

Research Article

Sheep Reproductive Performance and Lamb Survivability under Mature Oil Palm

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Abstract: The study examines the seasonal reproductive performance of sheep reared under oil palm plantation and the subsequent survival of lambs up to weaning age. On-station studies were carried out from 2007 to 2010 at CSIR-Oil Palm Research Institute, Kusi (001.45 W, 0600 N and 150 m above sea level). The average total rainfall is about 1600 mm/annum with average daily maximum temperature of $32\pm 2^{\circ}\text{C}$. Sheep productivity (% lambing, litter size per ewe, survival rate, monthly birth and death rates) were the variables measured. An annual average of 58 ewes and 4 lambs were used. Results show that while lambing rate was 98%, lamb survival was 63.84%. This implies that almost two-fifth of yearly reproduction was lost to mortality with significantly large number of lambs dying in August. Though there was high percentage of lambing, this was offset by high mortality of lambs.

Keywords: Lamb mortality, lamb survivability, oil palm sheep-integration, sheep productivity

INTRODUCTION

The inter row areas between oil palm stands are usually covered with vegetation which forms a natural pasture and can be utilized as forage for livestock production. The oil palm plantations therefore provide not only a favorable climatic environment but also good quality forage with a high metabolisable energy and crude protein content for animal production (Chen, 1991).

Integrating sheep under oil palm results in; reduced competition for the oil palm from weeds, an important source of income before the oil palm enters production, supplemental income during oil palm production, enhances soil fertility from faeces and urine and diversifies agricultural enterprise as hedge against fluctuating commodity prices and lesser soil compaction (Thomas and Bradford, 1990).

Sanchez and Pond (1991) observed that the economic return from small ruminants is dependent upon productivity (number of lambs produced annually per ewe) of animals and the extent to which the animals can reduce the cost of weed removal. Reynolds (1988) noted that the contribution of beef to the gross farm income increased from 21 to 46% for a farm with natural pasture under tree crops.

Sheep reproduction is affected by the environment (Sanchez and Pond, 1991). Among the climatic factors that may impose stress on the reproductive performance trait on sheep include ambient temperature and humidity (Marai *et al.*, 2008). In general, sheep are susceptible to a lowering reproductive ability during times of high ambient temperature and humidity

(Khusary and Ariff, 1990). Exposure to high temperature results in physiological changes that lead to low body weight and impaired reproduction in sheep (Habeeb *et al.*, 1992). Marai *et al.* (2008) observed that sexual activity of sheep in tropical and subtropical areas may be restricted, to a certain extent, during months with high temperatures and lack of feed. The effect of heat stress is reflected in increased rectal temperature and reduced food intake which results in reduced growth. Continuous exposure to high environmental temperature results in reduced fertility and libido in male sheep (Khusary and Ariff, 1990). Chen (1989) has observed that temperature under the canopy of tree crops is $2\text{-}3^{\circ}\text{C}$ lower at mid-day as compared to that in the open. This probably provides a better microclimatic condition for animals raised as a component of tree crop-livestock integration. Reynolds (1988) postulated that as far as animal production is concerned the provision of shade lowers heat loads on animals and thus, is likely to have a positive effect on productivity.

The adoption of livestock integration with tree crops such as coconut; oil palm etc has not been very much accepted nor researched into in Ghana. Information on the productivity of an integrated sheep-oil palm production system is very limited in Ghana.

To promote interest of plantation owners towards sheep-oil palm integration, adequate information on the performance of the animals in the plantation and relevant technology in livestock production is required. Since sheep contribute enormously towards promotion of livelihood security (Ramesh *et al.*, 2012) improved understanding of the reproductive performance of sheep in oil palm-sheep integration will increase the level of

adoption of the practice. The impact of oil palm plantation on reproductive performance and lamb survival therefore requires definitive study to provide adequate information to enhance adoption.

The study therefore seeks to:

- Determine if the condition under the oil palm is a contributory factor to the rate of reproduction and subsequent survival of lambs up to weaning age.
- Which months of the year are favorable for sheep littering under oil palm plantation.
- Which months of the year are detrimental to lambs.

MATERIALS AND METHODS

The on-station study was conducted at CSIR-OPRI, Kusi (001.45 W, 0600 N and 150 m above sea level). The average total rainfall is about 1600 mm/annum, with daily maximum temperature of $32 \pm 2^\circ\text{C}$. Native herbage under the oil palm trees were used as feed.

The breed of sheep used in the study was Nungua blackhead. The animals were allowed to graze on the undergrowth available under the oil palm over an unlimited area, daily between 1000 and 1600 h. This was however supplemented with mineral lick ad libitum. Drenching was done on monthly intervals to remove internal parasites. All ewes which reached sexual maturity were selected at the beginning of each year for observation.

The mating system practiced in the integration was using rams at the ratio of one ram to fifteen ewes. The rams run together with the ewes at all times. After parturition, lambs were allowed to suckle the dams for sixty days. During this period record of all lambs that survived and those that died was kept.

The data collected was subjected to statistical analysis, using SPSS 16.0.

RESULTS

Reproductive performance of ewes under mature oil palm: The reproductive performance measures the mothering ability of ewes as well as their prolificacy. Table 1 shows average lambing rate of 98% over the period of the study. Lambs born per ewe was 0.95, indicating rare occurrence of twinning among the ewes. The average lambing percentage between 2007 and 2010 was 98% with a litter size of approximately 1. Lamb survivability was 63.84% an indication of almost two-fifth of yearly reproduction was lost to mortality.

The sheep reproduce all year round. Mean monthly reproduction ranges between two (in January) and seven (in October) Fig. 1. Statistically these births are not significantly ($p = 0.05$) different among the months of the year. However, slightly high lambing of ewes was observed in the months February to June, October and December.

Figure 2 shows mean monthly mortality of lambs during the period of study. Mean monthly mortality

Table 1: Reproductive performance of sheep under mature oil palm from 2007-2010

Traits	Mean
Number of ewes	58.00±3.89
Number of lambs	55.00±2.12
Lambing percentage	98.00±3.44
Number of lambs born/ewe/year	0.95±0.05
No. of lambs weaned/ewe/year	0.65±0.08
Birth weight (kg)	1.95±0.50
Weaning weight (kg)	11.59±2.50
Survival percentage	63.84±8.15

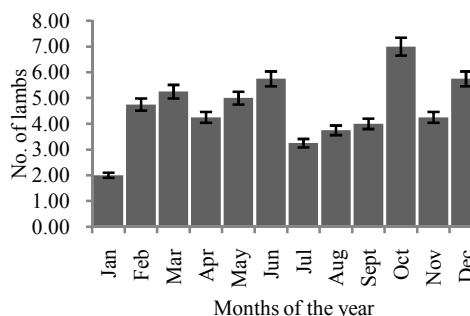


Fig. 1: Mean monthly lambing performance of ewes under oil palm between 2007-2010

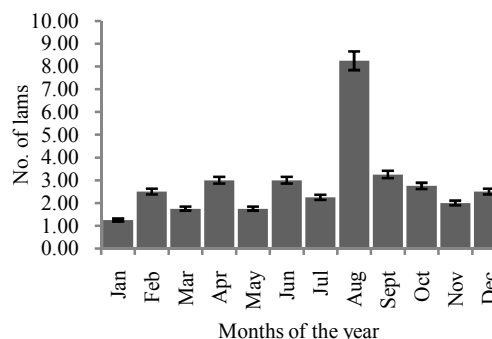


Fig. 2: Mean monthly mortality of lambs in sheep reared under oil palm-sheep integration between 2007-2010

ranges from 1.25 in January and 8.25 in August. Statistically the mortality rates were not significantly ($p = 0.5$) different among the months of the year except August which recorded significantly high death among lambs compared to the rest of the months of the year.

DISCUSSION

The most important factor in determining profitability of a sheep enterprise is reproduction. If a sheep will not reproduce, it is worth no more than its current slaughter value. According to Khusary and Ariff (1990), ewe productivity is determined by the ability of the ewe to wean lambs by weight of lambs weaned per ewe or number of lamb weaned per ewe. This therefore measures the mothering ability, lamb growth ability and lamb survivability. In this study lamb born per ewe is 0.95, (Table 1), indicating that twinning among the ewes was rare. The average lambing percentage between

2007 and 2010 was 98% with a litter size of 0.95, approximately 1.0. This is however better than 45.5% and a litter size of 1.1, respectively observed by Khusary and Ariff (1990), between 1982 and 1985 in similar study. In this study lamb survivability observed was 63.84% compared to 79% observed in West African sheep, (Thomas and Bradford, 1990). The mothering ability of the sheep was above average as seen in the number of lambs that reached weaning age. The all year round reproductive ability of the sheep may have resulted from generally less or non variation in daylight length which makes indigenous ewes in the tropics and sub-tropics to breed throughout the year (Jainuden and Hafez, 1987).

Lamb mortality: Mortality rate observed in the study was relatively high compared to the number of births recorded for each month. This however is expected as earlier reports (Thomas and Bradford, 1990; Chen, 1989), have indicated high mortality in lambs raised under oil palm in the humid tropical regions. The abnormally high mortality recorded for the month of August (Fig. 2) in this study is a confirmation of such challenges (high temperature and humidity associated with high disease incidence) that constrains animal productivity in the humid tropics (Iniguez *et al.*, 1990). Notwithstanding important aspect of such animal-plant integration system of biomass recycling, converting crop residues and weeds into a source of cash income and reducing competition from the under-storey vegetation (Reynolds, 2001), the high lamb mortality could offset any increase in productivity. This however, may not negate the synergistic interactions, which have a greater total contribution than the sum of their individual effects (Reynolds, 2001). It is therefore essential to identify the exact cause of high mortality and to remove the constraints.

CONCLUSION

Under oil palm-sheep integration, the sheep could reproduce throughout the year. Sheep productivity is therefore high. At the same time however high mortality occurred at every month of the year with peak occurring in August. Implications are that the productivity of sheep could also be offset by high mortality associated with such enterprise. Therefore, the exact cause of this high mortality should be identified to improve the profitability of the system. This therefore provides opportunity for further research.

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