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Opportunities for Increasing Camel Milk in Sudan

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Abstract

The aim of this research is to increase camel milk production in Sudan by improving the management environment for camels. Thirty-two female camels owned by small-scale dairy camel keepers in North Kordfan were divided into four groups and kept in shaded enclosures equipped with water and feed. The experimental camels were treated for parasites and vaccinated against hemorrhagic septicemia. Ticks and other insects were controlled by allowing scavenger or poultry to pick the insects infesting the camels' skin. The camels were given an experimental ration for 7 days as an adaptation period before being allowed to graze for specific hours each day. The behavior of people toward camel milk was also examined. The experiment lasted for 60 days and the results showed that 100% of people consumed camel milk, with 80% drinking both fermented Gariss and fresh milk, and only 20% not drinking Gariss. No diseases or tick infestations were observed, and the milk yield increased by 200%. The average daily milk yield was 9 kg for Group A, 6 kg for Group B, 6 kg for Group C and 5 kg for Group D. The research concluded that improving the environment for dairy camels increases productivity and milk yield.

Keywords: Browse Cariss, supplement, she camels, Grazing.

Introduction

Agroforestry is the primary source of camel feed for pastoral management systems, particularly among Bedouin groups in the harsh and desert regions of Sudan, as noted by **Bakhit et al. (2008)**. Grazing lands are characterized by low-quality pastures,

including trees, shrubs, and grasses, and the disappearance of palatable pastures due to tree cutting and grass burning to eradicate biting insects, according to **Ageeb et al. (2010)**. Irregular water resource distribution and uncontrolled grazing contribute to soil encroachment, desertification, and climate change. On the one hand, camels are known for their usefulness in transportation and their ability to provide milk and meat for human consumption. However, they can also contribute to the outbreak of diseases and conflicts among different tribes due to competition for land use, as noted by **Sallam Bakhit and Ali Hassabo (2016)**. Camels are particularly vulnerable to high temperatures and water scarcity, and they tend to browse rather than graze, which requires more time for them to consume their food. Moreover, their ability to move around and need for less water enables them to graze over a wider area than other domestic animals, as described by **Elshami et al. (1985)** who reported that camels have the unique ability to oxidize the fat in their humps to produce water whenever they need it, without having to drink from any external sources. They also have water sacs in their rumen that help maintain the balance of fluids in the body. Camels can reabsorb water from the digesta in their colon and rectum, recycling it for future use.

However, camels still require approximately 8-12 hours a day to graze and another 8 hours to ruminate and increase salivation. According to studies, the average milk yield from Sudanese camels can vary from 5-16 kg per day and 1200-2600 kg per year. Dams that are maintained on irrigated pastures can yield 5-35 kg per day, while those kept in poor desert conditions can yield 3-15 kg per day for 9-12 months **(Hassabo and Ihsan, 2013).**

There are various factors that can affect the amount and quality of milk produced by camels. These factors include their diet, how they are managed, the availability of water, the climate they are in, how often they are milked, and any diseases they may have **(Alhaj and Al Kanhal, 2010)**.

It is important to note that there is a difference in milk yield between the autumn and dry periods. During the dry season, camels tend to produce more milk due to a decrease in total solids (TS) content, which drops from 13.19% to 10.2%. The fat content also decreases during this time, from 4.3% to 1.1%. Additionally, milking dairy camels twice a day can increase milk yield by up to 30% **(Jihad, 1993; Faye et al., 2010)**.

Camel milk is composed of protein (c p), fat, lactose, ash, and vitamins. Although it is very delicious, it has a salty taste due to the high amount of sodium chloride present in the trees and hay that camels consume. When camels are thirsty, the level of calcium and magnesium in their milk decreases. This information was presented in a study conducted by **Bakhiet and Magid (2006)**.

Camel milk is not only a nutritious diet for humans and animals, but it also has various medicinal properties. Several research studies have been conducted on camel milk and its products, which have shown that it can cure many diseases such as Jaundice, Kalazar, ulceration caused by sand fly, and others. **Magid (2006) and Magid et al. (2010)**

are some of the researchers who have published their findings on the medicinal benefits of camel milk and reported that Nowadays, there is an observed increase in the consumption of camel milk, possibly due to its medicinal properties and nutritional value. Therefore, this research aims to increase the yield of camel milk in Sudan.

Materials and methods

The present study was conducted in Kordfan within the Khartoum capital of Sudan. The study was carried out at the Animal Production Department laboratory, Faculty of Natural Resource, Kordofan University. The objective of this study was to increase the camel milk yield in Sudan.

Description of the study area

The survey was conducted in Kordfan, within the Khartoum governorate of Sudan, from March to May. The area covers approximately 27 by 35 square kilometers and is home to around 32 camels (as per the current study). Various cereals and pulses are produced in the high, mid, and some lowland areas. Camels are found distributed across all agro-ecological zones of the region. The annual rainfall in this area ranges from 500 to 400 ml.

Data collection and analytical methods

A preliminary field survey was carried out before the main experiment to examine the reliance on camel milk in pastoral areas. This information was used to establish the experimental framework. Fifty men and fifty women were surveyed, with 25 men and 25 women aged over 30, and 25 men and 25 women aged under 30. Using a rapid (single-visit) survey technique (**ILCA, 1990 and Workneh Ayalew, 1992**), a total of 100 camel milk consumers were sampled. A semi-structured questionnaire was administered to both camel milk consumers and camel herders to collect data on their milk consumption patterns. The questionnaire investigated their consumption of raw camel milk and fermented camel milk. Furthermore, the questionnaire gathered information on the biological control of camel ticks through the use of antivenin to drench camels and the vaccination of experimental camels against Hemorrhagic Septicemia (HS), a disease that can be transmitted through ticks.

The experiment

In a study conducted in North Kordofan, 32 she-camels were selected and distributed into four experimental treatments A, B, C, and D. They were kept in separate shaded fences. Each camel had an average body weight of 400 kg and an average milk yield of 3 kg/day. Water was given ad libitum. Before the experiment, a basal ration containing 17% crude protein (CP) and TDN19 was gradually introduced over 7 days. To adapt the camels, 12 scavenger chickens (Balady) were allowed to pick ticks from their skin and scratch the litter in the fences to feed on the larvae and ration waste. The camels grazed for 4, 5, 6, and 7 hours a day and were fed 3, 2.5, 2, and 1.5 kg of ration per day for groups A, B, C, and D, respectively. Milking was done twice a day with a 10-hour interval. Statistical analysis was carried out using ANOVA and simple statistics.

Results and discussion

Table 1 illustrates the camel milk consumption pattern in the research area. According to the survey results, all residents consume fresh camel milk, while only 20% of those fewer than 30 years of age do not consume fermented milk in addition to fresh milk. The study also indicates that consumers prefer camel milk due to its appealing taste, nutritional properties, and medicinal values, which aligns with the findings of Salam et al (2010). Consequently, there is a high demand for camel milk among consumers.

Table 1. Camel milk consumption.

Age and Sex	**Fresh**		**Fermented**		**%**
	Yes	No	Yes	No	-
Over 30 year					
Women (25)	25	-	25	-	100%
Men (25)	25	-	25	-	100%
Less than 30 years					
Women(25)	25	-	20	5	80%
Men(25)	25	-	20	5	80%

The infestation and infection of ticks are presented in Table 2. The results indicate that no ticks were observed during the experiment, indicating that the biosecurity measures in place were very effective. Disease control, vaccination, drenching and biological tick irradiation using scavenger chickens play a significant role in dairy farming. This confirms previous research findings of **Willomson and Payne (1987), Hassabo and Abdelgadir (2011) and Hassabo and Ihsan (2013)**.

The findings presented in Table 3 verify that camels in pastoral areas experience low-quality grazing, suffer from hot temperatures and walk long distances. To address these issues, experimental dairy camels were kept in shaded enclosures with ad lib water and adequate rest times for efficient rumination and digestion of their intake. This allowed the animals to make full use of the feed and energy for maintenance and milk production. The group that had less grazing and more rest time showed higher milk yield. Group A showed a 200% increase in milk yield, while groups B and C showed a 100% increase and group D showed only a 60% increase.

Conclusion

Research indicates that improving the environment for dairy camels can help meet the rising demand for camel milk. It is essential to identify the best dairy camels in order to boost productivity and milk production. Merely managing camels in a pastoral setting does not necessarily lead to increased milk yield. To incentivize farmers to invest in dairy

camels in urban areas, it is crucial to practice biosecurity, reduce grazing hours, increase resting time, provide adequate supplementation, and select the best camels to enhance production. It is important to implement the findings of this research and carry out further studies on camel milk in urban areas.

Table 2. Ticks infestation and infection.

Group	**Women**		**Tick**		**Tryps**		**Hs**		**Result**
No	Yes	No	Yes	No	Yes	No	Yes	No	No infestation of ticks
A	-	-	-	√	-	√	-	√	
B	-	-	-	√	-	√	-	√	
C	-	-	-	√	-	√	-	√	
D	-	-	-	√	-	√	-	√	

Table 3. Milk yield pre and postural experiment.

Group	**Body weight (kg)**	**Grazing hours/day**	**Average initial yield (kg)**	**Supplemented ration (kg)**	**Postrior yield (kg)**	**incrence in yield %**
A	400	4	3	3	9	200
B	400	5	3	2.5	6	100
C	400	6	3	2	6	100
D	400	7	3	1.5	5	60

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