



Effects of Feeding Different Levels of Sesame Cake on Camel Milk Production and Quality

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ABSTRACT

This study was conducted in North Kordufan (Omruaba rural area) and aimed at investigating the effect of supplementation of sesame cake on production and chemical composition of camel milk. Twenty she camels in the second parity and 2-month post-partum were selected and separated into 4 groups A, B, C & D and kept in four fences for 60 days. The research animals allowed to graze 3 hours/day and supplemented basic ration containing 18%CP. The percentage of sesame cake used in the basic ration was 4.5%, 9%, 13% and 18% CP for group A, B, C and D respectively. The drinking water was ad libitum. Milk production and composition was monitored during the trial period. Analysis of variance was used to analyzed data that was designed as complete randomized design. Duncan multiple range test (DMRT) was used separate differences among means. The average milk yield/group was 2.2 kgs, 2.3 k.gs, 2.3 k.gs and 2.4 k.gs milk/day for group A, B, C and D respectively. The post-trial yield was 5.5, 6.2, 8.1 and 8.5kgs milk/day. The increase in the yield was significant for all groups. On the other-hand group D showed the highest yield but some cases of diarrhea observed due to the laxative effect of sesame cake oil. Furthermore the fat % of the milk increased. Therefore the research concluded to adopt group C supplementation and rejected D trial for its expected contrast effect of sesame oil. It is recommended to feed sesame cake in Kordufan as a main source of protein for dairy camel because of its efficiency and availability.

INTRODUCTION

There are 17 million camels in the world of which 12.2 million are in Africa and 4, 8 in Asia ((Yagil, R. 2004, A. A. Hassabo (2013). The camel is an important source of milk which is considered as main food for badowian. Sudan is considered as first producer of camel in the world (5 million camels) nowadays after the drought and the war that minimized camel population in Somalia. (Farah *et al.*, 1991).

Close analysis of camel milk showed some medicinal potential, the milk lactoferin in camel is ten times than in cow milk and have some anti bacterial and anti viral properties (Agamy, 1992). On the other hand, fermented camel milk is effective against

pathogens, like *E. coli* infection and other diseases like tuberculosis Alwan Al *et al.* (2000). Camel milk contained the main component as other milk, but had some therapeutic benefit (Yagil, 2000).

Camel milk contains large concentrations of insulin-15U/ml (Zagorski *et al.*, 1998). Camel milk has high concentration of insulin secretion, the drop in blood sugar indicates insulin activity (Barbour *et al.*1984). Dromedary camel milk is white in colour because the fats are homogenized throughout the milk, also camel milk has low fat percentage and the lactose appear in similar percentage to cow's milk, but camel milk has more concentration of Calcium and Iron and low PH, and this enhance the absorption from duodenum. Kappeler s (1988).

Table 1: Comparison between milk composition

	Moisture	Fat%	Cp%	Lacto	Na	Ca. Mg
Human	87	3.8	1.2	7	7	34
Cows	87.3	3.5	3.4	4.8	22	13
Camels	86.91	1.9	2.85	2.8	11.4	80

Source: Yagil R. (2006), scientific research paper.

Camel immune system is stronger than that of human, and the small immunoglobulins pass from the camel milk into the human blood, because they are found throughout lactation. Drinking camel milk will provide a tool of autoimmune against diseases by rehabilitating the immune system rather than depression. As camels are reared by nomads that means they are traditionally managed, so it is necessary to supplement them when kept in urban area and fences.

Economically supplements should be available and of high quality in Sudan abundant of green and dry sources of supplements are available like Dura and cakes; cotton seed cake and sunflower cakes in

addition to sesame and groundnut cakes, which are available in Kordofan particularly in the Study area (Salam, 2009 and Wardeh , 2004).

Objective of Study

The overall objective of this study was to contribute to developing sustainable livestock production systems especially camel of rural and urban levels in Sudan depending on available and cost reducing feed resources.

The specific objectives were to evaluate inclusion of varying levels of *sesamum orientales* cake

(sesame seed cake) as protein source on she camel milk production and quality.

MATERIALS AND METHODS

The study area

Umm Ruwaba, also Umm Ruwabah (Arabic: أم روابية; Ruaba and Umm Ruaba), is a city in the state of North Kordofan in Sudan and is the capital of the Um Rawaba District. By road it is located 147 kilometres (91 mi) southeast of El Obeid, and 184 kilometres (114 mi) west of Rabak. Founded by the Ottoman Empire in late 1820s, it is at the junction of important roads and camel caravan routes.

The experimental Animals

Twenty she camels in the second parity and 2-month post-partum were selected and separated into 4 groups A, B, C & D and kept in four fences for 60 days. The research animals allowed to graze 3 hours/day and supplemented basic ration containing 18%CP. The percentage of sesame cake used in the basic ration was 4.5%, 9%, 13% and 18% CP for group A, B, C and D respectively. The drinking water was ad libitum. Milk production and composition was monitored during the trial period. Analysis of variance was used to analyzed data that was designed as complete randomized design

The experimental Rations

Four rations with different levels of sesame seed cake were formulated for the experimental she camels.

Chemical Analysis

The ingredients used for formulation of the ration fed to does in group I was chemically analyzed using proximate analysis as described by AOAC, (2010).

Statistical Analysis

The experiment was designed as complete randomized design according to Seltman (2018). Data on feed intake, nutrients digestibility coefficients and live body weight changes of does and Kids was analyzed via variance analysis variance. Differences among means were detected using Duncan Multiple Range Test (DMRT) as described in Gomez and Gomez (1996).

The experimental animals

12 she camels were selected and classified in four groups A, B, C, and D.

Each group kept in a separate fence and they were in the same parity and lactation for two month, or sixty days.

They offered the same amount of supplements with different level of sesame cakes containing stable percentage of crude protein (CP) with Fixed grazing period for all groups.

Water was adlib.

Approximates Analysis (AOAC-1990) was used to analyze both supplements and milk yield.

Average daily milk yield was determined and recorded.

Analysis of variance ANOVA showed significance difference <0.5% between the treatment-

Duncan Statistic method was used to differentiate between the results-

RESULTS AND DISCUSSION:

Table 2: Chemical composition (%) of the supplement offered to trial camels

Ingredients	TS				CP%	CF%	NFE%	ME%	Ca%	P%
	FSI									
Sesame cake	A	B	C	D	51	8.5	9.1	14.5	2.5	0.9
	17	22	27	39						
Groundnut cake	25	20	15	0	40.5	0.10	2.6	12	0.7	0.6
Groundnut hay	40				0.801	35.5	42.5	7.8	0.18	0.6
Molasses	15				0.408	Nil	78.8	1.6	0.9	0.8
Ca	2									
Na Cl	1									

Table 3: Comparison between pretrial and post-trial increase in milk yield & fat

Yield\Group		A	B	C	D	Average	Increase %
Milk yield	pretrial	2.2	2.3	2.3	2.4	2.3	2.38
	post-trial	5.5	6.2	8.1	8	7.0	
Fat %	pretrial	2.2	2.1	2.2	2.3	2.2	2.28
	post-trial	3	3.2	5.3	4	3.9	

The Approximate analysis showed that sesame cake contains high percentage of crude protein (Cp and non-protein Nitrogen NPN) and high level of either extract rather than groundnut cake. Sesame cake is available in the research area (Omruba rural area). It is a product of sesame seed and oil extraction, which is usually traditionally done by using animal traction (Assara).

The milk yield increase in the all trials and groups to double and more than 100% in case of group C & D. Some sort of diarrhea seems to cause some contrast effect on the amount of milk produced from group "D" which began to decline. It may be due to laxative effect of sesame cake oil supplement. The rate of production increased in regular rhythm without any incidence in case of group "C".

CONCLUSION

It is necessary to use sesame cake in the research area, because it contains high level of protein and fat percentage and available in the area.

Sesame cake raises the level of camel milk production.

Supplementation with 75% is acceptable than the other treatments and 25% GNCS.

The price of milk is very high in summer, because of migration of cows to South.

The research recommend to adopt group C trial and to use sesame cake as a main source of protein for camel milk production, and to be mixed with 25% groundnut cake and rejected D trial for its contrast effect on the yield.

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REFERENCES:

- Barbour, E. K. Nabbut, N. H., Frederics, W. M., and Al Nakhli, H. M. (1984) Inhibition of pathogenic bacteria by camel milk relation to whey Isoime and stage of lactation J. Food Protection.47-838-840
- Elagamy, E. I., Ruppaner R. Ismail, A., Champagne, C. P. and Assaf, R. (1992) Antibacterial and antiviral activity of camel milk protective proteins dairy research 59, 169-175. P.
- Hassabo A. A. (2013), Camel the promising dairy animal in the Sudan, King Faisal University, Camel Conference.
- Kappler, S. I (1998) Compositional and structural analysis of camel milk proteins with emphasis on protective protein PHD Dissertation ETH, No 12947, Zurich.
- Salam B. A. (2009) Effect of intensive system on camel milk. Obied, 2011 Conference.
- Wardah, M. F. (2004), the Nutrient requirements of dromedary camel J. Camel Science. 1:37-
- Yagil, R. (1985) the Desert Camel Comparative Physiology, Comparative Agri-Basol Switzerland. 163 pp.
- Yagil, R. and Van Creveld (2000), Medicinal use of camel milk fat or fancy Camel Agro. Economic Conference.
- Yagil R. (2006), Reproductive process in camel, Journal of Veterinary medicine p. 61 Israil (Online version).
- Z. Farah, R. Retten Mier and D. Atkins (1991), Vitamin contents of camel milk, Journal of Veterinary Nutrition Research. 30-33 p Switzerland.
- Zagorski, O, Maman, A., Yatte, A., Van Creveld, C., and Yagil are (1998). Insulin in milk- a comparative Study in Journal of Anim. Sci. 13: 241-44.