Indian J. Anim. Res., **43** (1) : 27-31, 2009

AGRICULTURAL RESEARCH COMMUNICATION CENTRE
www.arccjournals.com / indianjournals.com

GROWTH AND CARCASS TRAITS OF DUROC X (LARGE WHITE YORKHSIRE X LANDRACE) PIGS UNDER DIFFERENT FEEDING REGIMES*

M. Murugan, Joseph Mathew, P.C. Saseendran, Francis Xavier[1] and A. Kannan

Department of Livestock Production Management,
College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala-680 651, India

ABSTRACT

An experiment was conducted to assess the growth performance and carcass traits of Duroc x (Large White Yorkshire x Landrace) pigs under different feeding regimes. Twenty four weaned piglets were divided into four groups of six animals each . First group (T1) was maintained on farm concentrate. Piglets belonging to T2, T3 and T4 were fed with swill feed. In addition to this, T3 and T4 group were supplemented with inorganic and organic minerals @ 1% of dry matter, respectively. There was no significant difference in monthly body weights, body measurements, ADG and average daily feed intake between T1 and T2. T4 was significantly (P<0.01) better than others. There was significant (P<0.01) difference in feed efficiency between T1 and T2. T4 attained significantly (P<0.01) higher slaughter weight, hot carcass weight and carcass length than other treatment groups followed by T3, T2and T1. T1 had significantly (P<0.01) higher dressing percentage; lesser back fat thickness and gut weight than other treatment groups. T2 had significantly (P<0.01) lesser loin eye area and meat-bone ratio than other treatment groups. It was found that swill feed was equally effective compared to concentrate feed in promoting growth of fattener pigs. Carcass characteristics and growth promotion could be improved by supplementation of minerals in the diet of fattener pigs.

Key words : Growth performance, Carcass trait, Pig, Duroc, Feeding regimes, LWY, Landrace.

INTRODUCTION

Pig rearing based on a commercial pig ration with conventional feed ingredients is not profitable considering the present market values of pork, cost of feed ingredients and feed conversion efficiency. Hence, any attempt to reduce the feed cost will be of benefit to farmers. Therefore, the most logical step of saving the grains and reducing the cost of pork production is to replace grains with alternative sources of feed. The popular feeding practice, swill, consisting of organic wastes of animal and plant origin in liquid form. The nutrient composition of swill feed is comparable to conventional feeds but the availability of minerals in the swill feed is not fully exploited since pigs are desperately in need of minerals, which are primarily involved in the structural components and body fluids of pigs. Hence this study was aimed to assess the effect of different feeding regimes on the performance of crossbred pigs under farm and field conditions.

MATERIAL AND METHODS

An experiment was conducted to assess the performance of Duroc x (Large White Yorkshire x Landrace) pigs under different regimes at Centre for Pig Production and Research, Mannuthy, Kerala. Twenty four weaned piglets (56th day) were selected at random and they were allotted to four treatments with respect to feeding systems. With respect to control group (T1), maintained in the farm were fed with standard concentrate ration having 18 per cent crude protein up to the age of five months and with 14 per cent crude protein during the rest of the study period. Piglets belonging to T2, T3 and T4 groups were supplied to three progressive farmers from

* Part of Ph.D. Thesis submitted by the first author to the Kerala Agricultural University, Thrissur-680 656, India.

[1] Present address : COVAS, Pookot, Kerala-673 576, India

neighbouring Panchayats of Thrissur District, Kerala and the animals were fed with left over food from hotels, restaurants, slaughter house waste and waste available from agricultural fields. In addition to this, T3 group was supplemented with inorganic minerals (Ca, P, Mn, Zn, Fe, Cu, Co, Iodine, Sulphur and Fluorine) and T4 group was supplemented with organic minerals (Ca, P, Mn, Zn, Fe, Cu, Co and Iodine) @ one per cent level on dry matter basis throughout the experimental period. Two times feeding was followed every day. Monthly deworming and spraying for ectoparasite control were practised. Recording was done on monthly body weight, linear body measurements, average daily feed intake and feed efficiency. Carcass characteristics were assessed at the end of the experiment. Collected data were subjected to statistical analysis (Snedecor and Cochran, 1994) for interpretation.

RESULTS AND DISCUSSION

Monthly body weight : Piglets of Duroc x (Large White Yorkshire x Landrace) maintained under different feeding regimes up to 3 months showed no significant difference in monthly body weight (Table 1). This indicated a variation in adaptation to different feeding system between the treatment groups. From 4th month onwards minerals supplemented group attained significantly higher body weight than T1 and T2 groups. There was a linear increase in body weight from 2nd month to ten months of age, as supported by Kannan, (1995). These results indicated that the feeding system adapted in different treatment group has not affected the standard growth pattern in pigs. At the end of tenth month, there was no significant difference in body weight of pigs between concentrate (T1) and swill feeding (T2). This indicates that swill feed was equally effective in promoting growth of the pigs. These results are in accordance with the findings of Gustafson and Stern (2003). In contrast to this Anil (2005) reported a significantly higher body weight in pigs maintained in the field on swill feed compared to concentrate feed fed group in the farm.

Table 1. Mean monthly body weight (kg) of D x (LWY x LR) pigs

Age (Month)	T1	T2	T3	T4
2	$10.30^{a} \pm 0.34$	$10.20^{a} \pm 0.35$	$10.25^{a} \pm 0.34$	$10.31^{a} \pm 0.35$
3	$14.80^{a} \pm 0.39$	$14.83^{a} \pm 0.43$	$15.25^{a} \pm 0.37$	$16.07^{a} \pm 0.39$
4	$24.33^{a} \pm 0.48$	$24.60^{a} \pm 0.51$	$25.65^{ab} \pm 0.45$	$27.63^{b} \pm 0.48$
5	$35.82^{a} \pm 0.57$	$36.55^{ab} \pm 0.60$	$38.20^{ab} \pm 0.51$	$41.96^{c} \pm 0.56$
6	$49.55^{a} \pm 0.66$	$50.47^{ab} \pm 0.69$	$52.57^{ab} \pm 0.59$	$57.37^{c} \pm 0.63$
7	$64.47^{a} \pm 0.73$	$65.70^{a} \pm 0.76$	$68.35^{b} \pm 0.67$	$73.85^{c} \pm 0.71$
8	$78.20^{a} \pm 0.79$	$79.95^{a} \pm 0.83$	$83.20^{b} \pm 0.74$	$89.18^{c} \pm 0.77$
9	$91.70^{a} \pm 0.82$	$93.52^{a} \pm 0.87$	$97.50^{b} \pm 0.78$	$103.80^{c} \pm 0.80$
10	$104.95^{a} \pm 0.94$	$106.90^{a} \pm 0.91$	$111.10^{b} \pm 0.84$	$117.85^{c} \pm 0.82$

Mean values bearing different superscript in a row differ significantly ($P< 0.01$)

Table 2. Mean monthly body length (cm) of D x (LWY x LR) pigs

Age (Month)	T1	T2	T3	T4
2	$41.35^{a} \pm 0.26$	$41.20^{a} \pm 0.28$	$41.25^{a} \pm 0.25$	$41.68^{a} \pm 0.29$
3	$47.75^{a} \pm 0.29$	$48.05^{a} \pm 0.34$	$48.38^{a} \pm 0.30$	$49.37^{a} \pm 0.32$
4	$55.41^{a} \pm 0.36$	$55.78^{a} \pm 0.38$	$56.35^{a} \pm 0.35$	$58.22^{b} \pm 0.37$
5	$60.21^{a} \pm 0.43$	$60.98^{a} \pm 0.46$	$61.87^{a} \pm 0.44$	$64.37^{b} \pm 0.39$
6	$66.91^{a} \pm 0.50$	$67.02^{a} \pm 0.52$	$69.23^{b} \pm 0.49$	$71.80^{c} \pm 0.45$
7	$73.40^{a} \pm 0.58$	$74.85^{a} \pm 0.57$	$76.25^{b} \pm 0.54$	$78.95^{c} \pm 0.49$
8	$78.90^{a} \pm 0.67$	$79.60^{a} \pm 0.65$	$82.30^{b} \pm 0.61$	$85.15^{c} \pm 0.58$
9	$83.80^{a} \pm 0.76$	$84.85^{a} \pm 0.69$	$87.78^{b} \pm 0.67$	$90.75^{c} \pm 0.63$
10	$87.97^{a} \pm 0.80$	$88.35^{a} \pm 0.77$	$92.50^{b} \pm 0.72$	$95.63^{c} \pm 0.69$

Mean values bearing different superscript in a row differ significantly ($P< 0.01$)

Swill feed supplemented with minerals (T3 and T4) attained significantly (P<0.01) higher body weight than T2 and T1. Organic mineral supplemented group attained significantly (P<0.01) higher body weight (Fig 1) than the other treatment groups. This might probably be due to variation in bioavailability of minerals for the metabolic process in the system. These results are in agreement with Sekar *et al*.(2006).

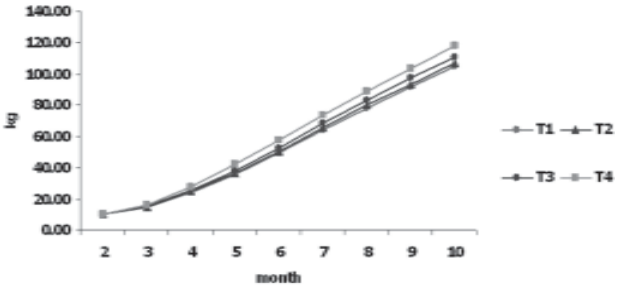

Fig. 1. Monthly body weight of D X (LWY X LR) pigs

Linear body measurements : The effect of different feeding systems on the body measurements of D x (LWY x LR) pigs recorded at monthly interval for body length, girth and height (Table 2,3,4) revealed that there was no significant difference between treatment groups up to 3rd month. From 4th month onwards minerals supplemented groups began to show significant difference in body measurements. There was a positive relationship between body weight and measurements under different treatments with no significant difference in body length, girth and height of pigs between T1 and T2. Swill feed supplemented with minerals attained significantly (P<0.01) higher body measurements than concentrate and swill feed fed groups. Organic mineral supplemented group attained significantly (P<0.01) higher body measurements than the other treatment groups. Pigs fed with mineral supplemented diet had significantly (P<0.01) higher body weight might be attributed for the higher body measurements in T3 and T4 pigs.

Average daily gain : The average daily weight gains (g) of different treatment groups (Table 5) revealed that there was no significant difference between T1 and T2 groups. This is in agreement with findings of Gustafson and Stern (2003). In contrast, Anil (2005) who found that LWY in the field had significantly higher (P<0.01) average daily weight gain than LWY in the farm. Swill feed supplemented with minerals attained significantly (P<0.01) higher average daily gain than T1 and T2 groups. Organic mineral supplemented group attained significantly (P<0.01) higher average daily gain than the other treatment groups. This observation is in line with that of Sekar *et al*. (2006).

Average daily feed intake : The average daily feed intakes (g) of pigs under different feeding systems (Table 5) was statistically significant between T1 and T2. Swill feed supplemented with minerals had significantly (P<0.01) higher average daily feed intake than other treatment groups. Higher moisture content and palatability of the swill feed might have favoured higher feed intake than concentrate feed. This is in agreement with the findings of Adesehinwa and Ogunmodede (2004). Contrary results were reported by Anil (2005), Anton (2005) in crossbred pigs and Kannan (2006) in Large White Yorkshire pigs.

Table 3. Mean monthly girth (cm) of D x (LWY x LR) pigs

Age (Month)	T1	T2	T3	T4
2	$45.32^{a} \pm 0.28$	$45.17^{a} \pm 0.29$	$45.38^{a} \pm 0.31$	$45.60^{a} \pm 0.28$
3	$54.50^{a} \pm 0.33$	$54.57^{a} \pm 0.34$	$55.08^{a} \pm 0.32$	$55.55^{a} \pm 0.30$
4	$63.92^{a} \pm 0.38$	$64.25^{a} \pm 0.37$	$65.02^{ab} \pm 0.36$	$66.50^{b} \pm 0.33$
5	$75.48^{a} \pm 0.43$	$76.07^{a} \pm 0.44$	$78.42^{ab} \pm 0.42$	$80.80^{b} \pm 0.38$
6	$83.27^{a} \pm 0.54$	$84.10^{a} \pm 0.57$	$86.05^{b} \pm 0.48$	$88.23^{c} \pm 0.45$
7	$90.67^{a} \pm 0.61$	$91.92^{a} \pm 0.65$	$94.37^{b} \pm 0.57$	$96.95^{c} \pm 0.49$
8	$97.35^{a} \pm 0.67$	$98.85^{a} \pm 0.72$	$102.25^{b} \pm 0.66$	$105.15^{c} \pm 0.57$
9	$103.60^{a} \pm 0.75$	$104.45^{a} \pm 0.75$	$109.25^{b} \pm 0.69$	$112.50^{c} \pm 0.59$
10	$108.28^{a} \pm 0.82$	$109.00^{a} \pm 0.78$	$114.08^{b} \pm 0.73$	$117.85^{c} \pm 0.64$

Mean values bearing different superscript in a row differ significantly (P< 0.01)

Table 4. Mean monthly height (cm) of D x (LWY x LR) pigs

Age (Month)	T1	T2	T3	T4
2	$28.02^{a} \pm 0.21$	$27.92^{a} \pm 0.21$	$28.10^{a} \pm 0.20$	$28.20^{a} \pm 0.20$
3	$33.20^{a} \pm 0.26$	$33.22^{a} \pm 0.24$	$33.62^{a} \pm 0.23$	$33.22^{a} \pm 0.22$
4	$39.40^{a} \pm 0.33$	$39.55^{a} \pm 0.31$	$40.08^{ab} \pm 0.28$	$41.32^{b} \pm 0.25$
5	$49.05^{a} \pm 0.37$	$49.32^{a} \pm 0.35$	$49.93^{ab} \pm 0.34$	$51.28^{b} \pm 0.29$
6	$57.73^{a} \pm 0.42$	$58.08^{a} \pm 0.41$	$58.80^{b} \pm 0.38$	$60.23^{c} \pm 0.35$
7	$64.20^{a} \pm 0.48$	$64.65^{a} \pm 0.46$	$65.68^{b} \pm 0.40$	$67.05^{c} \pm 0.37$
8	$68.98^{a} \pm 0.53$	$69.47^{a} \pm 0.52$	$71.45^{b} \pm 0.47$	$73.15^{c} \pm 0.42$
9	$72.58^{a} \pm 0.59$	$73.17^{a} \pm 0.57$	$74.28^{b} \pm 0.50$	$76.18^{c} \pm 0.46$
10	$75.75^{a} \pm 0.64$	$76.30^{a} \pm 0.62$	$77.75^{b} \pm 0.58$	$79.80^{c} \pm 0.49$

Mean values bearing different superscript in a row differ significantly ($P< 0.01$)

Feed efficiency : It was revealed that there was a significant ($P<0.01$) difference in feed efficiency (Table 5) between T1 and swill feeding (T2, T3 and T4). Swill feed supplemented with minerals and without supplementation had no significant difference. But there was a trend for better feed efficiency in animals supplemented with organic minerals. This is in accordance with Adesehinwa and Ogunmodede (2004). However, Large White Yorkshire and their crossbreds (75 % Large White Yorkshire x 25 % Desi) had significantly higher ($P<0.01$) feed conversion efficiency in the field fed with swill than the animals fed on concentrate feed in the farm (Anil, 2005).

Carcass characteristics : The carcass characteristics *viz*., slaughter weight (kg), hot carcass weight (kg), dressing percentage, carcass length (cm), back fat thickness (mm), loin *eye* area (cm^2), meat-bone ratio and gut weight (kg) of different treatment groups under different feeding systems (Tables 6) revealed that slaughter weight and carcass length had no significant difference between T1 and T2. This is in agreement with report of Anil (2005) who reported that carcass length did not vary significantly between concentrate and swill feeding. Swill feed supplemented with minerals fed groups (T3 and T4) attained higher slaughter weight than concentrate feed fed groups. This may probably be due to pigs fed with swill had better palatability over concentrate feed contributed for the higher slaughter weight. This result concurs with findings of Anil (2005). However, there was no significant difference observed between treatments by Kannan (2006).

Pigs fed with concentrate feed had significantly ($P<0.01$) higher hot carcass weight, dressing

Table 6. Carcass characteristics of (D x LWY x LR) pigs

Parameters	T1	T2	T3	T4
Slaughter weight (kg)	106.40^{a}	106.90^{a}	111.40^{b}	119.90^{c}
Hot carcass weight (kg)	79.00^{b}	76.70^{a}	81.20^{c}	86.90^{d}
Dressing percentage	74.25^{b}	71.75^{a}	72.89^{a}	72.48^{a}
Carcass length (cm)	79.55^{a}	79.80^{a}	83.35^{b}	87.80^{c}
Back fat thickness (mm)	24.64^{a}	31.31^{b}	30.30^{b}	30.78^{b}
Loin *eye* area (cm^2)	23.41^{b}	19.75^{a}	23.72^{b}	25.04^{b}
Meat-bone ratio	4.30^{b}	3.94^{a}	4.50^{b}	4.56^{b}
Gut weight (kg)	8.32^{a}	11.19^{b}	11.90^{b}	12.21^{b}

Mean values bearing different superscript in a row differ significantly ($P< 0.01$)

Table 5. Average daily weight gain, average daily feed intake and feed efficiency

Parameters	T1	T2	T3	T4
Average daily weight gain (g)	$394.38^{a} \pm 16.23$	$398.82^{a} \pm 17.30$	$418.12^{b} \pm 18.22$	$445.52^{c} \pm 16.75$
Average daily feed intake (g)	$1575.37^{a} \pm 31.55$	$1813.62^{b} \pm 32.48$	$1878.61^{c} \pm 36.10$	$1938.04^{d} \pm 30.24$
Feed efficiency	$3.90^{a} \pm 0.12$	$4.43^{b} \pm 0.11$	$4.37^{b} \pm 0.12$	$4.27^{b} \pm 0.11$

Mean values bearing different superscript in a row differ significantly ($P< 0.01$)

percentage and loin eye area, meat-bone ratio and lesser back fat thickness and gut weight than swill feed. This is in agreement with reports of Sinha *et al*.(1993) with regard to back fat thickness, and Harikumar (2001) who observed that pigs fed on concentrate ration attained a maximum of 19.36 ± 2.2 cm^2 for loin eye area and a minimum of 28.0 ± 0.22 mm for back fat thickness. Meat bone ratio was the lowest in pigs fed on hostel food waste (3.53 ± 0.19). However contrast results were shown with regard to dressing percentage (Harikumar, 2001; Chen *et al*., 1997 and Sinha *et al*., 1993) and back fat thickness (Sarma *et al*., 1996 and Jha *et al*., 1999).

Among swill feed fed groups (T2, T3 and T4) there was no significant difference in gut weight, back fat thickness and dressing percentage. This is in agreement with the findings of Kannan (2006) under different forms of swill feeding in LWY pigs. However meat-bone ratio and loin eye area was improved in mineral supplemented groups and this may probably due to the addition of minerals, which might have enhanced the metabolic process in the system by virtue of their bioavailability.

REFERENCES

Adesehinwa, A.O.K and Ogunmodede, B.K. (2004). *Indian J. Anim. Sci.*, **74(1):**113-116.

Anil, K.S. (2005). *Ph.D. Thesis*, Kerala Agricultural University, Vellanikkara, India.

Anton Roseline, J. (2005). *M.V.Sc. Thesis* , Kerala Agricultural University, Vellanikkara, India.

Chen, Y.C. *et al.* (1997). *J. Chin. Soc. Anim. Sci.* **26:**67-76.

Gustafson, G.M and Stern, S. (2003). *Livestock Prod. Sci*., **80:**167-174.

Harikumar, S. (2001). *M.V.Sc. Thesis*, Kerala Agricultural University, Vellanikkara, India.

Jha, D.D. *et al.* (1999). *Indian J. Anim. Res.* **33:**48-50.

Kannan, A.(1995). *M.V.Sc., Thesis*, Kerala Agricultural University, Vellanikkara, India.

Kannan, A. (2006). *Ph.D. Thesis*, Kerala Agricultural University, Vellanikkara, India.

Sarma, S.S. *et al.* (1996). *Indian Vet. J.* **73:**356-357.

Sekar, M. *et al.* (2006). In: National Seminar on Recent Trends in Animal Welfare and Production, 6th December, Thrissur. India.

Sinha, S.K. (1993). *Indian J. Anim. Sci.* **63:**787-789.

Snedecor. G.W. and Cochran, W.G. (1994). *Statistical Methods*, Iowa State University Press, Ames, Iowa, USA. p.313.