Effect of housing system on carcass characteristics of crossbred (Hampshire x Assam local) pigs

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Abstract

Farms with differing types of housing systems should account for finishing environment in the development of their finishing management protocols. The objective of this study to compare carcass characteristics of crossbred Hampshire pigs under two different housing systems *viz.,* deep litter and conventional concrete floor. From the study of carcass characteristics, it was revealed that slaughter weight, hot carcass weight, dressing percentage, wholesale cut (ham, loin, bacon), meat: bone ratio and edible (liver) were significantly higher in Group II (deep litter floor) whereas, wholesale cut (jowl), edible offal (kidney) and inedible offal (intestine) were significantly higher in Group I (conventional concrete floor) while insignificant effect observed in wholesale cut (picnic and Boston butt), expelled blood, edible offal (heart) and inedible offal (head, fore and hind feet, tail) between Group I and Group II, respectively. It may be concluded that the deep litter system of housing of crossbred pigs is advantageous in terms of carcass characteristics than the conventional concrete floor housing system

Keywords: Crossbred pig (Hampshire and Doom); Conventional concrete floor; Deep litter floor housing; Carcass characteristics.

Introduction

Pigs are generally maintained under confinement for economic and health reasons to optimize higher production output. Although confinement housing of pigs allows optimal thermal conditions to be maintained (Hayne *et al.* 2000), it increases their stress susceptibility (Beattie *et al.* 2000) and restricts the biological and etiological demands of animals (Hotzel *et al.* 2004). Consumers all over the world now-a-days prefer their pork to be produced from pigs maintained on animal welfare friendly systems. In that direction, deep litter floor housing system has attracted the pig farmers for a variety of explicit reasons, including low capital investment, versatility and the perception of positive environmental and animal welfare attributes and the ability to absorb the liquid fraction of the manure.

Studies on effects of housing system on carcass characteristics of pigs have yielded widely differing results. The conventional system is generally considered to be associated with a negative environmental impact and poor animal welfare due to high animal densities and hard floor conditions, and is perceived to result in reduced meat quality Rainelli (2011). Deep litter housing has been proposed as an alternative due to its aforesaid advantages. Hence, the present study has been carried out to determine the effect of deep litter and conventional concrete floor housing systems on carcass characteristics of crossbred (Hampshire x Local) pigs under the agro-climatic condition of Assam**.**

Materials and Methods

Experimental design

40 crossbred (Hampshire x Assam Local) weaned piglets (females and castrated males) of 2 to 3 months of age and with an average body weight of 10 kg were selected from the National Agricultural Innovation Project (Component -2) pig farm located at the Assam Agricultural University, Khanapara Campus, Guwahati. The animals were divided into two equal groups and were housed in two different housing systems. One group was kept in a conventional concrete floor (Group - I) house (Fig 1) while the other group was kept on deep litter floor (Group - II) (Fig 2). The deep litter house was made up of bamboo and locally available materials with a roof height of 8 feet and side wall of 3 feet. The elevated feeding and drinking troughs were made up with concrete. The deep litter composed of paddy husk (60 %), sawdust (20 %) and dry soil (20 %) with a bedding height made up to 30 cm on a compact soiled ground. The overall construction and maintenance cost of deep litter housing system was approximately 40,000/- which was found to be minimal. The bedding materials were changed at 15 days interval till the pigs were slaughtered. Pigs were fed with a compound ration containing 17.50 % crude protein up to 50 kg body weight and thereafter, with a ration containing 15.31 % crude protein as per (NRC, 1998) till 32 weeks of age as detailed in Table 1.

For the study of carcass characteristics, 5 males and 5 females of each group were slaughtered at the age of 32 weeks. Slaughter weight, hot carcass weight, dressing percentage and carcass measurement *viz.*, carcass length, back fat thickness and loin eye area were recorded. The weight of the wholesale cuts *viz.*, ham, bacon, loin, Boston butt, picnic and jowl of both the sides were recorded and the average value was calculated. Data were analyzed for randomized block design with interaction using SAS (Enterprise Guide 4.2.).

Table 1: Composition of experimental rations (%)

Ingredients	Ration	
	Grower	Finisher
Maize	50	55
Wheat Bran	22	22
Groundnut cake (Decorticated)	15	10
Soya bean meal	10	10
Mineral mixture	2.5	2.5
Common salt	0.5	0.5
Total	100	100
Vitamin (g)	10	10
Lysine (g)	30	30
Methionine (g)	15	15
Calculated analysis		
Crude Protein (%)	17.50	15.31
Crude Fiber (%)	2.37	2.80

Fig 1: Housing on concrete floor

Fig 2: Housing on deep litter

Ethical approval

The experiment was approved by the Institutional Animal Ethical Committee, College of Veterinary Science, Khanapara, Assam Agricultural University, Guwahati – 781022 (Approval No: 770/ac/CPCSEA/FVSc/AAU/IAEC/14-15/198).

Results and Discussion

The results on the effect of conventional concrete floor and deep litter housing systems on carcass characteristics of growing-finishing crossbred pigs are presented in Table 2.

The slaughter weight (67.42±059 kg), hot carcass weight (47.85±0.36 kg) and dressing percentage (70.98±0.21) were significantly higher (P<0.01) in pigs reared in deep litter housing systems than those housed on the conventional concrete floor. The findings of the present experiment were in agreement with results reported by (Lebret *et al*. 2011) that the pigs reared in outdoor with bedding produced significantly heavier slaughter and hot carcass weight with higher dressing percentage than conventionally housed pigs.

Carcass measurements *viz.,* carcass length and loin eye area were found to be significantly higher in deep litter housed pigs (73.80±0.40 *vs.* 69.15±0.97 cm, P<0.01) and (24.72±1.85 *vs.* 19.68±0.63 cm^2, P<0.05) than those reared in the conventional concrete floor house while, back fat thickness was found to be insignificantly different between the two groups of pigs. Data obtained from the present study in respect of carcass length corroborate to the report of (Kralik *et al.* 2005). The nonsignificant difference in back fat thickness of the pigs reared under the two housing systems is in agreement with the findings of (Kim *et al.* 2009).

Table 2: Carcass characteristics of crossbred Hampshire pigs

Parameters	Group	
	I	II
Slaughter weight (kg)	62.90±1.92	67.42±0.59
Hot carcass weight (kg)	42.80±1.46	47.85±0.36
Dressing percentage	67.99±0.32	70.98±0.21
Carcass measurements:		
Carcass length (cm)	69.15±0.97	73.80±0.40
Back fat thickness (cm)	1.53±0.17	1.60±0.07
Loin-eye area (cm^2)	19.68±0.63	24.72±1.85
Wholesale cuts (kg):		
Jowl	1.58±0.09	1.27±0.09
Picnic	5.55±0.32	6.17±0.08
Boston butt	5.97±0.20	6.50±0.18
Ham	9.87±0.55	11.79±0.19
Loin	11.77±0.49	13.12±0.26
Bacon	8.04±0.38	8.97±0.16
Meat: bone ratio	3.71±0.06	4.40 ±0.05

Values are expressed as mean ± standard error; n = 40. Significant difference (P < 0.01) between Group I and Group II.

       Data obtained from the present study in respect of loin eye area corroborate well to the report of (Maiorano *et al*. 2012) who reported that pig finished outdoor (bedding) had a larger loin eye area than indoor pigs. Different wholesale cuts *viz.*, ham (11.79±0.19 *vs.* 9.87±0.55 kg, P<0.01), loin (13.12±0.26 *vs.* 11.77±0.49 kg, P<0.05) and bacon (8.97±0.16 *vs.* 8.04±0.38 kg, P<0.05) were significantly heavier in deep litter housed pigs while, the weight of jowl was more in pigs reared in the conventional concrete floor house (1.58±0.09 kg, P<0.05). These findings correspond with the results of (Sirtori *et al.* 2011).

       The average meat to bone ratio was significantly higher (P<0.01) in deep litter (4.40±0.05) than conventional concrete floor housed pigs (71±0.06). Similar result was reported by (Sirtori *et al.* 2011) who observed that pigs reared outdoors had a lower percentage of bone (12.33 *vs.* 12.49) than pigs reared in the indoor system.

       When compared to the conventional housing system, many scientists agree that there is a cost benefit of deep litter housing system as it is 40% cheaper. (Kralik *et al*. 2004) and more favorable for animal welfare and environment protection (Margeta *et al*. 2005). While considering health and disease state, pigs reared on deep litter housing system have found more tolerance to disease development as it is less stressful and eco-friendly. Moreover, because of the bedding materials in deep litter housing, the pigs were less prone to injury in comparison to conventional housing system.

Conclusions

       The current data demonstrate that the deep litter floor housing system significantly influence carcass characteristics of crossbred Hampshire pigs. The deep litter system resulted in significantly higher slaughter weight, hot carcass weight, dressing percentage, carcass length and loin eye area. Wholesale cuts *viz.,* ham, loin and bacon, and meat to bone ratio of the deep litter housed pigs were significantly better than the conventional ones. Therefore, the benefit of the deep litter housing system for pig production in terms of carcass characteristics appears to be better than conventionally reared pigs on the concrete floor.

Acknowledgments

Conflict of interest

    The author declares no conflict of interest for the work presented here.

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