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Research Article

Milk Yield and Milk Composition of Nilotic Cattle Breed Supplemented with Different Levels of Concentration

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Abstract- An experiment was carried out at the farm of the Upper Nile University in Malakal city, South of Sudan, to evaluate the effect of concentration supplements on milk yield and milk composition of Nilotic cows. Twenty-seven Nilotic cows with similar stage of pregnancy (cows were first parity) were used. The experiment had three treatments with nine replications each using a complete randomized design. The treatments were; Treated group No one animals fed hay plus 4 kg commercial concentrate mix (Kenana Natural animal feed), Treated group No two animals fed hay plus 5 kg commercial concentrate mix (Kenana Natural animal feed; Treated group No three animals fed on only hay harvested from natural pasture (Control). The daily milk yield was 1.5, 1.6 and 1.2 for treatment one, two and three respectively. The overall mean of total solid, protein, fat and lactose composition of milk (%) were 10.91, 3.53, 3.89 and 4.11 respectively. Milk yield was significantly different (P<0.05) between treatment groups. Regarding the milk compositions, there were no significant difference (P<0.05) among treatment groups. Supplementation of Nilotic cows maintained on natural grass pasture with concentrations has an effect only on milk yield.

Index terms: Malakal, Milk yield, Nilotic cattle, Supplementation

I. INTRODUCTION

Nilotic cattle are indigenous cattle breeds of South of Sudan. They rear by Nilotic tribes of Southern Sudan; hence their name Nilotic cattle [1]. These cattle are descendants of ancient crossbreeding between Hamitc (hump less) long horn and long horned (humped) Zebu cattle [2, 1].The Nilotic cattle are distributed general in Southern Sudan, mainly in Upper Nile and Bahr El-Ghazal States, their presence was reported in Juba and Muduri in Equatorial State also [3, 1].

Nilotic cattle possesses medium to large body frames, with males being larger than females. Muzzle is dark and usually pigmented. Horns vary in both length and direction. Horns vary in both length and direction. Where as in males, they are long and massive and directed outward, or backwards. The tips of horns grow backward in females, forward, and inward in males. The back is straight, narrow and runs slightly upwards on the hump, and is rather rectangular. The sacrum is prominent and the pelvis is narrow. The tail is straight and could reach the hock in length. The fore limbs are fine and lack musculature while the hind quarters are lean. Udder and teats are small. Hair is short and fine. The prominent colors are white brown and fawn, black, red brown and grey. Each color has its own name. most Nuer or Dinka men are addressed by the names that refer to the color of their favorite bulls like Malwal means (red) Makuei means (black and white) Mabior (white) Majok (spotted). While women take names from the cows they milk like Achol (black) [4]. Dinka and Nuer cattle were superior to Shilluk cattle in respect to size, general conformation and probably productivity. This superiority was thought to be the result of rational selection of breeding bulls practiced by Dinka and Nuer herdsmen [9].

The previous studies showed that Nilotic cattle are poor producers particularly in terms of milk production, they attributed this to poor nutrition, diseases, stresses imposed by climatic factors, poor genetic potential [2, 5, 6] . According to previous surveys, the milk yield of Nilotic cattle range between 1.0 to 2.45 kg with the mean of 1.67 kg per cow per day in different tribes and different locations.

Regarding the Lactation Length, Nilotic cattle has lactation length between 160 to 255 days with the mean of 228.6 days in different tribes and different locations. The milk Yield Per season range between 450.8 to 606.1 kg with the mean of 528.5 kg [2, 6, 7]. The milk yield and milk composition performance of the Nilotic cattle breed under intensive management system is not yet evaluated. Therefore, the present study was intended to evaluate the milk yield and milk composition performances of Nilotic cattle breed fed with different locally available and commercial concentration feed supplements.

II. MATERIALS AND METHODS

Experimental animals and management

The experiment was carried out using twenty-seven Nilotic cows. The selected cows were first parity (heifers primary 6 – 7 month's pregnancy). Average body weight of the selected cows was 215 kg (213 - 220 kg). The animals were divided into three equal groups (9 in each). Treated group No one; Animals fed Hay plus 4 kg commercial concentrate mix (Kenana Natural animal feed), Treated group No two; Hay plus 5 kg commercial concentrate mix (Kenana Natural animal feed; Treated group No three (Control); Animals fed on only hay harvested from natural pasture Cows were free from Brocllusoes. In addition, animals were treated against internal and external parasite.

Experimental feeds and feeding

The treatment feeds used are present in Table 1. The three groups were allowed to graze green forages in an open range for about 7 – 8 hours during the day, water were available all the time during the day. The dominant grass in the range was Echinochloy Stagnine (Apajo). Hay used in this study was Sorghum bicolor (Abu 70). Kenana natural animal feed was purchased from Kenana Company. The supplement feeds were offered by dividing into two equal portions two times a day. Basal diet (hay) was offered ad libitum.

Table 1: Treatment feeds

Treatment	Basal Diet	Supplement
1	Natural pasture hay plus Sorghum bicolor hay	4 kg concentration (Kenana feed)
2	Natural pasture hay plus Sorghum bicolor hay	5 kg concentration (Kenana feed)
3	Natural pasture hay plus Sorghum bicolor hay (control)	No supplement

Milking procedure and Milk analysis

Hand milking was practiced morning and evening during feeding the supplement rations. Samples of milk from each group was taken at different stages of the lactation; during early lactation, during mid lactation; during late lactation. The samples were cooled and transferred to the laboratory for analysis.

Experimental design

A Complete Random Design (CRD) was used to carry out the experiment. The experiment had three treatments with seven animals in each treatment.

III. RESULTS AND DISCUSSION

Daily Milk yield

The average daily milk yields expressed as kg/day were 1.5, 1.6 and 1.2 for Treated group No One, Treated group No two and Treated group No three respectively. Group two yield, more milk than control yet the difference was not significant.

Milk yield

he overall mean milk yield in the current study is present in Table 2. Mean milk yield was significantly different ($P<0.05$) between treatment groups. Milk yield from cows supplemented with concentrations (Treated group one and Treated group two) was greater than ($P<0.05$) milk yield from cows supplemented with hay only (control) in 60 days, 90 days, 120 days and per lactation.

Effect of supplementation on lactation length

As shown in Table 3 the highest length was in treated group no. two (278.00 $\pm$ 26.26 days) followed by treated group no. one (272.00 $\pm$ 26.26 days) and untreated group no. three (242.00 $\pm$ 26.26 days). There was no significant difference between treated groups.

Effect of supplementation on milk composition

The overall mean total solids, protein, fat and lactose contents is present in Table 4. For the all milk, components analysed there were no significant differences ($p<0.05$) between the treated groups or the stages of lactation on milk composition.

Table 2: Effect of concentration supplementation on milk yield of Nilotic cattle (Kg) Mean + S. E

No.	Stage of lactation	Treated group One 4 kg	Treated group Two 5 kg	untreated group Three Control
1	60 days	161.62 ± 18.05[a]	159.23 + 1805[a]	59.67 ± 18.05[b]
	Overall mean	126.95 ± 10.42		
2	90 days	265.28 ± 29.19[a]	272.43 ± 29.19[a]	110.29 ± 29.19[b]
	Overall mean	216.00 ± 16.85		
3	120 days	364.93 ± 38.51[a]	368 ± 38.51[a]	160.011 + 38.5[b]
	Overall mean	297.72 ± 22.21		
4	Total yield per lactation	839.75 ± 127.90[a]	860.23 ± 127.90[a]	324.27± 127.90[b]
	Overall mean	674.75 ± 73.84		

Table 3: General mean Lactation length of Nilotic cattle (days)

Treatment	Mean + S. error
Treated group One (4 kg)	272.00 ± 26.26[a]
Treated group Two (5 kg)	278.00 ± 26.26[a]
Treated group Three (control)	242.00 ± 26.26[a]
Overall mean	265.00 ± 15.52

Table 4: Effect of supplementation and stages on milk composition of Nilotic cattle

	Treated group One 4 kg			Treated group Two 5 kg			Untreated group Three Control		
	Early	**Mid**	**Late**	**Early**	**Mid**	**Late**	**Early**	**Mid**	**Late**
Total solid (%)	11.62 ± 2.33[a]	12.75 ± 2.33[a]	9.93 ± 2.86[a]	11.20 ± 2.33[a]	11.74 ± 2.33[a]	11.52 ± 2.85[a]	10.69 ± 2.33[a]	9.74 ± 2.33[a]	9.05 ± 2.86[a]
Protein (%)	4.21 ± 0.870[a]	3.85 ± 0.870[a]	2.56 ± 1.07[a]	3.44 ± 0.87[a]	3.37 ± .87[a]	2.81 ± 1.07[a]	4.68 + 1.87[a]	3.43 ± 0.87[a]	3.42 + 1.07[a]
Fat (%)	4.09 ± 0.79[a]	5.19 ± 0.79[a]	2.97 ± 0.79[a]	3.59 + 0.79[a]	4.33 ± 0.79[a]	4.85 ± 0.79[a]	3.16 ± 0.79[a]	3.52 ± 0.79[a]	3.28 ± 0.97[a]
Lactose (%)	4.00 ± 0.44[a]	4.03 ± 0.44[a]	4.46 ± 0.54[a]	4.07 ± 0.44[a]	4.02 ± 0.44[a]	3.93 ± 0.54[a]	3.86 ± 0.44[a]	3.64 ± 0.44[a]	4.96 ± 0.54[a]

Means bearing the same superscript are not significantly different at 0.05 level of significant (P > 0.05).

In this study, the average daily milk yields expressed as Kg/day were 1.5, 1.6 and 1.2 for Treated group No One, Treated group No two and Treated group No three respectively. This similar with that reported by previous surveys for milk yield of Nilotic cattle which range between 1.0 to 2.45 kg with the mean of 1.67 kg per cow per day in different tribes and different locations. However, the daily milk yield of Nilotic cattle lower than that reported for western Baggara cattle breed (3.5 Kg) under improved conditions at Ghazala Gawazat [8], and for Kenana (6.8 Kg) and Butana (6.1 Kg) cattle breeds under improved conditions [9]. In comparison with other breeds, the foundation stock of the Sahiwal cattle reported higher daily milk yield of 2.7- 5.4 Kg and a maximum between 5.4 - 10 Kg [10].The low productions could be attributed to genetic factors.

The early 60 days milk yield amounted to (161.62 ±18.08 lit) for treatment group one, followed by (159.23 ± 18.05 Kg), and (59.67 ± 18.05 Kg), for treatment group Two and the control group respectively. These finding comply with the results of [1] and the findings of [11] who indicated that the supplemented group produced a significantly more milk in the first 3 – 8 weeks post-calving. The result of this study also agreed with the findings of [12].They reported that there was a steady increase in milk yield with the lactation stage up to 180 days, after which the milk yield started to decline.

The total milk yield in the experimental groups was 860.23 ± 127.90, 839.75 ± 127.90 Kg and 324.27 ± 127.90 Kg. For the three treatment respectively. This higher than that reported for Nilotic cattle by [7]. Which range between 480 Kg and 660 Kg as the total milk yield. This results in agreement with [13,14,15] reported that there was an increase in milk yield because of an increase in concentrate feeding. This report compared favorably with the present result. [11] also found that the pre-calving supplementation had a highly significant and favours the general body condition and improves body weight at calving. Moreover, [16] examined the Influence of varying proportion of forage to concentrate in diet of dairy cow on milk yield and quality, they concluded that raising the proportion of the concentrate in the diet until 60% of the total dry matter increased feed intake and milk yield in early lactation.

The results of the present study showed that the lactation length was (278.00 ± 26.26 days) in treatment group two and (242.00 ± 26.26 days) for the control group with an overall mean (265.00 ± 15.52 days 15.52 days). There was significant

deference between the treatment one and two with control group, this difference was expected since group one and group two were supplemented with concentration.

The lactation length of Nilotic cattle in this study was higher than that reported for Nilotic cows owned by Dinka Jongoli (225 – 255 days) and for those cows owned by Nuer Jongoli [2] and for cows owned by Dinka Malakal (160 – 200 days) [6]. The resent result indicated a longest lactation length compared to the pervious authors and this may be attributed to the improved feeding imposed by supplementation and improved health of the cows through health care involved vaccination against internal and external parasites. However, the lactation length of Nilotic cattle in this study was shorter than that reported for Butana cattle breed (283 days) At Atbara research station [17] and for the Sahiwal cattle breed of 270.7 days from India [18]. This may attributed to the breed type because both Butana and Sahiwal breeds consider as milk breeds. The overall mean of total solid reported here was 10.91 $\pm$ .84% which was less than the finding of 13.9% for Dinka cattle and 15.5% for Nuer cattle reported by [19]. The overall mean of protein was 3.53 $\pm$ 31% which was less than what reported in the previous reference 3.98%. The overall mean of fat was 3.89% which was less than the finding reported by [19, 20] who examined the response of high yielding dairy cows on intensive grazing to supplementation with concentrates. They observed that supplementation with high levels of concentrate increased milk yield but reduced milk fat content.

The overall mean for lactose was 4.11 $\pm$ .16% and it agreed with the finding of [19] reported for Dinka cattle (4.12%). It was found that milk composition variation was not significantly affected by treatment or the stage of lactation. [13] reported that the butter fat yield is high in the early lactation, it decreases steadily, but increase again towards the end of lactation.

IV. CONCLUSION AND RECOMMENDATIONS

The results of this study showed that the milk production of Nilotic cattle in Malakal area was very low compared to those cattle of Kenana and Butana especially in milk yield. In this study, also the diseases control, feed supplementation and good housing did not improve production to levels produced by Kenana or Butana cattle.Using Kenana and Butana cattle in crossbreeding to improve the production potential of the Nilotic cattle and their conformation.

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