

Comparison of Reproductive Parameters of Sow at the Rural Areas of Rangamati District of Bangladesh

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ABSTRSCT

It is imperative to know the reproductive parameters of the existing swine breed for profitable farming in Bangladesh. This study was designed to determine the reproductive parameters of sows at hilly areas. A total of 245 pigs with 47 breedable sows were included. The data on age at puberty, oestrous cycle length, oestrus duration, gestation length, interval between farrowing and onset of oestrus, first service pregnancy rate, service per pregnancy and number of piglets born per sow in local and cross bred sows were determined. The present study revealed that age at puberty of local and cross breed sows was 232.5 ± 8.4 , 221.3 ± 6.9 days, respectively. Oestrous duration was 41.1 ± 3.1 hours. The interval between farrowing and onset of oestrus was shorter in cross bred sows. There was no variation in values of oestrus cycle length and gestation length. The first service pregnancy rate was higher in both the local and cross bred sow. Number of piglets per sow per farrowing was 6.1 ± 2.2 and 60.9% local sows gave birth of 3 to 5 piglets per farrowing whereas 75.0% cross bred sows gave birth of 6 to 9 piglets. These results suggest that reproductive parameters of local sow need to be improved for better production, and cross bred sows should be reared for obtaining expected productivity.

(Key words : Bangladesh, reproductive parameters, sows)

INTRODUCTION

Pigs are fast growing and most prolific livestock breed. Due to these characteristics, they are considered a rich source of animal protein at a low cost. The pigs are reared by poor people who neither have means nor know how to improve production. Indigenous pigs are adopted for survival in most unfavorable condition of malnutrition. In general, pigs are fattened on garbage, kitchen waste and human excreta. Therefore, government endeavor is to improve native pigs by crossbreeding them with superior exotic genes. Exotic breeds include Yorkshire, Landrace, Hampshire and Poland China. Under field conditions, crossbreds are gradually gaining popularity owing to their higher potential for growth. Under such perspective it is imperative that indigenous pig resources might be up-graded to meet the requirement of animal protein (Taneja *et al.*, 1995).

Throughout of 1 billion pigs in the world, about 65% are raised in Asiatic countries (FAO, 2011). Due to the religious point of view and for the limited number of pork consumers, the pig population is not large compared to other ruminants and birds in Bangladesh. But a large numbers of pigs were seen in Chittagong Hill Tracts. Actually, it is difficult to get the exact number of pigs in Bangladesh. But the pig population is increasing in the tribe habited areas. Due to the high number of piglet born, easy rearing with available natural resources, high disease resistance and low production cost, pig rearing is getting importance in the tribal regions to eliminate poverty. The pig rearing continues to be primitive scavenging in nature because the farmers remain backward in education, economy and social activities.

However, it is imperative to know the reproductive parameters of the existing swine breed in Bangladesh. So far it is

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known very limited research work has been carry out earlier in sows to determine parameters of reproduction in Bangladesh. It seems rationale to determine the reproductive parameters of sows resulting in increased productivity and decrease poverty in Bangladesh. Therefore, the objective of the present study was to determine the common reproductive parameters of local and cross bred sow in hill tract areas of Bangladesh.

MATERIALS AND METHODS

The study was conducted in four upazilas of Rangamati district namely- Rangamati Sadar, Naniarchar, Kawkhali and Kaptai. A total of 25 pig owner having 245 pigs (83 pigs from 9 pig owners of Rangamati sadar Upazila, 54 pigs from 5 pig owners of Naniarchar Upazila, 63 pigs from 6 pig owners of Kawkhali Upazila and 45 pigs from 5 pig owners of Kaptai Upazila) was included for the study. Among 245 pigs, 47 were breedable females (sows), 19 were breedable males (boars), 14 were fattening, 45 were growers, 51 were weaning and 69 were piglets. The number of pigs per owner varied from 3 to 16 and data were collected from June 2013 to October 2013.

1. Management of Sows

Traditionally, the swine were managed by grazing on pasture

in small hold farms. All swine had free access to drinking water. There was no restriction of sucking by piglets (Fig. 1). Weaning is occurred naturally in these sows. Boars and sows were kept together and natural mating occurred among them (Fig. 1). The housing system of swine in study area mainly girth tethering system (Fig. 1), fencing system (Fig. 1), and free ranging system. In traditional rearing system sows are tied by rope or chain with a tree or thumb and feed was supplied to them under tied condition. Piglets were kept free until matured. No extra care or management was done for them. Floor of some houses was made of concrete and some were made of sand. Most of the houses of swine were not clean. Farmers are not careful of the general health condition of swine. Limited deworming and vaccination were in practice there. At day, pigs were kept free and they took food from here and there. At night, they were kept in mentioned housing system. Usually feed was given to the pigs two times daily. Sows were fed with fermented rice, rice polish, boiled broken rice and some unconventional feeds like cauliflowers, arum, grass.

2. Methods of Data Collection

In order to make the data collection programme successful, the investigator personally visited door to door to the selected Upazila of the study area. Direct interview method was used

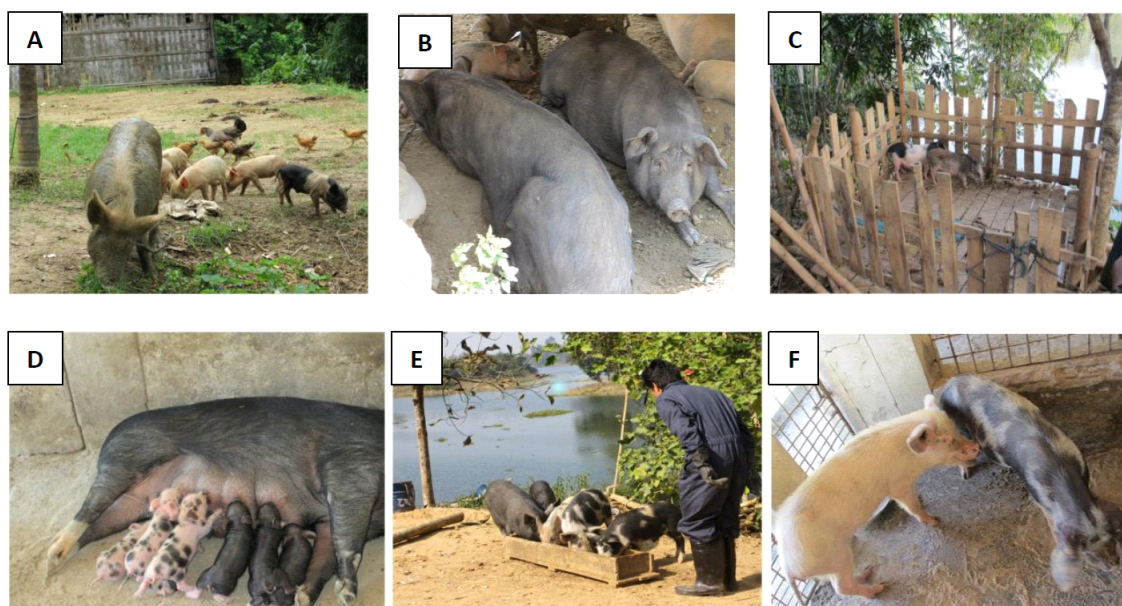


Fig. 1. (A) Local breed sow with piglets; (B) Cross breed sows; (C) The housing system of swine in study area mainly girth tethering system, fencing system; (D) There is no differentiate of suckling by piglets; (E) Feeding system; (F) Boars with sows were kept together and natural mating occurred among them.

for collection of information. Information given by owners of sows was recorded on questionnaire for analysis.

3. Preparation of the Questionnaire

The questionnaire was prepared according to the objective of the investigation and was designed in a simple way so that the farmers could understand easily. The questionnaire included questions to collect information on age at puberty, estrous cycle length, oestrus duration, prominent oestrus signs, gestation period, number of piglets born per sow, parity of sows, interval between farrowing and onset of oestrus and number of services required for each pregnancy.

4. Determination of Reproductive Parameters of Sows

1) Age at Puberty

It was determined by calculating intervals from birth to first detected oestrus of individual gilt and was expressed in days.

2) Oestrus Cycle Length

It was determined by calculating intervals between two consecutive oestruses and was expressed in days.

3) Oestrus Period

It was determined by calculating intervals from the onset of oestrus to the end of oestrus and was expressed in hours.

4) Prominent Oestrus Signs of Sows

Oestrus signs were determined by observing behavioural and physical signs of gilts and sows by the farmers.

5) Gestation Length of Sows

It was determined by calculating the interval between the date of service and the date of parturition. The gestation period was expressed in days.

6) Number of Piglets Born Per Sow

It was determined by counting the numbers of live and dead fetuses delivered by individual sows.

7) Parity of Sows

It was determined by recording the number of parturition occurred by individual sows. Farmers were interviewed to know this.

8) Interval between Farrowing and Onset of Oestrus in Sows

It was determined by calculating by the interval between date of parturition and date of onset of oestrus and was expressed in days.

9) Number of Required Services for Each Pregnancy

It was determined by interviewing the farmers and by calculating the number of services required for each pregnancy.

5. Statistical Analysis

Data were expressed as mean \pm standard error of mean (Mean \pm SEM). To analyze the variance regarding number of piglets born per sow per farrow and number of services required for each pregnancy, Chi-square test was performed. Whereas, to compare data on age at puberty, oestrus cycle length, oestrus period, gestation length, interval between farrowing and onset of oestrus paired "t" was used. All data were analyzed with SPSS software version 17 and *p*-value 1% considered as significant.

RESULTS

The study was conducted to observe reproductive performances of both local and cross breed sows of rural areas in Rangamati Hill District. The present study determined the reproductive parameters viz: age at puberty, estrus duration, estrus cycle length, interval between farrowing and onset of oestrus, gestation length, number of piglets born per sow per farrowing, and number of service required for each pregnancy and values are presented in Table 1.

1. Breed Difference in Terms of Age at Puberty, Oestrous Duration, Oestrous Cycle Length, Gestation Length and Interval between Farrowing and Onset of Oestrus

Breed difference of sow is determined by analyzing the age at puberty, oestrous duration, oestrous cycle length, interval between farrowing and onset of oestrus, gestation length of indigenous sows are presented in Table 2. It was observed that age at puberty in cross bred sows is 221.3 ± 6.9 days and in local sows is 232.52 ± 8.4 days. The mean oestrus duration in local and cross bred sows was 41.1 ± 3.1 , 36.8 ± 2.5 hours. Similarly, shorter duration of estrus 36.78 ± 2.5 hours was observed in cross bred. Shorter (51.54 ± 2.45 days) interval between farrowing and onset of oestrus was observed in cross

Table 1. The overall values of different reproductive parameters of sows in Rangamati district

Parameters	Minimum	Maximum	Average
Age at puberty (days)	170	310	226.8 ± 37.3
Oestrus duration (hours)	15	72	38.9 ± 13.7
Oestrous cycle length(days)	19	25	21.2 ± 1.5
Gestation length (days)	112	117	113.9 ± 1.1
Interval between farrowing and onset of oestrus (days)	38	75	54.4 ± 11.2
No. of piglet born sow/ farrowing	3	13	6.1 ± 2.2
No. of required service for each pregnancy	1	3	1.5 ± 0.6

Table 2. Reproductive parameters of indigenous and cross bred sows in Rangamati district

Parameters	Indigenous sow	Cross bred sow	<i>P</i> value
Age at puberty (day)	232.5 ± 8.4	221.2 ± 6.9	0.305
Oestrus duration (hours)	41.1 ± 3.1	36.8 ± 2.5	0.28
Oestrous cycle length (days)	21.4 ± 0.4	21.1 ± 0.2	0.49
Gestation length (days)	113.9 ± 0.2	113.8 ± 0.3	0.078
Interval between farrowing and onset of oestrus (days)	57.3 ± 2.0	51.5 ± 2.5	0.078

bred sows. It is observed that insignificant ($P>0.05$) differences in value of oestrus cycle length and gestation length.

2. Breed Difference in Terms of Number of Service Required for Each Pregnancy and Number of Piglets Born Per Sow Per Farrowing

The numbers of piglet born per sow per farrowing and number of natural services required for each pregnancy are presented in Table 3. It is found that 3 to 5 piglets per sow per farrowing in 60.9% local sows. Whereas 6 to 9 piglets per farrowing were observed in 75.0% cross bred sows. There was

marked significant ($P<0.01$) difference in piglet's number per sow per farrowing between indigenous and cross bred. Pregnancy rate is considered after service number, it is found that 52.2% local and 66.7% cross bred are pregnant after first service and values are higher when compared to that obtained after second and third services. Whereas, when breed was considered, there is non-significant ($P>0.05$) difference in pregnant sows of local and cross bred in term of service number needed.

DISCUSSION

Table 3. Effect of farrowing and services for pregnancy in the production of piglets

Parameters		Within breed		Within population	
		Local	Cross	Local	Cross
No. of piglet born per sow/ farrowing	3~5	60.9 ^{a*}	12.5 ^a	29.8 ^a	6.40 ^a
	6~9	34.8 ^b	75.0 ^b	17.0 ^b	38.3 ^b
	≥10	4.3 ^c	12.5 ^a	2.1 ^c	6.4 ^a
No. of required service for each pregnancy (%)	Once	52.2 ^a	66.7 ^a	25.5 ^a	34.0 ^a
	Twice	39.1 ^b	29.2 ^b	19.1 ^b	14.9 ^b
	Thrice	8.7 ^c	4.2 ^c	4.3 ^c	2.1 ^c

* indicates significant difference ($P<0.01$) within column; ^{a~c} indicate significant difference ($P<0.01$) within rows.

The study was conducted to assess the reproductive parameters of local and cross breed sows in Rangamati. For this purpose, a survey work was conducted by using direct interview method to determine the reproductive parameters on the basis of a pretested questionnaire. Because of it is thought to be more advantageous than other data collection methods. Since the farmers do not keep proper records of their operation, in this study like other survey works, information from individual farmers was collected.

Age at puberty is one of the important reproductive parameters for any profitable farm animals. The average age at puberty of local and cross breed sows was 232.5 ± 8.4 and 221.3 ± 6.9 days, respectively. Similarly, the age at puberty in European Large White gilts was 8 months (Bon *et al.*, 1979). However, the age at puberty of present study is lower than that of a previous study where the age at puberty was 254.5 days (Sinha, 2012) and higher than that (204.1 ± 28.0 days) observed by Tummaruk *et al.* (2003). Occurrence of puberty between 5 and 8 months of age has been reported in European breeds (Christenson and Ford, 1979; Hughes, 1982). Further photoperiod affected ages at puberty Camous *et al.* (1985). In contrast, occurrence of puberty at the age of 3 months was reported in Chinese Meishan breed (Cheng, 1983). The variations at the age of puberty among different studies might be due to variations in breeds of swine, agro-climatic conditions, feeding and management practices.

The mean oestrous cycle length in local and cross breed sows was 21.4 ± 0.4 and 21.1 ± 0.2 days, respectively and the range varied from 19 to 25 days in this study. These results correspond well with finding of Sinha (2012). The finding of the present study is consistent with previous study where the mean oestrous cycle length was 21 days and it ranged from 18 to 24 days (Singleton and Diekman, 1990). In another study, Motaleb (2013) has reported that the oestrous cycle length of native pigs is 22.2 days.

In the present study, the mean duration of oestrus in local and cross breed sows was 41.1 ± 3.1 and 36.8 ± 2.5 hours, respectively and it ranged from 15 to 72 hours. Similarly, Motaleb (2013) has reported that the duration of oestrus in native pigs was 37.9 hours. Duration of oestrus or heat is variable which may last only 12 hours in gilts or up to 60 hours or more in sows (Singleton and Diekman, 1990). Moreover, Sinha (2012) reported that the mean duration of oestrus was 34.2 hours. In contrast Bennemann *et al.* (2004) reported

that the mean oestrus duration was 59.8 ± 16.3 hours with a range from 24 to 120 hours. The variation in duration of oestrus among studies may be due to variation in breed of sows, environmental and nutrition conditions. Although, the actual time of the onset of estrus is not confined, it is recommended that a female receives at least two mating during oestrus.

The mean gestation length of local and cross bred sow in the present study was 113.9 ± 0.2 and 113.8 ± 0.3 days, respectively. Similarly, average gestation length of 114 ± 2.0 has been reported (Pitcher and Springer, 1997a). Cole and Foxcroft (1982) also reported a gestation length of 114 days in domestic sows and 119 days in wild sows. Furthermore, Sinha (2012) reported the gestation length of native sows of Bangladesh is 114.3 days. The number of CL or the level of progesterone and estrogen had no effect on the length of gestation (Paul *et al.*, 1976).

It is observed that the mean interval between farrowing and onset of oestrus in local and cross bred sows is 57.3 ± 2.0 and 51.5 ± 2.5 days, respectively and it ranged from 38 to 75 days. This result is consistent with the finding of Sinha (2012). The reported mean interval between farrowing and onset of oestrus in local and cross breed sows is lower than that of a previous study where the mean interval between farrowing and onset of oestrus was 86.2 days (Knox and Zas, 2001). Sows generally lack of cyclic ovarian activity during the lactation period (Melampy *et al.*, 1976; Crighton and Lamming, 1979). Normally, plasma progesterone remains at very low concentrations (less than 1 ng/ml) until late lactation or after weaning when oestrus and ovulation occur (Parvizi *et al.*, 1976). In the present study no weaning practice resulting in having long interval between farrowing and onset of oestrus in local and cross bred sows.

The mean number of piglet's production in the present study was 6.1 ± 2.2 . The mean number of piglet production of the present study is slightly lower than that of a previous study where the mean number of piglet production was 7.6 (Sinha, 2012), and higher than that of a previous study where the mean number of piglet production was 5.3 (Motaleb, 2013). Contrasting to the present finding, Halina *et al.* (1993) obtained 12.2 piglets per litter after evaluating 98 farrowings. Cole and Foxcroft (1982) also reported to have 12 piglets per litter in domestic sows and 5 piglets in wild sows. The variation between studies may be due to lower body weight, under nutritive condition, smaller size of the sows and lack of availability of

food in study area. Moreover, an inverse relationship between litter size and length of gestation was reported in sows (Paul *et al.*, 1976).

In the present study, it was observed that the mean number of services required for each pregnancy in local and cross bred sows was 1.5 ± 0.6 . The first service pregnancy rate within the local and cross breed sow was 52.2% and 66.7%, respectively. Sinha (2012) has reported that the mean number of service required for each pregnancy in native sows is 1.4 and first service pregnancy rate is 63.8%. Whereas, Motaleb (2013) has reported that the first service pregnancy rate in native sow was 71.7%, which is higher than that of this present study. A number of factors contribute to the success or failure of breeding in sows. Age, mode of insemination and the number of insemination attempts have been shown to affect rates of success in pregnancy (Flowers and Esbenshade, 1993). In the present study, second service pregnancy rate within the local and cross bred sow was 39.1% and 29.2%, respectively. Usually female swine are more likely to exhibit lower rates of successful breeding during their first four breeding attempts if they had been born in a male-biased litter (Lee *et al.*, 1997). Age of sows and birth litter sex ratio due to lack of records have not included in the present study. However, reproductive pattern and ability are directly involved in overall productivity of animals. Therefore, the reproductive adaptability in the given environment must be considered for any improvement.

CONCLUSIONS

It might be concluded that the age at puberty of local and cross bred sow was 232.5 ± 8.4 and 221.3 ± 6.9 days, respectively. The oestrous duration was longer (41.1 ± 3.1 hours) in local sows. The interval between farrowing and onset of oestrus were shorter in cross bred sows. There was no variation in values of oestrous cycle length and gestation length. The first service pregnancy rate was higher in both local and cross bred sows natural mating. Number of piglets per sow per farrowing is 6.1 ± 2.2 . 60.9% local sows gave birth of 3 to 5 piglets per farrowing and 75.0% cross bred sows gave birth of 6 to 9 piglets per farrowing.

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