Reproductive Performance, Piglet Mortality and Reproductive Health Problems of Sows in The Ejisu Municipality

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Abstract
A cross-sectional study was conducted among commercial pig farmers in the Ejisu Municipality to investigate reproductive performance, piglet mortality, and reproductive health problems on their farms. Questionnaires designed to obtain information on reproductive performance and reproductive health problems were administered to a total of 50 randomly selected pig farmers. Three farms were randomly selected to monitor farrowing and pre-weaning piglet mortality. The farrowing records of a minimum of 10 sows on each farm were taken, and the piglets followed up to the point of weaning by six weeks. Records of piglet mortalities and their causes were retrieved from farm records or post mortem reports. The mean litter size, stillbirth per litter, piglet birth weight (Kg), weaning to estrus interval, and gestation period were 9.5± 1.4, 1.6 ± 0.2, 1.0 ± 0.1, .7±1.0 days, and 115.1± 2.6 days, respectively. The pre-weaning mortality (%) at day 42 was 18.7 and ranged from 7.3-28.3. Within the first two days post farrowing, mechanical crushing (8.9%) of piglets by sows and piglet starvation (7.2%), while diarrhea (2.5%) and piglet anemia (1.5%) accounted for mortalities within the first two weeks of life. Reproductive health problems by frequency of occurrence included mastitis (23%), agalactia (18%), stillbirths (18%), repeat breeders (14%) and dystocia (14%). The study concluded that the reproductive performance of sows was satisfactory, while pre-weaning piglet mortality was high. It is recommended to intensify extension education on the management of piglets after farrowing.

Keywords: reproductive performance, piglet mortality, health problems, sow

Background
The population of pigs in Ghana is estimated to be 730,000 (MOFA, 2016), with the majority produced in the Greater Accra, Ashanti, and Bono regions. The main breeds of pigs include the traditional Ashanti black pig in Northern Ghana and crossbreeds of exotic breeds like large White and Landrace, usually reared on semi-intensive and intensive farms throughout the country. Pig production in Ghana has been commercialized and faces challenges such as the high cost of feed, disease outbreaks, and maintenance of on-farm biosecurity (Okai et al, 2001).

In Ghana, the significant constraints facing pig production include diseases such as African swine fever, piglet mortality, low reproductive potential of the local breeds, and high feed cost (Osei and Adu, 2015).

The profitability of the swine industry relies on sow reproductive performance and piglet mortality. Efforts at improving swine production in developing countries have relied on breed improvement using exotic breeds and crossbreeds between the indigenous and exotic breeds. The reproductive performance of sows in West Africa has been low compared to the pure exotic breeds (Dotche et al, 2018). In Ghana, scanty information is available on the performance of these crossbreeds. Perinatal mortality is a significant concern for the pig industry worldwide, resulting in decreased sow performance and critical economic losses (Houska et al, 2010). The study aimed to investigate reproductive performance, pre-weaning piglet mortality, and reproductive health problems in sows.

Materials and Method
The study was conducted in the Ejisu Municipality of the Ashanti Region. This district is located approximately 15 Km from Kumasi and has a very vibrant Pig Farmers’ Association. Questionnaires designed to obtain information on reproductive performance and reproductive health problems were administered to a total of 50 pig farmers involved in intensive
rearing with average production figures of more than 100. Out of this number, three farms were randomly selected to monitor farrowing and pre-weaning piglet mortality. The farrowing records were taken, and the piglets were followed up to weaning by six weeks. All mortalities were recorded, and their causes were determined from farm records or post mortem examinations. The parameters recorded were expressed in the form of Mean ± Standard deviation and presented in tables.

**Results and Discussions**

**Reproductive Performance**

The reproductive performance of sows in the study area is presented in Table 1. The average litter size, still birth per litter, piglet birth weight (Kg), weaning to estrus interval, and gestation period were 9.5± 1.4, 1.6 ± 0.2, 1.0 ± 0.1, 7±1.0 days, and 115.1± 2.6 days, respectively. These parameters were similar in the farms investigated. The findings are similar to the reproductive performance of the Prestice black tied pigs in the Czech Republic (Nervkla et al., 2016). This breed had a litter size, still birth per litter and gestation period of 9.5 ± 2.4, 1.76/litter and 115.3 ± 1.7 days. The study results are also similar to a mean litter size and weaning to estrus interval of 9.1 ± 2.1 and 5.6 ± 1.7 days, respectively, on a commercial pig farm in Central Ethiopia (Yilma, 2017).

According to Yang et al, 2019, reproductive performance in sows was influenced by parity. A study on twenty sows of different parties found that gestation period was higher (116.7 ± 0.9 days) in sows with parity greater than six, compared to mid parity sows (115.5 ± 1.2 days).

On the contrary, the litter size was larger than the 7.6±3.4 piglets reported by Sinha et al, 2015 in rural Bangladesh. The difference was because, in the latter, the sows were native breeds that were extensively reared. The litter size was also higher than 7.2±1.1 reported among intensively reared in Nigeria (Abah et al, 2019).

The reproductive performance of sows in this study was lower than figures reported in Europe and Asia. For instance, King et al, 2018, reported a total born litter size of 13.7 ± 0.1, and 12.9± 0.1 at first and second parity in Camborough sows reared intensively in North East England. The current study did not consider parity. This difference in reproductive performance was mainly due to the breed involved and the highly mechanized intensive system of swine production practiced in North East England. In recent times concerns have been raised about large litter size and piglet viability (Ward et al, 2020). In commercial piggeries, litter size greater than 16 piglets are common (Roelofs et al, 2019). Large litters are strongly correlated with a proportion of piglets born underweight (<1.0 kg) (Schmitt et al, 2019). In this study, piglet birth weight was lower than 1.49±0.38 Kg reported in Thailand (Nuntapaitoon et al, 2015).

**Table 1: Reproductive performance of sows**

| Parameters                  | Farm A         | Farm B         | Farm C         | Average       |
|-----------------------------|----------------|----------------|----------------|---------------|
| Litter size                 | 9.7±1.2        | 9.2 ± 1.6      | 9.7 ± 2.5      | 9.5±1.4       |
| No of Males                 | 4.6±1.5        | 4.2±1.0        | 4.6±2.1        | 4.5±1.5       |
| No of Females               | 5.0±1.8        | 3.8 ± 2.3      | 4.9 ± 1.1      | 4.9±1.1       |
| Live births                 | 8.8±2.6        | 9.2 ± 2.4      | 9.4±2.6        | 9.1±2.6       |
| Still Birth                 | 2.5±0.5        | 1.1 ± 0.2      | 1 ± 0.1        | 1.6±0.2       |
| Piglet weight at birth/Kg   | 1.1±0.1        | 0.9 ± 0.1      | 0.9±0.1        | 1.0±0.1       |
| Gestation length/days       | 115.7±4.4      | 115.6±1.5     | 114 ± 1.8     | 115.1±2.6     |
| Weaning to oestrus interval | 7.8±0.8        | 8.8±1.1        | 8.0±1.1        | 7.7±1.0       |

**Piglet mortality**

Pre-weaning mortality and its associated causes in piglets was investigated in a total of 405 piglets from 40 sows (Table 2 and Table 3). The pre-weaning mortality (%) at day 42 averaged 18.7 and ranged
from 7.3-28.3. This finding is similar to pre-weaning mortality of 16.9% in Ashanti black pigs at Babile research farms (Abdul-Rahman et al., 2016). There was a wide variation in mortality across the farms based on different farm management issues. The cumulative mortality rate of 18.4 % during the first 7 days of age was higher than 8.6% reported by Nuntapaitoon et al., 2018 in Thailand. On the contrary, the pre-weaning was lower than 31% reported in Nigeria (Abah et al., 2019).

The study reported that most of mortalities occurred within the first 48 hours after farrowing. This finding is similar to the observation by Pedersen et al., 2003, that majority of mortality occurs within the first 2-4 days of life.

Mechanical crushing of piglets by sows and piglet starvation were the leading causes of mortality within this period. Within the first 24 hours of life, starvation accounted for 4% mortality, while crushing was responsible for 3% mortality. On the contrary, within 48 hours after farrowing, crushing accounted for most deaths (5.9%), while starvation was responsible in 3.2% of cases. According to Abah et al., 2019, mechanical crushing (31.3%), splay leg/hypoglycemia (22.3%), sow cannibalism (20.4 %) and starvation (14.9 %) accounted for pre-weaning piglet mortality in intensively managed pigs in Abuja, Nigeria. Mechanical crushing of piglets by sows occurs mainly during the three to four days after birth (Marchant et al.,2000, Nicolaisen et al., 2019) and is usually associated with poor sow maternal behavior, inadequate space in the farrowing pen and low weight of piglets at birth (Mainau et al., 2015). Mechanical crushing of piglets by sows can be minimized by introducing farrowing crates and temporary fixation of the sow during farrowing and a few days after birth (Nicolaisen et al., 2019). According to Nicolaisen et al., 2019, a higher incidence of crushing of piglets occurred in loose housing (both single and grouped) than crate sows.

Starvation is another crucial risk factor associated with piglet mortality and is experienced by low birth weight piglets and sows arriving at farrowing with inadequate body condition (Decaluwé et al., 2013). Piglets with low birth weight are highly susceptible to hypothermia, starvation and crushing (Edwards, 2002). Malnourished sows at farrowing cannot produce enough colostrum as a source of maternal immunoglobulins necessary for passive immune protection of piglets up to three to four weeks of life (Rooke and Bland 2002, Oliviero et al., 2019). Piglets with lower birthweight and signs of intrauterine growth retardation should be provided with additional support to acquire a sufficient amount of good quality colostrum. In this respect, Hasan et al., 2016, proposed using a Brix refractometer to estimate IgG content in sow colostrum. When the IgG is low based on this assessment, farmers will pay attention to their management practices to reduce neonatal piglet mortality.

The study reported diarrhea (2.5%) and piglet anemia (1.5%) as other causes of piglet mortality within the first two weeks of life. Studies conducted in Sweden and Denmark, reported that diarrhea accounted for 5–24% of the overall pre-weaning mortality (Svendsen et al., 1975). In Spain, neonatal piglet diarrhea is caused by microorganisms such as Escherichia coli, Clostridium perfringens types A and C, Transmissible gastroenteritis virus, porcine epidemic diarrhea virus or Rotavirus A (Mesonero-Escuredo et al., 2018).

Table 2: Cumulative piglet mortality (%) by age

| Age      | PBA  | 24 hours | 48 hours | 7 days | 14 days | 42 days |
|----------|------|----------|----------|--------|---------|---------|
| Farm A   | 291  | 12.0     | 15.8     | 19.6   | 20.6    | 20.6    |
| Farm B   | 46   | 13.0     | 26.0     | 28.3   | 28.3    | 28.3    |
| Farm C   | 68   | 4.4      | 4.4      | 7.3    | 7.3     | 7.3     |
| TOTAL    | 405  | 27.4     | 46.2     | 55.2   | 56.2    | 56.2    |
| Average  |      | 9.1      | 15.4     | 18.4   | 18.7    | 18.7    |

* PBA-piglet born alive
Reproductive health problems

Reproductive health problems affecting sows in the study area are presented in Table 4. The five conditions in order of frequency of occurrence are mastitis (23%), agalactia (18%), stillbirths (18%), repeat breeders (14%) and dystocia (14%). These findings are similar to a report in Swedish sows, the common morbidities include mastitis, metritis and agalactia complex (MMA) and farrowing problems (Olson et al., 2019). In a review, Pozzi and Alborali, 2012, pointed out that reproductive diseases in sows were mainly of infectious origin. Such infections negatively affected porcine reproductive and productive parameters. According to Rueff, 2000, reproductive problems in sows are classified as acute or chronic conditions. Acute conditions include abortions, stillbirths and premature litters, while chronic conditions are characterized by low farrowing rates, low live births and a high number of repeat breeders.

| Table 3: Causes of piglet mortality by age |
|-----------------|-----------------|-----------------|
| Age             | Cause of death  | % per litter    |
| 0               | Still birth     | 2.9             |
| 24 hours        | Crushing        | 3.0             |
|                 | Starvation      | 4.0             |
| 48 hours        | Crushing        | 5.9             |
|                 | Starvation      | 3.2             |
| 2 weeks         | Anaemia         | 1.5             |
|                 | Diarrhoea       | 2.5             |

Table 4: Prevalence of Reproductive health disorders

| Condition      | Frequency | Prevalence (%) |
|----------------|-----------|----------------|
| Mastitis       | 5         | 23             |
| Agalactia      | 4         | 18             |
| Still birth    | 4         | 18             |
| Repeat breeders| 3         | 14             |
| Dystocia       | 3         | 14             |
| Abortion       | 2         | 9              |
| Retained placenta | 1     | 4              |

Conclusion

The reproductive performance of sows was satisfactory, while pre-weaning piglet mortality was high. The most prevalent reproductive problems in sows included mastitis, agalactia, and still births.

Recommendation

It is recommended to intensify extension education on management of piglets after farrowing.

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