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The Productive and Reproductive Performance of Fuja Dairy Cows Kept in Zero Grazing and Grazing Range Land in Western Sudan

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ABSTRACT

This research work was conducted to suggest and develop feed supplementation strategies for improving milk production of Fuja herds in Kordofan states (Sudan); utilizing local feedstuffs to cover feed shortage during dry season. Forty lactating Fuja cows and their calves were used in this study. They were divided into four groups, A, B and D (grazing group) and C (zero grazing group). A General Linear Model procedure of SAS (SAS, 2001) was used to analyze the recorded data. The obtained results indicated that dietary supplementation and grazing type had significant (P <0.05) effect on daily and total milk yield; it was observed that Cows supplemented after grazing produced higher milk yield than zero grazing group. Also, the results revealed that age and seasons significantly (P<0.05) influenced milk yield (daily milk and total milk yield were highest for cows in winter, followed by those of summer and rainy season). Furthermore, the result elucidated that there was significantly (P<0.05) shorter interval for 2nd parity, and relatively a longer days for the 3rd parity, whereas, cows in the third parity recorded longer calving interval compared with cows in the second parity. It is possible to conclude that post-partum supplementation of nomadic milking cows with energy and concentrate mixtures using local materials during the dry season effectively improved production performance; particularly milk yield during early and mid-lactation periods..

Keywords: Fuja cattle, Productive, Reproductive traits, grazing, zero-grazing, supplementation.

1. Introduction

The Sudan is a large country of variable ecological zones ranging from desert in the North to tropical forests in the South. The country hold a large livestock population, of which cattle are estimated 38, 2 million heads (FAO, 2005).

Nomadic dairy herds are raised within pastoral system in the western Sudan (Kordofan). They spend the rainy season in home territories (in North) and move to the South in the dry season. The natural pasture in western Kordofan becomes more deficient in energy, protein and essential minerals during a long period of the year. Consequently the grazing cattle are apt to suffer from nutritional deficiency, loss of body weight and body condition during the dry season, this generally reflected in lower milk yield, slower growth rate, reduced maturity and low productive and reproductive performance. Fuja cattle type is a famous Sudanese dairy cattle found in Northern and Western part of Kordofan states reared by the Kaja tribe and concentrated in a triangle area include Sodaray, Umbader and Armal cities. This breed has not yet been investigated in a proper way. Therefore, this research programme has been under taken in the rangeland of western Kordofan to develop feed supplementation strategies for improving milk production of Fuja herds. Also one of the objectives of this study is intended to assess the utilization of some of the commonly available feed concentrates for supplementary feeding of grazing milking herds in Western Kordofan State (Sudan), and also to adopt zero-grazing system in the dry season especially before rainy season.

2. Objectives/Purpose

This research programme has been under taken in the rangeland of western Kordofan (Sudan) to:

a. Develop feed supplementation strategies for improving milk production of Fuja Cattle and,

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b. Utilization of local feedstuffs to cover feed shortage during dry season.

3. Methodology

3.1 Study Area

The study was conducted at the farm of Peace University Western Kordofan State, which lies between longitudes 28° -30° east and latitudes 10° -12° North.

3.2 Animals and Feed

Forty lactating Fuja cows and their calves were selected on the basis of similarity in age, live weight and stage of lactation. Animals were divided into two main groups, grazing and zero grazing group. Grazing groups were A, B and D (each group consist of 10 cows), these were allowed to graze grasses residue and Sorghum Stover during the day light in the dry season. Group C (10 cows) was kept in the experimental farm (zero grazing), after grazing, each cow within each group was supplemented with respective ration on individuals basis.

3.3 Experimental Procedure

The experiment was carried out during rainy, winter season, and during the summer in which the natural pasture was not abundant and the nutritive value of the grasses was relatively low. Veterinary care can be obtained when needed and routine vaccination against common infectious diseases is commonly practiced (table 1).

The experimental rations were assigned at random to each of the four experimental groups of the animals in a completely randomized block design arrangement. The rations were fed only during the dry season; cows were supplemented after grazing at rate of 2 kg per cow per day. Cows on ration A, B , and D were allowed to grazing and supplemented with the experimental rations (table 1), cow on ration C were kept in the experimental farm and fed with filler diet (20% Corn residue, 77 % Ground nut cake Hulls and 3% salt minerals) and in the evening, were supplement as in the same grazing group with ration C).

Table 1: Composition of the diets (%)

	Grazing			Zero Grazing
	Ration A %	**Ration B %**	**Ration D %**	**Ration C %**
Ground nut Cake	20	20	12	10
Sorghum	20	20	10	10
Corn Residue	20	20	0	20
Wheat bran	10	10	5	5
Ground nut Cake Hulls	27	27	60	52
Kernel ration	0	0	10	0
Salt + Minerals	3	3	3	3
Energy Density (Mcal DE/kg DM)	10.2	9.7	8.6	8.5
CP %	15.5	15.3	12.6	10.8

3.4 Data Collection

Data was collected for daily milk production were estimated for each cow in 30, 60, 90, 120, 150, 150, 180, 210 and 240 day post-partum, also milk yield were estimated in the rainy, winter and early season. Progesterone profile was done to calculate reproductive performance, also calving intervals and dry period were calculated for each group.

3.5 Data Analysis and Chemical Composition

The data were analyzed using the General Linear Model procedures of SAS (SAS, 2001) in a Completely Randomized Block Design with grazing type and diet as main effects. Significant differences between means were determined by multiple comparisons using the Fisher test (Samuels, 1989). Grass species, crop residue and experimental rations were subjected to the proximate analysis, according to (A.O.A.C, 1980).

4. Results

The result of dietary supplementation and grazing type on daily and total milk yield were shown in table (2), there were significantly different ($P < 0.05$) among the three treatments (A, B, and D), daily and total milk yield were highest for cows fed ration A and B, followed by those on ration D. Cows supplemented after grazing recorded higher milk yield than zero grazing group.

The effect of age on daily milk yield in the eight months after calving was shown in table (3), there were significantly different ($P<0.05$) among the three age groups in 120, 150 and 240 days after calving, milk yield was highest for cows 7^{th} years, followed by 6^{th} and the lowest for cows age 5^{th}.

The effect of season on daily milk yield are shown in table (4), there were significantly different ($P<0.05$) among the three seasons (rainy, summer and winter), daily milk and total milk

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yield were highest for cows in winter, followed by those of summer and rainy season.

Table (5) shows the calving interval (day) from first calving to second. It was found that there was a shorter interval for 2nd parity, and relatively a longer days for 3rd parity, and the difference among the 2 groups was statistically significant ($P<0.05$). Furthermore, calving interval (days ± SE) was also, shown in the same table, it was noticed that cows in the third parity recorded longer calving interval compared with cows in the second parity.

Table 2: The effect of diets and grazing type on daily and total milk yield (Kg)

		Daily	Total
Diet	Ration A	4.1^{a}	28.8^{a}
	Ration B	4.2^{a}	29.2^{a}
	Ration D	3.2^{b}	19.0^{b}
Grazing type			
	grazing	4.8^{a}	30.2^{a}
	Zero grazing	3.2^{b}	18.2^{b}

Table 3: The effect of age on daily milk yield after calving (Kg)

	Daily Milk Yield (kg)							
	30 days	60 days	90 days	120 days	150 days	180 days	210 days	240 days
5th	4.2 ± 0.70^{NS}	4.0 ± 0.39^{NS}	3.8 ± 0.46^{NS}	3.2 ± 0.57^{ab}	2.5 ± 0.47^{b}	2.7 ± 0.28^{NS}	2.6 ± 0.211^{NS}	3.7 ± 0.20^{a}
6th	4.5 ± 0.62^{NS}	4.6 ± 0.35^{NS}	4.4 ± 0.412^{NS}	2.6 ± 0.51^{b}	2.4 ± 0.42^{b}	2.7 ± 0.25^{NS}	2.7 ± 0.19^{NS}	3.1 ± 0.18^{b}
7th	5.3 ± 0.8^{NS}	4.7 ± 0.54^{NS}	4.5 ± 0.53^{NS}	4.7 ± 0.66^{a}	3.9 ± 0.54^{a}	$2.8.0.33^{NS}$	2.1 ± 0.24^{NS}	3.6 ± 0.23^{ab}

Table 4: The effect of season on total milk yield (kg per cow)

	Milk Yield (Kg/Cow)		
	Morning	Evening	Daily
Rainy	205.2 ± 48.673^{b}	162.66 ± 40.009^{b}	367.82 ± 88.30^{b}
Summer	215.3 ± 80.715^{ab}	153.00 ± 66.348^{b}	368.30 ± 146.43^{b}
Winter	453.15 ± 80.715^{a}	358.40 ± 66.348^{a}	811.52 ± 146.43^{a}

Table 5: The effect of parity number on dry period and calving interval (Day)

	Dry Period	Calving Interval
2nd parity	141.33 ± 8.4^{a}	418.8 ± 27.3^{b}
3rd parity	97.75 ± 10.3^{b}	502.00 ± 22.3^{a}

5. Discussion

Under the condition of the present experiment, it was evident that pos-partum supplementary feeding resulted in a certain degree of improvement in milk yield and reproductive performance of Fuja dairy cows.

In this study, milk production was significantly improved by supplementation with concentrate mixtures. The cows offered concentrate after grazing produced higher milk yield than zero grazing group. This finding are in line with (Hoogendroon, and Griever 1970), (Ali, 1991) and (Eltaher 1999). Also Tag Elsir *et al* (1988) reported that, supplementation of grazing cows with concentrate increased milk yield. The increased milk yield was progressive with the increase of energy level of the experimental concentrate mixtures. These findings are in general agreement with those obtained by, Meeske *et. al* (2006) who indicated that, the milk production increased as the level of concentrate feeding increased. Cows fed the high level of concentrate produced significantly more fat corrected milk and butterfat than cows on all the other treatments. Robaina *et al*. (1998) and Meeske *et. al* (2006) reported that cows grazing on ryegrass/clover pasture produced less milk when compared with animals fed with concentrate after grazing.

The calving interval (days) was a shorter interval for 2nd parity, and relatively a longer days for 3rd parity. The inter-calving period may be affected by many factors such as calving ease, incidence of milk fever, heat observation, and as well as nutrition of the cow. Keady *et al.* (2001) and Meeske *et al*. (2006) they showed that concentrate supplementation in late

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lactation did not alter dairy cow fertility in subsequent lactations.

Days to dry period were significantly longer in second parity cows compared to third parity; this may be due to the animal age and body weight of the cows. Similar findings were reported by other researchers Idris *et al* 2010 and Peter 1991 and Thatcher *et al* 1986.

Cows supplemented after grazing in the dry season recorded higher milk yield than zero grazing group. Zero-grazing system in this study was seemed to benefit during the dry season when the pasture quantity and quality were low in the nutritive value. Most of the cows in both systems need extra energy expenditure during grazing, and this will be reflected on low milk yield, longer days to conception and lower conception rates.

It is better to apply Zero-grazing system in the nomadic farms because sometimes the rain fall too late, and animals needs to move from one place to another, this condition might also be exacerbated by poor nutritive value of the pasture in the different seasons. Although concentrates offered by farmers were of good quality, they were not offered in adequate quantities as they were sometimes given every other day due to their high cost. This could place cows in negative energy balance and thereby affecting the calving to conception interval and conception rates.

During the rainy season animals were allowed to graze the native pasture without additional supplemental feeding, which failed to fulfil the requirement for meat and milk production. Milking cows were supplemented with concentrate diets during the dry season only. Cows in their pre-partum period received no supplementation and hence were likely to calve in poor condition. Also it has been shown that cows, in winter season produced more milk than the other seasons, this may be due to nutrition quality of the grasses in the end of the rainy season, this results agree Idris *et al* 2011 and Emansoury *et al* 2000.

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