II. The Large White Yorkshire excelled Crossbred and Desi pigs in all carcass traits.

Fat constants like melting point, Saponification value and iodine value were not influenced either by protein levels or by body weights.

INTRODUCTION

Pigs are ideal suppliers of good quality meat. Pigs excel all other meat producing animals except well kept broiler. Swine can effectively utilize agricultural by products and many other waste materials. Compared to other meat animals pigs yield higher dressing percentage. Pork has higher energy value than beef or mutton. In India pig rearing is still not in a satisfactory state and almost entirely in the hands of people with little resources who continue to follow the primitive methods of rearing. There are three basic genetic groups of pigs in our country i.e., desi pigs, exotic pigs and a non- standardized crossbred of these two. The common Indian desi pig is a scrub animal, slow grower, small sized and producer of small litters. These are rich in genetic variability and are endowed with many positive aspects like disease resistance and tolerance to climatic variables. But these animals are poor in reproductive and productive traits.

Exotic pigs are larger in size with superior feed efficiency. These animals are good converters of feed with low mothering ability. They outdo desi pigs in growth rate and carcass characteristics. Recognizing the merits and potential of exotic pigs as a source of animal protein, the Government of India is paying considerable attention in the development of pig industry. A number of pig production centers have been established in several states and the farmers are being educated on pig raising on scientific lines. There are not many reports comparing exotic breeds like Large White Yorkshire with indigenous desi pigs and the available reports indicate a significantly lower growth rate and a higher production cost in indigenous stock when compared to Large White Yorkshire pigs (Sasendran and Rajagopalan, 1981, 1982).While crossing the desi pigs with exotic animals, a substantiate increase in both productive and reproductive performance as well as disease resistance in the resultant crossbreds is yet to be ascertained.

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Growth rate, feed efficiency and carcass quality are vital factors influencing the cost of fattener production in swine industry. These factors are related to live weight, age, quality and quantity of feed, genetic potential and environmental factors. Feed efficiency is maximum at the early stages of growth and it decreases with increasing age and live weight. Efficiency of production depends on the successful interaction of several factors. Of these, nutrition is by and large the most important. The efficiency of the pig in this respect can be divided into different categories on the following basis biologic efficiency economic efficiency. When biologic efficiency is calculated, the feed consumed and the weight gained alone is considered. On the other hand, when economic efficiency is assessed, units of feed consumed, labour charges and equipment charges involved are also taken in to account. Protein is one of the most important nutrients required by all classes of Livestock and especially by pig for own body processes as well as to synthesize different products.

Hence the present study was undertaken with the following objectives and to make suitable recommendations, which can be practiced by formers.

• To compare the merits and demerits of cross bred pigs over indigenous and exotic pigs with respect to growth and carcass characteristics.

• To study the economic feasibility of rearing crossbred pigs.

MATERIALS AND METHODS

Three groups of twelve weaned female piglings each belonging to indigenous (Desi), Large White Yorkshire (LWY) and crossbreds (CB) (LWY × Desi) of Centre for pig Production and Research (CPPR), Kerala Agricultural University, Mannuthy were selected as the experimental animals. Animals for the study were selected as uniform as possible with regard to age and body weight. All the animals were dewormed before the commencement of the experiment and maintained under similar managemental conditions of the farm during the experimental period of 210 days.

Experimental Diets

The pig lings were maintained on two planes of feeding with respect to crude protein (CP) as follows: Treatment I – ICAR recommended Level of crude protein



Treatment II – A Low Plane (LP) of 10 per cent less of crude protein with reference to ICAR level.

$$G1 - 6$$
 indigenous piglings

T2 G2 - 6 exotic piglings G3 - 6 Crossbred piglings

All the pigs were fed iso - caloric ration as per ICAR recommendations.

Three animals from each treatment were selected randomly and slaughtered at the end of the experiment for evaluation of their carcass traits. pigs were given sufficient rest prior to slaughter and they were slaughtered by standard procedure at Meat Technology Unit, College of Veterinary and Animal Sciences, Mannuthy.

The length of the carcass was measured from the anterior edge of the aitech bone (Os - Sacrum) to the anterior border of the first rib and expressed in centimetre as carcass length.

The back fat thickness was estimated as an average thickness of fat measured at first rib, last rib and last lumbar vertebrae region as expressed in centimeter as back fat thickness.

The loin eye area or the area of the longissimus dorsi muscle at 10th inter costal space was cut and traced on transparent paper and the area was measured by plotting the trace surface on graph paper.

The dressing percentage was calculated using the following formula.

Dressing percentage = $\underline{Carcass weight} \times 100$ Live body weight

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Saponification value, iodine number, and melting point of lard were estimated as the methods specified in A O A C (1990). The data were statistically analyzed as per the method described by Snedecor and Cochran, (1994).

RESULTS AND DISCUSSION

Carcass Characteristics

Table 1: gives the comparative carcass traits of the three breeds of pigs fed with different rations.

The statistical analysis of the data indicated that dressing percentage, carcass weight, carcass length, back fat thickness and loin eye area did not show any significant difference (P>0.05) between the treatment groups. This may be due to the small differences in protein levels used in the experimental rations. Similar results are reported by Aunan *et al.*, (1961) in their studies with pigs using rations with protein levels of 18, 16 and 14 per cent. These results are also supported by Clawson *et al.*, (1962) and Ramachandran (1977) who could not detect any significant difference in carcass characteristics of pigs maintained on different dietary protein levels. Shields and Mahan (1980) found that temporary moderate protein restrictions in diets did not affect carcass traits. Similarly, Kuhn and Burgstaller (1995) revealed no significant difference in carcass traits in pigs fed with low protein diet. Several workers on the other hand, had obtained increased lean growth (Cunningham *et al.*, 1973; Baird *et al.*, 1975 and lrwin et al. 1975) and decreased back fat thickness (Irwin *et al.*, 1975) on higher dietary protein levels.

	Treatment I (ICAR)				Treatment 11 (10% less ICAR)			
Carcass characteristics	Large White Yorkshire	Crossbred	Desi	Treatment Mean	Large White Yorkshire	Cross- bred	Desi	Treatment Mean
Live Weight at slaughter (kg)	96.66 ^a ± 3.28	76.33 ^b ± 4.17	46.00 ^{c**} ± 4.51	73.00 NS	93.16 ^a ± 5.05	66.33 ^b ± 6.23	40.00 ° ± 1.15	66.50
Weight of Head (kg)	${5.93}^{\ \ a}\ \pm \\ 0.32$	$\begin{array}{c} 4.41 & {}^{b} & \pm \\ 0.16 & \end{array}$	3.07 ^{c**} ± 0.20	4.47 ^{NS}	${5.70}^{\ \ a} \ \pm \\ 0.38$	4.26 ^b ± 0.28	2.81 ^c ± 0.11	4.26
Carcass weight (kg)	$72.66^{\ a}\ \pm \\ 4.18$	55.33 ^b ± 3.71	33.33 ^{c**} ± 3.33	53.77 ^{NS}	66.66 ^a ± 3.71	47.33 ^b ±3.71	28.66 °± 1.45	47.55
Dressing percentage with head	81.21 ^a ± 2.23	78.19 ^b ± 1.32	79.16 ^{c**} ± 0.59	79.52 ^{NS}	77.68 ^a ±1.51	77.93 ^a ± 2.50	78.68 ^a ± 3.06	78.09
Dressing percentage without head	$\begin{array}{c} 75.07^{\ a}\ \pm \\ 2.04 \end{array}$	72.39 ^b ± 1.34	72.43 ^{b**} ± 0.52	73.30 ^{NS}	71.57 ^a ± 1.40	71.62 ^a ± 2.04	71.65 ^a ± 2.93	71.61
Carcass length (cm)	$\begin{array}{c} 83.33 \ ^{a} \ \pm \\ 0.88 \end{array}$	${\begin{array}{c} 71.83 \\ 3.06 \end{array}}^{a}\ \pm$	43.33 ^{c**} ± 0.67	67.83 ^{NS}	$\begin{array}{c} 82.66 \ ^{a} \ \pm \\ 1.67 \end{array}$	68.66 ^b ± 2.96	46.5^{a} \pm 0.58^{a}	65.94
Back fat thickness (cm)	$\begin{array}{rrr} 3.91 & {}^{a} & \pm \\ 0.51 & \end{array}$	$\begin{array}{ccc} 3.22 & {}^{b} & \pm \\ 0.06 & \end{array}$	2.78 ^c ** ± 0.06	03.30 ^{NS}	${\begin{array}{c} 3.61 & {}^{a} \\ 0.01 \end{array}} \pm$	3.12 ^b ± 0.06	2.60 ° ± 0.12	3.11
Loin eye area (cm ²)	$\begin{array}{c} 33.00 \ ^{a} \ \pm \\ 0.58 \end{array}$	22.00 ^b ± 1.53	15.66 ±1.20	23.55 ^{NS}	32.00 ^a ±1.15	19.00 ^b ± 1.53	15.33 ^c ± 0.88	22.11

Table 1: Carcass Characteristics of pigs at seve	en months of age fed with two different rations
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Means having the same superscript in a row do not differ significantly

NS - Non Significant; * - Significant at 5 per cent ; ** - Significant at 1 per cent

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	Treatment I (ICAR)				Treatment 11 (10% less ICAR)			
Carcass characteristics	Large White Yorkshire	Crossbred	Desi	Treatment Mean	Large White Yorkshire	Cross-bred	Desi	Treatment Mean
Melting point	$48.00^{a} \pm$	$48.67 \ ^a \ \pm$	$48.00 \ ^a \ \pm$	48 22 NG	$48.00 \ ^a \ \pm$	47.33 ^a ±	48.00 ^a	17 77
of lard (^{0}C)	0.000	0.33	0.000	40.22 113	0.00	0.33	± 0.000	4/.//
Saponification	193.67 ^a	194.00 ^a	193.33 ^a	193.66 NS	193.33 ^a	$190.67^{a} \pm$	191.00	191.66
value of fat	± 1.20	± 2.31	± 0.67		± 0.88	1.45	$^{a} \pm 0.58$	
Iodine value	$69.00^{a} \pm$	$71.00^{\ a}$ \pm	$71.00^{\ a}$ \pm	70 22 NG	70.00 a \pm	69.33 ^a ±	69.00 ^a	60.44
of fat	0.58	0.58	0.58	70.33 NS	0.58	0.58	± 0.58	09.44

Table 2: Characteristics of fat of pigs fed with two different rations

Means having the same superscript in a row do not differ significantly NS - Non Significant

A clear breed difference was noticed with respect to carcass traits such as carcass weight, carcass length, back fat thickness and loin eye area except dressing percentage in both the treatment groups. Dressing percentage of Large White Yorkshire was significantly (P < 0.05) higher than Crossbreds and Desi pigs in treatment group I but it was non significant statistically in treatment group II. These findings are in accordance with that of Saseendran (1979); Joseph; (1997) and Gopi (2001). The Large White Yorkshire excelled Crossbred and Desi pigs in all carcass traits. This is in agreement with the observations made by Deo *et al.*, (1992).

Fat Constants

Summarised data on fat constants (Table 2) and their statistical analysis indicate that there was no significant difference (P>0.05) in melting point, saponification value and iodine value of body fat of animals maintained under the two dietary treatment groups. This may be due to the fact that the experimental rations used in the study were essentially similar in all except for the little difference in the percentage of crude protein, to exert any marked influence on any of the fat characteristics studied.

The values obtained in the present study is in agreement with the results of Woodman, (1941); Ramachandran (1977) and Sebastian (1992) who also observed similar range of melting point, saponification value and iodine value. But lower iodine value (range 53 - 63) was reported by Yatsenko (1987) in Large White Yorkshire pigs. Fat constants like melting point, Saponification value and iodine value were not influenced either by protein levels or by body weights.

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REFERENCES

A O A C (1990). Official Methods of Ayalysis. 15th ed. Association of Official Analytical Chemists, Washington, D C.

Aunan WJ, Hanson LR and Meade RJ (1961). Influence of level of dietary protein on live weight gain and carcass characteristics of swine. *Journal of Animal Science* 20(10).

Baird DM, McCampbell HC and Allison JR (1975). Effects of levels of crude fibre, protein and bulk in diets for finishing pigs. *Journal of Animal Science* **41**(4) 1039-1048.

Carton, G A (1965). The digestion and assimilation of lipids. *In physiology of digestion in the Ruminant. Butterworth Washington, D C* 390-398.

Clawson AJ, Blumen TN, Smart WWG JR and Barrick ER (1962). Influence of energy: protein ratio on performance and carcass characteristics of pigs. *Journal of Animal Science* **21**(1) 62-68.

Cunningham PJ, Socha TE, Peo ER and Mandigo RW (1973). Gain, feed conversion and carcass traits of swine fed under two nutritional regimes. *Journal of Animal Science* **37**(1) 75 - 80.

Research Article

Deo S, Chhabra AK and Bhist GS (1992). Genetic and nongenetic factors affecting growth performance in desi pigs and its crosses. *Indian Journal of Animal Science* **62** 1107 -08.

Irvin KM, Swiger LA and Mahan D C(1975). Influence of dietary protein level on swine with different growth capabilities. *Journal of Animal Science* **41**(4) 1031 - 1038.

Joseph M (1997). Effect of enrichment of environment and Halothane sensitivity on performance of Large White Yorkshire and Desi Pigs *Thesis Kerala Agriculture University Mannuthy.*

Kuhn M and Burgstaller G (1995). Utilizing low protein diets of heavy finisher pigs. Ziichtungskunde. 66(5) 373 - 382 Nutritional Abstracts and Review 65(2)741.

Ramachandran P (1977). Studies on the growth rate, feed efficiency and caracass characteristics of pigs reared up to different market weights on two dietary treatments. *M V Sc thesis, Kerala Agricultural University, Mannuthy.*

Saseendran, P C(1979). The growth, carcass characteristics and economics of rearing of indigenous and exotic pigs. *M V Sc Thesis, College of Veterinary and Animal Sciences, Mannuthy.*

Saseendran, P C and Rajagopalan, T G (1981). Note on the feed efficiency and economics of rearing of indigenous and exotic pig. *Journal of Animal Science* **51**(10) 1003 - 1004.

Sebastian, K S (1992). Effect of season of birth and energy levels of feed on production performance of pigs. *Thesis, Kerala Agricultural University, Mannuthy*.

Shields, R G and Mahan, D C (1980). Effect of protein sequences on performance and carcass characteristics of growing - finishing swine. *Journal of Animal Science* **51**(6)1340 - 1346.

Snedecor, G W and Cochran W G (1994). Statistical Methods. Eighth edition. *The Iowa state University* press, Ames, Iowa, 313.

Woodman, (1941). Food analysis 4th Edn. McGraw Hill Book Company, INC, New York, London.

Yatsenko, L I (1987). Meat yield of pigs in relation to level of protein feeding, *Nutrition and Reviews* 57 46.