

Performance of Doom pigs under different production systems in subtropical ecosystem of north east India

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Pig husbandry significantly contributes to meet the human protein demand as well as to uplift the socio-economic livelihood of rural people of India. India share only 5.23% of total pork production in the world but the northeastern region of the country consisting of 8 states are contributing 38.5% of India's total pig population (Livestock Census 2012). Interestingly, about 50% of the country's pork is consumed in Northeast India by the way of own production as well as procurement of live pigs from other parts of the country. However, the system of pig production in the states of Northeast India is unique and traditional (Das and Bujarbaruah 2005). The north east region of India has a potential scope for piggery development because of the traditional involvement of local people in pig rearing, their food habits and absence of taboo against consumption of pork and pork products.

Out of the 8 registered pig breeds of the country, 4 are from this region. Among them, Doom pig is distributed in lower part of Brahmaputra valley of Assam and its adjoining areas of Meghalaya state of India. They are typically characterized by small to medium body size, short ears and black coat colour with thick line of hair (bristle) on the crest extending up to lumber region. This breed is well known for their adaptability and production ability in diverse and harsh agro-climatic condition with minimum input. In spite of their unique characteristics, the population of this pig breed showed declining trend which is mainly due to high rate of crossbreeding, lack of breeding policy and lacunae in production system (Banik *et al.* 2016). To adopt a suitable breeding policy and sustainable conservation strategies for propagation and production of Doom pig, a detail study of performance in different production systems in their native tract is utmost important.

Therefore, the present work was designed to study the productive, reproductive and carcass performance of Doom pigs in existing production systems in north east India.

The study was conducted in the breeding tracts of Doom pigs, viz. Dhubri, South Salmara, Goalpara, Kokrajhar, Bongaigaon and Kamrup districts of Assam and its adjoining area of Meghalaya. The breeding tract of Doom Pigs is located at latitude of 25.43 to 26.51°N and longitude of 89.54 to 91.23°E with an altitude of 35 meters above the mean sea level (MSL). It is hot humid sub tropical and high rainfall area with annual rainfall from 1752 mm to 3159 mm and temperature from 23 to 38.5°C in summer and 8 to 24°C during winter.

Under field condition, the farmer's follow two different types of management/rearing system for production and propagation of Doom pigs in their breeding tract, viz. migratory scavenging production system and backyard production system.

In migratory scavenging production system, the pigs are reared in groups with a herd size of 120 to 150 (Fig. 1). Pigs are allowed to migrate from one place to other places in search of food within their breeding tract as described by Banik *et al.* (2016). No specific housing and feeding are provided; animal takes shelter under tree during night time. Pigs primarily scavenges in marshy land and prefers petioles and roots of water hyacinth, colocasia, water lilies, vegetable



Fig. 1. Migration of Doom pig.

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Fig. 2. Scavenging of Doom pig.

plants etc. as their primary sources of feed (Fig. 2). However, temporary housing and locally available feed such as rice beer waste, cooked vegetables are provided during late pregnancy, farrowing period and for sick animal. Migratory scavenging systems are mostly followed by large farmer.

Backyard production system is mostly practiced by small and marginal farmers. In this system, farmers rear around 2 to 7 pigs in backyard (Fig. 3) providing a small house made of locally available materials like bamboo, wood and fed them with locally available feeds, viz. rice beer waste, kitchen waste, cooked vegetables like cabbage, potato etc. Special feeding cares are taken for piglets, pregnant and diseased animals in this system. Similar type of production system was also described by Kadirvel *et al.* (2013).

The relevant information related to production systems and data on reproductive traits were randomly collected from the farmers by providing pre tested questionnaire and visual appraisal. The body weight of the animals at different ages, viz. at birth, weaning (3 months) and adult (8 months), litter weight at birth and weaning were recorded using weighing balance. A total of 58 (42 from migratory scavenging system and 16 from backyard system) and 325 (236 from migratory scavenging system and 89 from backyard system) pigs were utilized for evaluation of productive and reproductive performances respectively. Twelve pigs (six from each production system) were slaughtered for evaluation of carcass characteristics.



Fig. 3. Doom pigs in backyard system.

The statistical analysis of the data were carried out using standard statistical techniques given by Snedecor and Cochran (1994). The productive and reproductive performance and carcass characteristics of Doom pigs between migratory scavenging and backyard production systems were compared using student's *t* test for statistical significance.

The profitability of a pig producer largely depends on productive performance of pig, where management system/rearing pattern play an important role. The comparative productive performance of Doom pigs under migratory scavenging and backyard production system are given in Table 1. Body weight of Doom pigs at birth, weaning and adult were 0.61 ± 0.04 , 8.37 ± 0.32 and 37.76 ± 0.73 kg respectively under migratory scavenging system and 0.65 ± 0.07 , 8.85 ± 0.24 and 38.50 ± 0.65 kg respectively under backyard system. The present study revealed significantly ($P < 0.05$) higher body weight at weaning and pre weaning growth rate under backyard system than migratory scavenging system which might be due to special feeding care of the piglets from birth to weaning under backyard system. The pre weaning feeding management enhances the body weight at weaning and pre weaning growth rate of pig were also reported by Lawlor *et al.* (2002). Pre weaning care is not up to the mark under migratory scavenging system due to larger flock size. Moreover, piglets suffered from stress under migratory scavenging system due to changes in environment leading to poor pre-weaning performance. Changes of environment has negative impact on performance leading to poor body weight gain of livestock were reported by Adeshinwa *et al.* (2003). Besides, lower agility of pigs reared under backyard system might be one of the factors for higher body weight gain and growth rate than migratory scavenging system. Lower

Table 1. Comparative growth performances (Mean $\pm$ SE) of doom pig under different production systems

Growth parameter	Migratory scavenging system	Backyard production system
Body weight at birth (kg)	0.61 ± 0.04 (236)	0.65 ± 0.07 (89)
Body weight at weaning (kg)	$8.37^a \pm 0.32$ (199)	$8.85^b \pm 0.24$ (77)
Body weight at adult (kg)	37.76 ± 0.73 (57)	38.50 ± 0.65 (26)
Pre weaning growth rate (g/day)	$92.71^a \pm 1.33$ (199)	$97.35^b \pm 1.49$ (77)
Post weaning growth rate (g/day)	195.93 ± 2.50 (57)	197.67 ± 1.97 (26)
Pre weaning mortality (%)	$15.68^a \pm 0.17$	$13.48^b \pm 0.12$
Post weaning mortality (%)	$09.16^a \pm 0.10$	$7.44^b \pm 0.28$

Figures in parentheses are the number of observations. Mean with different superscript differs significantly ($P < 0.05$).

agility of the indoor pigs revealed higher weight gain and growth rate reported by Enfält *et al.* (1997) and Heyer (2004). Though there was significant effect in weaning weight and pre weaning growth rate, but no significant effect on adult body weight and post weaning growth rate of Doom pig among the two production system was observed. This could be due to higher adaptability of Doom pigs under migratory scavenging system (Banik *et al.* 2016). The adult body weight of doom pig in both the production system in the present study revealed good conformity with the finding of Banik *et al.* (2016). The present study revealed significantly higher pre and post weaning pig mortality under migratory scavenging system which could be due to the weather change and exposure to adverse climatic condition during migration of animal from one place to another. Adverse climatic condition, viz. extreme temperature results in incidences of diseases and parasitic infestation leading to increase in pig mortality (Johnson *et al.* 2015).

Reproductive performance is associated with the life time productivity of pigs that significantly contribute to the economic return to swine farmers. The reproductive performance of Doom pig under migratory scavenging and backyard pig production systems are presented in Table 2. The mean age at first heat, age at first conception, age at first farrowing and farrowing interval were 211.54±2.01, 232.61±1.89, 346.12±2.91 and 201.03±2.06 days respectively for migratory scavenging system and 223.11±2.51, 245.95±2.38, 359.45±3.02 and 216.43±2.12 days respectively for backyard system. The present findings in both the production systems are in agreement with Banik *et al.* (2016) in Doom pigs. There was significant difference in reproductive performance of Doom pigs between migratory scavenging and backyard production system. Pigs reared under migratory scavenging system revealed significantly ($P<0.01$) lesser number of days for age at first heat, age at first conception, age at first farrowing and farrowing interval. The early puberty of pigs under migratory scavenging system lead to early sexual maturity and farrowing. Attaining puberty at early age could be due

to strong influence of the male as the boars and sows were kept together under migratory system. Exposure of boar to gilt play a significant role in advancement of puberty of gilts as reported by Brooks and Cole (1970), Kirkwood and Hughes (1979) and Kirkwood *et al.* (1981). The litter size at birth and litter size at weaning of Doom pigs were 5.61±0.23 and 4.73±0.10 under migratory scavenging system and 5.68±0.17 and 4.92±0.08 under backyard production system. The present findings are comparable with the findings of Khargharia *et al.* (2014) in Doom pigs maintained under organized farm. There was no significant effect on litter performance between migratory scavenging and backyard production system except for litter weight at weaning where it was significantly ($P<0.05$) higher in backyard production system. Higher litter weight at weaning is due to higher litter size at weaning and higher individual weaning weight in backyard production system. Higher individual birth weight of piglet also influence the litter weight at weaning as they are positively correlated as reported by El-Saied *et al.* (2006).

The mean carcass weight (kg), dressing percentage (%), carcass length (cm), back fat thickness (mm), lean meat content (%) and loin eye area (cm²) of Doom pigs were 27.63±1.49, 73.23±0.76, 46.02±0.59, 24.80±0.36, 52.03±1.33 and 14.74±1.89 in migratory scavenging system and 29.48±1.04, 75.72±0.92, 47.27±0.63, 28.50±0.29, 47.74±1.48 and 15.44±1.61 in backyard production system (Table 3). Significantly higher carcass weight, dressing percentage and higher back fat thickness were observed in pigs reared under backyard system than migratory scavenging system. However, lean meat content was significantly higher in migratory scavenging system than backyard system. The higher back fat thickness and body fat content might be attributed to higher dressing percentage in pigs reared under backyard system. Higher lean content and lower back fat thickness in migratory scavenging pigs might be due to continuous migration from one place to other place which ensured regular exercise of the pigs. Pig reared outdoor revealed lower back fat thickness and high lean meat content were also described by Enfält *et al.*

Table 2. Comparative reproductive and litter performance (Mean±SE) of doom pig under different production systems

Reproductive parameter	Migratory scavenging system (n=42)	Backyard pig production system (n=16)
Age at first heat (days)	211.54 ^a ±2.01	223.11 ^b ±2.51
Age at first conception (days)	232.61 ^a ±1.89	245.95 ^b ±2.38
Age at first farrowing (days)	346.12 ^a ±2.91	359.45 ^b ±3.02
Farrowing interval (days)	201.03 ^a ±2.06	216.43 ^b ±2.12
Litter size at birth (no)	5.61±0.23	5.68±0.17
Litter size at weaning (no)	4.73±0.10	4.92±0.08
Litter weight at birth (kg)	3.42±0.11	3.67±0.06
Litter weight at weaning (kg)	39.59 ^a ±1.19	43.45 ^b ±1.37

n, number of observation. Mean with different superscript differs significantly ($P<0.05$).

Table 3. Carcass characteristics (Mean±SE) of doom pig under different production systems.

Carcass parameter	Migratory scavenging system (n=06)	Backyard pig production system (n=06)
Slaughter age (days)	240	240
Slaughter weight (kg)	37.73±2.11	39.20±1.72
Carcass weight (kg)	27.63 ^a ±1.49	29 ^b .48±1.04
Dressing percentage (%)	73.23 ^a ±0.76	75.72 ^b ±0.92
Carcass length (cm)	46.02±0.59	47.27±0.63
Back fat thickness (mm)	24.80 ^a ±0.36	28.50 ^b ±0.29
Lean content (%)	52.03 ^a ±1.33	47.74 ^b ±1.48
Loin eye area (cm ²)	14.74±1.89	15.44±1.61

n, number of observations. Mean with different superscript differs significantly ($P<0.05$).

(1997), Sather *et al.* (1997) and Bondesan *et al.* (2004). Other carcass traits such as carcass length, loin eye area depicts no significant differences among the two production system in the present study as described by Lebret *et al.* (2002) and Gentry *et al.* (2004). The carcass characteristics of Doom pig among the two production system rectified the higher carcass yield in backyard production system and high quality carcass yield in migratory scavenging system due to its low back fat and high lean content since high quality pork exhibit low back fat and body fat and high lean meat content as reported by Choi *et al.* (2004), Kim (2012) and Larzul *et al.* (1997).

Doom pigs reared under backyard production system has higher growth performance and carcass yield. However, pigs under migratory scavenging system have better reproductive efficiency and quality pork yield. Therefore, our study suggested that backyard production system is more suitable for fattener pig production and migratory scavenging system for breeding pig production. The performance of Doom pig under different production system can be utilized as a useful source of information to implement sustainable breeding policies for economic pig production in the region.

SUMMARY

Doom pig is a newly registered indigenous breed from subtropical ecosystem of north east India. This breed adapt well to the harsh agro-climatic condition with minimum input. The population of this pig breed showed a declining trend, mainly due to high rate of crossbreeding, lack of breeding policy and lacunae in production system. Under field condition, the farmers follow two different types of production systems, viz. migratory scavenging and backyard production system. Doom pigs reared under backyard production system has higher growth performance and carcass yield. However, pigs in migratory scavenging system have better reproductive efficiency and quality pork yield. Therefore, it can be concluded from the present study that backyard production system is more suitable for fattener pig production and migratory scavenging system for breeding pig production. The results from this study can be suitably exploited to design conservation and breeding strategies for newly registered Doom pigs of north east India.

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