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The effect of management system on camel milk yield, composition and reproductive performance in Sudan.

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Introduction

Sudan ranks the second country in the world camel population; according to last estimation of camels in Sudan are 4.715000 heads (MARF, 2011). Most camels are raised within pastoral systems in western Kordofan, Darfur and eastern regions of the country, also some camels raised in the rain fed-cultivation areas in central Sudan. The camel production systems in central Sudan were maintained under intensive, semi-intensive and traditional system. In traditional management system the camel productive and reproductive traits are low. The main constraints facing camel pastoral systems are camels loose their base environments and desire of the herders to settle in towns.

The present study was prepared to evaluate the impact of farming system on she-camel milk yield, milk composition and Progesterone concentration hormone level.

Material and Methods

Study area

This study was carried out in the rain fed-cultivation areas in central Sudan (Sennar state).

Experimental work:

Arabian camel of *Nefidia* ecotypes at different ages were used in this study, thirty six lactating she-camels and their calves were selected, the animals were divided into three groups (12 she-camels in each group). The first group was managed under semi-intensive system in which the animals were kept during night in closed pen and set free during mid-day and supplemented in the evening with diet composed from 25% ground nut cake, 25 % sesame cake, 30 % sorghum grains and 20% wheat straw. However, camels in this system were left to graze or spent 12 hours/ day grazing. Whereas, the second group was maintained on intensive system; where, animals were kept in the experimental farm during all the time and received 15 kg/head/day roughages (30 % sorghum stalk, 35 % sesame straw and 35 % sorghum straw) and supplemented with the concentrate (3 kg/head/day) the same for the first group. The third group was served as a control (under traditional system) all animals managed traditionally in the rain-fed areas after harvesting crops. In this system the animals are brought to graze in the open field freely the available plants, agricultural-residues and without

supplementary feeding, with the exception of offering salt in the wet season. Camels rearing in traditional system grazed and walked about 18 hours/day.

Data of milk yield and milk chemical composition were collected in addition to blood samples were collected for determination of progesterone hormone concentration by using radio immune-assay (RIA) kits in Soba laboratory, ten ml of blood were collected into tubes at monthly intervals starting 10 days after parturition and continued until the animal was confirmed pregnant by non-return to oestrus. Blood serum was stored in a sealed plastic container at 20^o C until assayed for progesterone. Progesterone concentrations in blood serum were measured using the solid-phase RIA system supplied by the Joint FAO/IAEA Division (Plazier, 1983). Progesterone concentrations greater than 1 nmol/L was considered as indicator to cyclic ovaries.

Statistical analyses

Data were analyzed by least square mixed model (Harvey 1990).

Results and Discussion

The study revealed that she-camels under intensive and semi-intensive systems produce significantly ($P<0.05$) more milk than those raised under traditional system (Figure 1). It was observed that improving management increased milk yield three times compared to she-camels under traditional management, the significant difference ($P<0.05$) in milk yield between intensive and semi-intensive systems appeared after the 6 months of lactation. High yield of milk in intensive system may be due to the supplementary feeding and improved of nutritive value of the feeds offered to this group. Similar results were obtained by Farah and Fischer (2004) whom reported that milk yield varies with breed, stage of lactation, feeding status and management conditions; also this result is similar with Bakheit (1999) who studied camels' performance under pastoral systems in Sudan.

Furthermore, lactation peak was observed at the 4th month of lactation with the mean value of 10 litre /day obtained from both intensive and semi-intensive systems, and 5 litre/day from the traditional system. These results contrasted the findings reported by Bakheit (1999) who found that peak was observed at the 4th month of lactation in western Sudan. This may be attributed to the differences in nutrition conditions and feeding regime applied for camel production in western and central Sudan. On the other hand, milk composition showed that the differences among the three studied production systems and during the production seasons. As shown in Table (1) protein contents attained higher values in intensive and semi-intensive systems as compared to the traditional system. Fat contents, ash and total solids contents followed the same trend of protein, they were significantly ($P<0.05$) higher than the results obtained from traditional system. These findings were in line with the results reported by Gnan and Sheriha (1986). The differences in values of camel milk compositions in the three

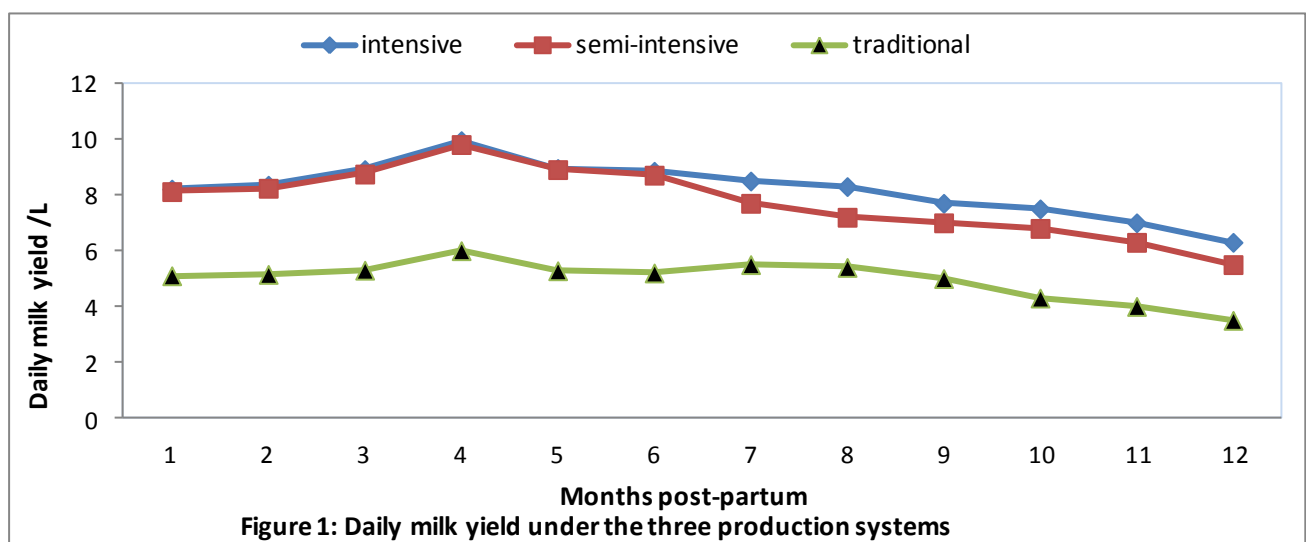
systems could be attributed to the improved level of feeding for camels raised in intensive and semi-intensive system.

The level of progesterone hormone levels increased from the 9th month post-partum till it reached the peak in 13th and 14th months postpartum before started to decrease gradually. Its profile showed the lowest level in the traditional system (Figure 2). The study indicated that more than 75.2% of the camels reared under intensive and 80.8 % semi-intensive systems became pregnant early; however only 45.3% were were pregnant late in the traditional system. She-camels start to be pregnant at the 8th month postpartum that means the supplementation stimulated the ovarian activities. In accordance to these results, farming system had a clear effect on the progesterone hormone concentration in camel. This may be attributed to pregnancy which took place earlier and that occurred in high percentage in she-camels reared in intensive and in semi-intensive systems.

Fertility of she-camels kept under traditional system was showed to be low percentage (45.3%) compared to the other groups. This was largely correlated with nutritional and other environmental stress. Similarly, other studies revealed the low fertility of zebu cattle in tropical and subtropical areas reported by Fitzpatrick (1993). Similar results revealed by Eisa (2006) who studied the productive and reproductive characters of camels raised in Butana area Eastern Sudan.

Conclusion and Outlook

The result of the present study indicated that, supplementation of she camels under intensive and semi-intensive system increased daily milk yield and improved milk chemical composition, also the study indicated the importance of the nutritional status of she camels on body weight of the calves to improve production and reproduction performance of the animals.



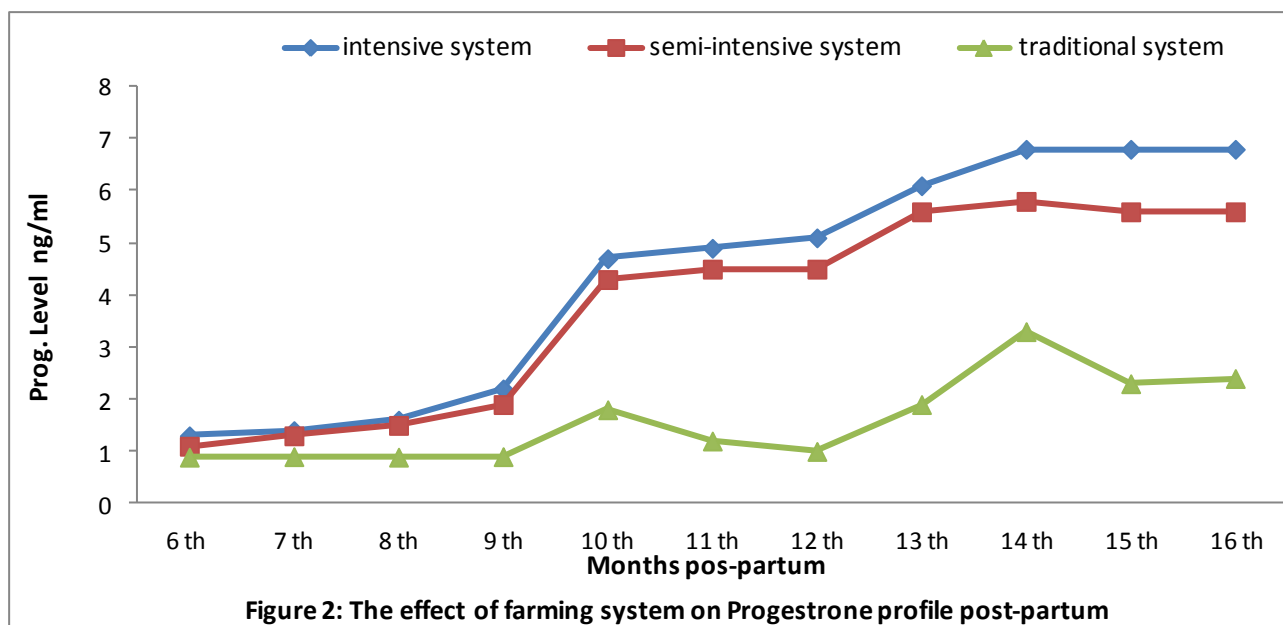


Table 1: Camel milk composition in the three farming systems (% DM)

	Protein %	Fat %	Ash %	Lactose %	Total solid %
Intensive	3.9 ± 0.23	3.9 ± 0.16	0.9 ± 0.05	4.8 ± 0.02	13.50 ± 0.5
Semi-intensive	3.7 ± 0.19	3.8 ± 0.19	0.8 ± 0.09	4.74 ± 0.04	13.04 ± 0.7
Traditional	3.3 ± 0.15	3.5 ± 0.23	0.8 ± 0.04	5.20 ± 0.03	12.80 ± 0.4

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