Reproductive performance of sows in rural communities of Busia and Kakamega Districts, Western Kenya

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This study provided baseline performance of breeding pigs information on local sow productivity that was previously lacking. The objective was to investigate performance of breeding pigs in rural smallholder communities of Western Kenya. A random sample of 288 smallholder farms in Busia and Kakamega districts was selected pigs. The farms were visited three times in the course of the study period, 2006 to 2008. Data on management and productivity were gathered by means of questionnaires administered to sow owners. The average number of sows owned per farm was 1.3±0.6. Sows were bred for an average of 2.18±1.08 days during one estrus. Sows were 12.1±4.5 months old when they farrowed for the first time. They were bred 1.9±1.6 month after piglets were weaned. Sources of breeding boars included borrowed boars from the neighbourhood (77%), farmers` own boars (14%), group-owned boars (0.4%) and those that were free roaming (2%). The average litter size was 7.8±2.6 while the average number weaned was 6.8±3.1. Piglets were weaned at 5.4±3.3 weeks of age. Piglets were reportedly cheaper in Busia (USD 6.36±0.71) than they were in Kakamega (USD 9.71±2.18) (p<0.05). Factors that are likely to influence performance of both sows and boars in the villages are discussed.

Key words: Smallholder pig farms, Western Kenya, sow production, litter size, piglet mortality.

INTRODUCTION

Smallholder pig farming in Kenya is an important livelihood source in many households rural communities. Pig population in Kenya stands at 334,689 and 26% of which is found in Western Province (Census, 2009). Pigs are sold to earn family income which is in turn used to meet basic needs such as buying food, medicine, school fees and clothing. Pigs have short breeding cycles; sows can farrow at least two times in a year yielding multiple piglets at each farrowing. Pigs have short breeding cycles; sows can farrow at least two times in a year yielding multiple piglets at each farrowing. The role of breeding pigs in sustaining village pig production cannot be underestimated. They are the main sources of weaned pigs in the community. The weaned pigs are subsequently reared for marketing or in some cases retained for breeding. There is scanty information on reproductive performance of village sows in smallholder farms (Lanada et al., 1999). in Western Kenya Wabacha et al. (2004a) studied performance of commercial sows in a peri-urban area of Nairobi. The pigs selected in the study were crossbreeds of large white or landrace and were intensively managed, and therefore are expected to...
differ from the local breeds raised in the rural villages of Western Kenya where the current study was conducted. To the authors’ knowledge, there exists no data on the reproduction performance of local sows in the study districts. Such data are important in identifying key intervention areas and in exploring opportunities for improvement in the sector. The primary objective of this study was to provide baseline information on the reproductive performance of sows, investigate the challenges faced by the farmers, and explore opportunities to improved breeding pig farming in the smallholder communities of Busia and Kakamega districts, Kenya.

MATERIALS AND METHODS

Study sites

Detailed description of the study sites and the sampling methodology used has previously been described (Wohlegumut et al., 2010; Mutua et al., 2011). A small-scale pig farmer, for the purposes of this study, is defined as the farmer owning on average 1 to 2 pigs. A sow was defined as any female pig that had farrowed or had been bred in the course of the study period. Pigs kept in the study area are of the local non-descript breed, typically black in colour, sometimes black or brown with white patches and/or spots or white with dark patches.

Data collection

Data used for this study were part of a longitudinal study investigating opportunities for improved pig farming in Kenyan districts of Busia and Kakamega. Briefly, farms were visited three times in the course of the study period. The visits were made 3 to 6 months apart between June 2006 and February 2007 for Busia and between July 2007 and October 2008 for Kakamega. Face to face interviews were conducted using pre-designed questionnaires. During the interviews, data on the reproductive performance of breeding pigs were gathered from farmers that currently owned a breeding pig, and those that had owned one within the previous year. Breeding details were obtained for sows that farrowed in the course of the study period, even if the sow had been sold before the researcher visited the farm during the follow up farm visits. Data also included details on the sale of sows, who bought the sows and the reasons for the sale.

Management and analysis of the data

Data relating to pig breeding were extracted from the larger dataset and screened for potential data entry errors. These were based on biologically feasible parameters such as age of sow at first farrowing being > 10 months but ≤36 months, litter size at ≥1 but ≤20, and the number of times a sow was bred in one estrus ranging from 1 to 4. Data from the three farm visits were combined and analyses performed in Stata® (StataCorp LP, College Station, Texas). Each reason for the sow sale was classified as a “yes” or a “no” based on whether the farmer had identified it as a reason for the sale or not.

The sow production was described using the reproductive productivity variables of the number of live born pigs per litter (NLB), number of pigs weaned per litter, pre-weaning piglet mortality (PWM), age at weaning (weeks), age of sow when first bred (SBA), age of sow when she first farrowed, weaning to breeding interval (WBI) and farrowing to breeding interval (FBI). Inter-farrowing interval was not calculated since most farmers did not keep sows for more than one farrowing. Farmers did not keep records on the ages at which they weaned their pigs, thus average weaning age was derived by asking farmers to state the age at which they sold the piglets after farrowing. This was likely equivalent to the weaning age, as the researchers found piglets were left to roam freely and therefore were allowed to suckle the sow until they were sold. Weaning age typically fell into one of three defined categories; ≤4 weeks, >4 to 8 weeks and >8 weeks. Mortality was calculated as the percent difference in the number of pigs born alive and the number of pigs that were weaned per litter. Farms were categorized into low (<10%), medium (>10 ≤20) and high mortality (>20) farms. Farmers were asked to estimate farrowing to breeding interval (FBI) in months. The weaning to breeding interval was calculated by subtracting the FBI minus the average weaning age for the study, which was 5 weeks. The age of the gilt when she was bred and conceived (sow breeding age; SBA) was calculated as the difference between sow’s age at her first farrowing minus an assumed gestation period (GP) of four months. We asked the farmers to state the average price of the sows sold during the study period. The farmers were further asked to indicate the expected price for each sow sold. On farms where multiple sows were sold before the next farm visit, the highest and the lowest price received was obtained. A conversion rate of 1USD=80KSH was used to convert Kenya shilling to US dollars. Sample means and their standard deviations were used for the normally distributed continuous data such as age at farrowing and litter size. Median value was reported for skewed distributions including the number of times a sow was bred and pre-weaning mortality. Data across districts were compared using student t-tests for the continuous variables such as litter size and piglet price, and, using chi square tests for categorical variables such as the weaning age categories. Level of significance was set at 5% for all analyses. Spearman’s rho statistics were used to measure correlation and association with the number of pigs weaned. This was done as a univariate analysis where p values of ≤0.10 were considered significant.

RESULTS

Sow statistics

A total of 288 pig farms in Busia and Kakamega districts were visited three times in the course of the study period. The total number of completed questionnaires resulting from the three farm visits was 748 resulting therefore in 784 individual farms by time records. In many of these records (68%; 510 /748) farmers had owned a sow either at the time of the visit or within the previous year before the interview. However, In 55% of the records with sow history (280 /510), no sow was present at the time of the farm visit even though these farmers had previously owned a sow. On average, and including only farms where at least one sow was present, farmers owned 1.3 (±0.5) sows. There was no difference (p>0.05) between the average number observed in Busia (1.3±0.05) and that in Kakamega (1.3±0.06). Other livestock species
kept by the 288 farmers were cattle (68%), goats (33%), chickens (84%), and sheep (24%). Challenges reported by the farmers included feeding (65%), poor profits (61%), availability of breeding boars (60%), pigs as sources of conflicts with neighbours (53%), piglet mortality (49%), and diseases (46%).

At each visit, farmers were asked to specify the sources for the sows they owned, specifically, farmers were asked to state if the sows owned had been bought as piglets, bought as growing pigs, bred on the farms, provided as gifts or given freely by the government or non-governmental organizations. The most frequently reported source was that of farmers purchasing weaned female piglets and subsequently rearing them for breeding (45%; 229/510). Others sources identified included sows purchased as growing pigs (6%; 29/510), those given as gifts (1%; 6/510), sows given freely by non-governmental organizations (1%; 6/510), sows purchased as adults (2%; 8/510) and sows bred on the farms and specifically retained for breeding (7%; 36/510). The average prices for sows purchased as piglets (≤4 weeks), as growing pigs (4 to 8 weeks) and as adults were USD 7.74 (±2.23), USD 10.16 (±5.94) and USD 38.25 (±8.55), respectively. Piglets were cheaper in Busia (USD 6.36±0.71) than those in Kakamega (USD 9.71±2.18) (p<0.05). In most records (87%; 447/510), sows were fed equal amounts of feed as that provided to other pigs, particularly on the farms where the sow farmer had multiple pigs.

Breeding of sows

Data on the approximate age at which sows farrowed for the first time was gathered in 53% of the records (Table 1). The average age at which sows farrowed for the first time was 12.1 (±4.5) months translating to an average age at first breeding of 8.1±4.5 months. The mean farrowing to breeding interval (FBI) was 2.7 (±1.7) months while the mean weaning to breeding interval was 1.9 (±1.6) months. Over half of the farmers (57%; n=185) set one day, typically from 08:00am to 18:00pm, as the time for breeding. This duration was not fixed and could vary from as little as few hours to a complete day. The mean number of times boars were allowed to mate sows was 2.18 (±1.16), with a mean of 1.88 (±0.15) for Busia and 2.40 (±0.96) for Kakamega district (p=0.00). The mean number of breeding times was numerically higher on farms that owned a boar (2.17 ±1.30) than that on farms that relied on borrowed boars 1.90 (±1.31). At the time of breeding, farmers walked the sows to a neighbouring farm that owned a breeding boar. Only 17% (48/288) of the farmers owned breeding boars including a 15% (19/124) and a 17% (29/164) in Kakamega and Busia districts, respectively. Sources of breeding boars for farmers whose sows were bred included; boars that were borrowed from a neighbour (77%; 339/439), owned personally (14%; 60/439), group-owned boars (0.4%; 2/439) or boars that were free-roaming (2%; 9/439).

Sows were sold (n=107) for a number of reasons, including; purchase of family food (40%), to pay fees for the children’s schooling (63%), pay medical bills (18%), and purchase of Christmas goods (14%). Other reasons included using the money to build their own houses, buy grazing cattle, to buy farm inputs and cover costs related to feeding the pigs (63%). The mean number of litters sows had before they were sold was 1.04 (±0.21). Those that had sold more than one sow were asked to report both the highest and lowest price received for the sows. If only one sow was sold, the value of that sow was treated as the highest price received by the farmer. Expected price was the price the farmers expected to receive upon selling the sows. Sows were sold at USD 28.58 (±11.68) and USD 32.54 (±12.47) for the lowest and highest prices respectively. The average price expected for the sold sows was USD 35.38 (±13.93). Sows were mostly (91%; 74/81) sold to pork butcher men who subsequently slaughtered them for immediate local consumption. The rest (9%) was sold to neighbours wishing to keep breeding sows.

Weaning age for pigs

Overall, pigs were weaned at an average age of 5.4 (±3.3) weeks. Three age categories at which pigs were weaned were defined as: ≤4 weeks, >4 to 8 weeks and >8 weeks. Fifty six percent (182 /324) of the farmers weaned their pigs at ≤4 weeks, 36% (117 /324) at 5 to 8 weeks and 8% (25 /324) at >8 weeks of age. The mean age (in weeks) at which piglets were weaned was 3.3 (±0.9) for pigs weaned at the age of ≤4 weeks. A higher percentage of farmers in Kakamega were more likely to wean pigs at ≤4 weeks (68%; 77/112) than those in Busia (49%; 105/212) (p<0.05). Pigs were not all weaned on one day but rather weaned one pig at a time depending on when the piglets were sold. Some farmers retained a pig from the sow and these pigs were not weaned until they chose to stop nursing often at a very old age.

Number of pigs born alive

Only two cases of still birth were reported in the course of the study period. The mean number of piglets born alive was 7.8 (±2.6); the average was 7.6 (±2.5) for Busia and 8.1 (±2.6) for Kakamega. The mean number of piglets weaned per sow per litter was 6.8 (±3.1), with a mean of 6.7 (±3.6) in Busia and 6.9 (±2.7) in Kakamega district. Piglet mortality was calculated as: average number of pigs born alive minus the average number weaned divided by the average number of piglets born alive. Median mortality was 0% when all farms were included in the analyses but 27% on including farms where at least...
Table 1. Description of the reproductive performance of sows reared by small-holder pig farmers in Busia and Kakamega Districts.

<table>
<thead>
<tr>
<th>Reproduction parameter</th>
<th>Age at first farrowing</th>
<th>Age at first breeding</th>
<th>Pig born alive per litter</th>
<th>Pigs weaned per litter</th>
<th>Farrow to breed interval (month)</th>
<th>Pre-weaning mortality (%)</th>
<th>Weaning age (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>295</td>
<td>295</td>
<td>366</td>
<td>366</td>
<td>151</td>
<td>365</td>
<td>324</td>
</tr>
<tr>
<td>Percentiles</td>
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<tr>
<td>25th</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>1.5</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>50th</td>
<td>10</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>75th</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>9</td>
<td>4</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>12.1 (4.5)</td>
<td>8.1 (4.5)</td>
<td>7.8 (2.6)</td>
<td>6.8 (3.1)</td>
<td>2.7 (1.7)</td>
<td>13 (26.0)</td>
<td>5.4 (3.3)</td>
</tr>
</tbody>
</table>

one piglet had died. The average pre-weaning mortality rate for all farms was 13 (±26). The mean mortality for medium mortality farms was 15 (±3.2). No case of mortality was reported in 68% (n=365) of the records but was 100% in 3.5% (13/365) of the records. The mean number of pigs born alive was 7.8 (±2.7), 7.9 (±2.0) and 8.0 (±2.5) for farms with the low, medium and high mortality rates (p>0.05), respectively. The mean number weaned per litter was 7.8 (±2.5), 8.0 (±2.5) and 3.2 (±2.5) for the low, medium and high mortality pig farms, respectively. The average number weaned was significantly higher in the low and medium mortality farms than on farms where mortality was reportedly >20% (p=0.000). The average number born alive was positively correlated with the average number weaned (r=0.73) but poorly correlated with the pre-weaning mortality (r=0.02).

Determinants of the proportion piglets weaned

Univariate analyses indicated that the number of pigs born alive influenced the number that was finally weaned. An extra piglet born alive increased the number of pigs weaned per litter by an average of 0.9 of a piglet.

DISCUSSION

The observed small number of sows owned per farm is comparable to what has been reported elsewhere within the tropics (Lanada et al., 1999; Wabacha et al., 2004a; More et al., 2005). Breeding pigs are an important component of pig herds. Their reproductive performance will determine herd size and indeed influence the number pigs available for sale (Lanada et al., 2005). The challenges observed in the current study, including feeding, breeding and diseases, likely had negative impacts on the performance of breeding pigs in the study villages, and will need to be addressed. These challenges were perhaps the reasons why a large number of farmers had no sow present on the farm at the time of the farm visit. Similar constraints were reported in Central Kenya by Wabacha et al. (2004a). Sows should be fed *ad libitum* from weaning to service (Peadar et al., 2007).

Compared to growing pigs, sows are costly to keep explaining the small number of households opting to keep them in the rural communities. For instance, a farmer must purchase a weaned pig and feed her until she is 14 months old before earning money from the animal. Smallholder pig farming in Western Kenya is a fluctuating business with the likelihood that farmers keep pigs...
at specific times of the year, perhaps when they have feed available for the pigs. It is a promising source of income, since pigs including sows, can be sold at any time to meet immediate family needs. The risk is that most sows in our study were sold after weaning their first litter, and were sold to local butcher men for slaughter and subsequent sale at the nearby market centres. Aherne et al. (1999) and Lanada et al. (2005) noted that the breeding life of most sows is prematurely ended when sows are sold to generate cash for the family and meet basic household needs. Breeding pigs should be sold for reasons related to declining performance (Lemke et al., 2006). A reduction in both the grower and breeding pigs in the population will reduce the availability of weaned pigs for farmers wishing to use pigs as a step out of poverty (Thornton et al., 2002). Kagira et al. (2010) observed that butchers in Western Kenya slaughtered pregnant pigs. The reduction in sows in the villages will reduce the number of weaned pigs available for other farmers to purchase as growing pigs for the meat market. This problem is further exacerbated by the reduction in the number of boars.

The major source of sows was weaned piglets purchased locally and subsequently reared for breeding. It may have been difficult for the farmers to get pigs elsewhere, for instance from commercial settings, given the poor rural infrastructure and their preference for some breeds. Pigs raised in the study areas are of the local genotype, not well defined, mostly tethered and breeds. Pigs raised in the study areas are of the local genotype, not well defined, mostly tethered and sometimes allowed to free range on their own (Githigia et al., 2005; Mutua et al., 2011). The performance of local genotype is questionable, and is obviously lower than that of the exotic breeds (More et al., 1999; Lemke et al., 2006; Phonepaseuth et al., 2010), pig farmers could be encouraged to keep more of the exotic breeds, but according to Lemke et al. (2005), introducing exotic breeds is disastrous and could potentially lead to decreases in the local pig population. Local pigs are easy to manage, have low input requirement, are resistant to diseases and provide an important source of household income for many needy families (More et al., 2005; Lekule et al., 2003).

This study showed that most sows are bred from a local boar owned by a neighbour. Our findings agree with Kagira et al. (2010) who found that few farmers (3.7%) keep boars. We note that a decrease in the numbers of boars may result in a loss of pig breeding capacity in the village. The fact that only few farmers keep breeding boars is risky and could severely affect the swine industry in Western Kenya. If a village does not have a boar, then farmers will be forced to sell the sow for meat because she cannot be bred. This translates to lost production.

The role of boars in pig herds was discussed by Langendijk et al. (2002). A number of problems have been known to discourage farmers from keeping breeding boars in the past including the animals becoming aggressive and the cost in feed and time to maintain the boar. The high cost associated with the raising boars is perhaps the main reason for the decrease in the number of boars owned by households in the current study. In the study by Wabacha et al. (2004a), boar keeping was considered uneconomical in Central Kenya and farmers opt to use hired boars instead of raising their own boars. In Nepal, farmers are reluctant to keep breeding boars because of the associated costs (Lanada et al., 2005). The usual price for boar service in Western Kenya is a weaned piglet, which is paid once the piglets are weaned following a successful mating. This observation is similar to what Lanada et al. (2005) reported in the Philippines. Sows need to be mated a number of times to enhance productivity; the importance of multiple matings has been described in the paper by Dewey et al. (1994) and Vickie et al. (1998). Thus for increased productivity, pig farmers should be encouraged to mate their sows multiple times each farrowing. This will increase litter size and ensure more pigs are available for sale even after paying for the boar service.

The use of local boars and the purchase of piglets from the government farm are the only options for farmers to improve the genetic potential of their pigs. For breeding, sows are typically walked to the farm that owns the boar. Sows stay at that farm for a few hours before they are walked back. Experiences in the field has shown that boar owners limit the duration of time the sow stays with the boar, citing problems of overuse and their reluctance to be responsible to feed the sow. The owners of the boar do not wish to accept the responsibility for feeding the sow. The observed number of days and the number of times the boars mated the sows was relatively small and is expected to impact on litter size. Ideally, each boar should be used for one double service each week (Paedar et al., 2007). Previous research reported that sows bred only once during estrus have lower litter size than those bred two or three times during estrus (Dewey et al., 1994). The use of borrowed boars is risky and can create opportunities for inbreeding. If boars are scarce and sow owners have to travel long distances to have their sows bred, disease transmission between villages may occur. This is quite possible particularly on farms where the sows were reportedly mated by roaming boars. Similar problems have been reported elsewhere, for example in Nepal, problems of inbreeding and lack of boars for service is common among the smallholder farms (Lanada et al., 2005). Boars with genetic defects are known to affect fertility and should not be used for breeding. Pig confinement coupled with controlled mating are important factors that need to be considered when instituting simple biosecurity measures for disease control at the village level.

The average number of pigs born alive compares with what was reported for the indigenous genotype in Zimbabwe (7.9 pigs), South Africa (7.2 pigs), Nigeria (6.5 pigs), and Ghana (6.3 pigs), (Dzame et al., 1995). In South East Asia, Kunavongkrit and Heard (2000)
reported a mean of 8.96 and 8.94 piglets born alive per litter for Landrace and Large white breeds respectively. Litter size observed in the current study is slightly lower than what has been reported elsewhere in Kenya. The average number of piglets per litter in commercial farms in Kenya was reported as 9 (KARI, 1996), Wabacha et al. (2004a) reported a median of 9 pigs; the current study reported a median of 8 pigs. The low litter size could be attributed to the fact that the pigs dealt with in the current study were of the local (non defined) genotypes, the low levels of feed provided to the sows, breeding the sows on only one day when they are in estrus and not keeping the sows for multiple litters. Litter size increases with increases in parity (Dewey et al., 1994; Koketsu and Dial, 1997; D’Allaire and Drolet, 1999). In particular, the most productive parties based on litter size, numbers of pigs weaned, and farrowing rate are parities three to five.

Pigs in Western Kenya are sold early in life, and sometimes, the farmers have to pay for the pigs, commonly referred to as “booking” for fear that the piglets could be sold to another willing farmer. The high local demand for weaned pigs presents an opportunity for the sow farmer to boost his income through increased piglet production. This advantage can only be realized if farmers are willing to adopt better management practices, particularly in feeding of the sows and retaining sows multiple parities. Improved profit from piglet production, as stated by More et al. (2005), is a direct benefit to smallholder families.

Piglet mortality is an important constraint in smallholder pig farms, occurs in the first 4 weeks of life and approximates 20% in many countries (Lanada et al., 1999; More et al., 2005). It is therefore not surprising that farmers in the current study identified pre-weaning mortality as one of the challenges affecting the local pig sector. The average number of weaned pigs per litter has been shown to be directly influenced by the average number born alive and pre-weaning mortality (Wilson et al., 1986). The median mortality (0%) reported in the study is comparable to that reported in the Philippines by Lanada et al. (1999), but lower than that of 12% observed by Wabacha et al. (2004a) in Central Kenya. This difference could be attributed to a number of factors including differences in weaning ages. The early weaning observed in the current study may have biased the estimation of the true piglet mortality in the target population. Details on the causes of observed mortalities were beyond the scope of study, however, obvious signs of piglet and sow negligence particularly with regard to feeding and housing, were observed (Mutua, personal communication). Enteritis, low birth weight and overlay are common causes of piglet death (Aherne et al., 1999; More et al., 2005). Sows in the study area are not vaccinated against *Escherichia coli*, a common cause of pre-weaning diarrhoea. Additional complaints by the farmers included farmers talking about pigs being born in the rain and getting chilled and eventually dying. One concept of importance is feeding sows sufficiently to be able to feed the piglets (Aherne et al., 1999). Piglets require a place where they can stay warm and dry until they are at least 3 days old, when they can maintain their own body temperatures; confining breeding sows is one strategy that could be used to implement this management practice.

A wide variation in the length of piglets suckling period has been reported (Kunavongkrit and Heard, 2000). Early weaning at less than 4 weeks of age reduces litter size in subsequent farrowing, decreases growth rate and increases mortality (Wilson et al., 1986; Main et al., 2004). Again, uterine involution takes place 2 to 3 weeks post farrowing, early weaning may cause reduction during the next farrowing. Although a sow can do well reproductively if weaned at 3 weeks, piglets weaned at 3 weeks will require very expensive and highly specialized easy-to-digest commercial feeds. The weaning to breeding interval observed is shorter than that of 3.1 months reported by Wabacha et al. (2004b) in commercial smallholder farms. Increased lactation length decreases weaning-to-first-service interval and weaning-to-conception interval and increases litter weaning weights (Koketsu and Dial, 1997). The sows in this study were given limited feed and therefore likely lost body condition during lactation. Feed intake has a significant effect on sows’s reproductive performance (Koketsu and Dial, 1997). Farmers did not keep any records particularly during the initial farm visit and the research project relied on what these farmers could remember. There was potential for recall bias since not all the farmers could remember the reproductive details for the sows they previously owned (Dohoo et al., 2003), however, we believe the bias was not so great considering the small numbers of sows owned per farm. Most farmers had only 1 sows and therefore their recall of the numbers of piglets born and sold at weaning was likely accurate. Due to the problem of poor record keeping, and the low number of breeding pigs kept, and the early culling of sows, it was not possible to estimate other production parameters. This study provided useful data on sow productivity that was previously lacking in breeding pig. Although such data are rare, they are obviously needed to determine baseline situations that would then be used in determining opportunities for improvement in smallholder pig farming systems.

**Conclusion**

The role of breeding pigs in the sustainability of rural pig sector cannot be overlooked. The performance in Western Kenya is sub-optimal and does not reflect the sows’ true potential. A reduction in pre-weaning mortality will not only increase the number of pigs available for sale but will ultimately increase the number of sows available for breeding as well. There is need to promote
rural extension services to encourage better management, breeding and feeding of the pigs, among other livestock species. Owners of sows need to be encouraged to keep sows for more than one litter to maximize the opportunity for reproduction performance. This will include increasing litter size, decreasing culling rates, decreasing pre-weaning mortality and increasing the number weaned per litter. Future research should be directed at identifying simple interventions to increase local sow production to enhance the economic opportunities for the smallholder pig farmers in the rural settings of Kenya.

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