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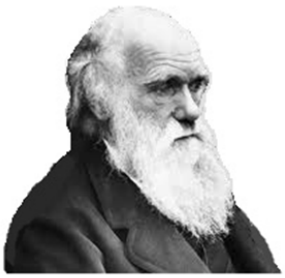

World News of Natural Sciences

An International Scientific Journal

WNOFNS 23 (2019) 104-109 EISSN 2543-5426

A comparative study of some chemical components of various milk samples in Yobe State, Nigeria

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ABSTRACT

Milk is important ingredient in our diet. It is very good source of of calcium. This study was carried out to investigate the chemical components of milk samples collected from cow, camel and goat in Yobe State, Nigeria. Milk samples were collected from goats, camels and cow for analysis. Chemical components as moisture content, dry matter and ash content were determined. Goat milk has the highest moisture content (88.41 ±0.20) and ash content (0.75 ±0.01) while Camel milk has lowest moisture content (84.73 ±0.22) and ash content. Dry matter is highest in camel milk (15.27 ±0.22) and lowest in goat milk (11.59 ±0.20).

***Keywords*:** camel, cow, goat, chemical components, milk

1. INTRODUCTION

Milk contains almost all the essential components which is required for balanced diet that's why it is nearly complete food. Milk is secreted by mammary glands of mammals. The function of milk is nourishment of the young ones because it is a complex mixture of various components such as water, minerals, vitamins, fat, protein, carbohydrates and more than twenty other necessary elements including calcium, phosphorus, zinc, copper, manganese, and iron and other constituents dispersed in water which are essential for health. Chemical composition of milk may differ between the species or within same species. This variation in chemical composition of milk can be due to nutritional factors such as feed composition, genetic factors such as species and breed, environmental conditions such as season, location, and physiological

(Received 17 January 2019; Accepted 31 January 2019; Date of Publication 01 February 2019)

factors such as lactation stage, milking methods (Claeys *et al.*, 2014; Ahmad *et al*., 2008; Kittivachra *et al.*, 2007).

These elements play very important role in various physiological functions as cofactors in many enzymes in both animals and humans. Milk constitutes the important source of bioavailable calcium in our diet. Deficiency of these essential elements causes various physiological and pathological disturbances in the body. Mammals such as cows, camels, sheep, buffaloes, and goats are used in various parts of the world for the production of milk (Eddleman, 1999; Roadhouse and Henderson, 1950; Imran *et al.*, 2008; Schumacher *et al*., 1991; ICAR, 1981). Composition of milk is different in every species of cow, goat, buffalo, camel and sheep. Species that produce milk with high fat content produce less milk than those with low fat content in milk (Caboni *et al.*, 2017).

Cow's milk is considered to be more nutritious and it is consumed by millions of people everyday. Camel milk is also nutritious and consumed by various people in the world because it contains important chemical components such as protein, potassium, iron, copper, manganese, magnesium and sodium but it contain low amount of lactose than cow's milk. Some rural and landless poor peoples consume goat milk that's why goat is called "poor man's cow". Alkalinity, buffering capacity and digestibility of goat milk is better than both cow and camel milk. Camels milk is also used in some medical problems because it has anti-diabetic, anti-cancer, and hypoallergic properties (Agrawal *et al*., 2003; Shabo *et al.*, 2005; Magjeed, 2005; Heeschan, 1994, Gorban and Izzeldin, 1997; Hashim, 2002)

The present study was planned to study the chemical composition such as moisture content, ash content and dry matter of camel, goat and cow milk in Yobe State, Nigeria.

2. MATERIAL METHOD

2. 1. Study Area

The study was carried out in Geidam local government area in Yobe State, Nigeria. This state covers estimated area of about 47,153 Square Kilometres. The maximum and minimum temperature ranges from 40 °C and 20 °C. The average annual rainfall range from 223 mm to 649 mm.

2. 2. Sample Collection

Milk samples of camel, cow and goat were collected from Geidam local government area in Yobe State. All the samples were collected in sterile sampling bottles in ice-box and transported to the laboratory, where samples were stored at 6 °C.

2. 3. Analysis of Chemical Components

The dry matter and moisture content of milk samples of goat, cow and camel were analysed in fresh milk samples and ash content were analysed in dried samples.

The milk samples were dried at 105 °C and the loss in weight is reported as moisture content was calculated in percentage (Reaffirmed, 1997).

The dried milk samples was weighted in a crucible and heat in a muffle furnace at 550 ±20 ºC till grey ash is obtained. Milk samples were frozen and then dried for 24 hours under a vacuum at room temperature for gravimetric determination of dry matter.

2. 4. Statistical Analysis

The data were analyzed by using SPSS (Statistical Package for Social Sciences). Statistical significant differences between means were calculated by one-way ANOVA (Analysis of Variance) test at $p<0.05$.

3. RESULTS AND DISCUSSION

Cows and goats are mostly affected by heat and lack of water, feed in arid and semi-arid areas. In these areas camel's play very important role in supplying milk in these areas. Tables 1-3 showed the chemical composition of cow, goat and camel's milk and Table 4 showed the significant differences between them. Table 1 & 4 showed the moisture content of cow (87.30 ±0.40), goat (88.41 ±0.20) and camel (84.73 ±0.22). In which moisture content is significant highest in goat milk and lowest in camel milk.

Table 1. Moisture Content.

	Cow	Goat	Camel
(g/100g)	87.00	88.10	84.90
(g/100g)	86.80	88.80	85.00
(g/100g)	88.10	88.34	84.28
Mean±SEM	87.30±0.40	88.41±0.20	84.73±0.22

Table 2. Dry Matter.

	Cow	Goat	Camel
(g/100g)	13.00	11.90	15.10
(g/100g)	13.20	11.20	15.00
(g/100g)	11.90	11.66	15.72
Mean±SEM	12.70±0.40	11.59±0.20	15.27±0.22

Table 2 & 4 showed dry matter in cow (12.70 ±0.40), goat (11.59 ±0.20) and camel (15.27 ±0.22) milk. Dry matter is significant highest in camel milk and lowest in goat milk. In contrast Mestawet *et al.*, 2012 reported that the dry matter in goat milk is significantly higher during lactation. Table 3 & 4 showed ash content in which it is non significant highest in goat (0.75

±0.01) and lowest in camel (0.64 ±0.02) milk. 0.35 to 0.95% ash was found in Indian camel milk was studied by Khanna and Rai (1993) and Sankhla *et al* (2000). Sela *et al* (2003) and Kouniba *et al* (2005) was observed 0.78% and 0.83) of ash content in Israeal and Morocco camel milk respectively. Several investigators also reported ash content of camel milk which ranged from 0.6 to 0.95% (Knoess, 1977; Elamin, 1992; Yagil and Etzoin, 1980).

Table 3. Ash Content.

	Cow	Goat	Camel
(g/100g)	0.69	0.77	0.68
(g/100g)	0.71	0.72	0.61
(g/100g)	0.71	0.75	0.63
Mean±SEM	0.70±0.005	0.75±0.01	0.64±0.02

Table 4. Significant differences of chemical components between the species.

	Moisture Content	Dry Matter	Ash Content
Camel Vs Cow	0.005	0.005	0.04
Camel Vs Goat	0.0002	0.0002	0.01
Cow Vs Goat	0.07 (NS)	0.07 (NS)	0.05 (NS)

4. CONCLUSION

The milk of different species varies in chemical composition. For humans goat milk is nutritious than other species such as cow and camel because in goat milk moisture content is more and dry matter is less and it is easier to digest.

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