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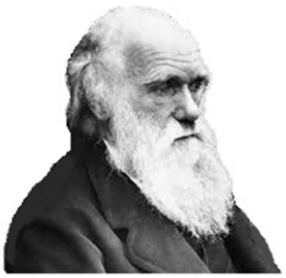

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A comparative study of some chemical components of various milk samples in Yobe State, Nigeria

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ABSTRACT

Milk is an important ingredient in our diet as it is very good source 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. Chemical components as moisture content, dry matter and ash content were determined. The generated data show that goat milk has the highest moisture content (88.41 ±0.20) and ash content (0.75 ±0.01), while Camel milk has the lowest moisture content (84.73 ±0.22) and ash content. Dry matter is the highest in camel milk (15.27 ±0.22) and the 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 are 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,

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and physiological 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 co-factors in many enzymes in both, animals and humans. Milk constitutes the important source of bio-available calcium in our diet. Deficiency of these essential elements results in 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 a high fat content produce less milk than those with a 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 contains a lower 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 ranges 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 contents were analysed in dried samples.

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

The dried milk samples were weighted in a crucible and heated in a muffle furnace at 550 ±20 ºC till a grey ash was obtained. Milk samples were frozen and then dried for 24 hours under a vacuum at a 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 to the people. **Tables 1**, **2**, **3** show the chemical composition of cow, goat and camel's milk, and **Table 4** show the significant differences between them. Tables 1 and 4 show the moisture content of cow (87.30 ±0.40), goat (88.41 ±0.20), and camel (84.73 ±0.22), in which the moisture content is significant, the highest in goat milk, and the lowest in camel milk.

Table 1. Moisture Content

	Cow	Goat	Camel
(g/100 g)	87.00	88.10	84.90
(g/100 g)	86.80	88.80	85.00
(g/100 g)	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/100 g)	13.00	11.90	15.10
(g/100 g)	13.20	11.20	15.00
(g/100 g)	11.90	11.66	15.72
Mean±SEM	12.70±0.40	11.59±0.20	15.27±0.22

Tables 2 and 4 show the dry matter in cow (12.70 ±0.40), goat (11.59 ±0.20) and camel (15.27 ±0.22) milk. Dry matter is significant the highest in camel milk and the lowest in goat milk. In contrast, Mestawet *et al.*, 2012, reported that the dry matter in goat milk is significantly higher during lactation. Tables 3 and 4 show the ash content in which it is non significant, the highest in goat (0.75 ±0.01) and the lowest in camel (0.64 ±0.02) milk. 0.35 to 0.95% ash, 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) 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/100 g)	0.69	0.77	0.68
(g/100 g)	0.71	0.72	0.61
(g/100 g)	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 more nutritious than other of species, such as cow and camel, because in goat milk there is more moisture content, and dry matter is less, and it is easier to digest.

References

[1] Agrawal P.P., Swami S.C., Beniwal R., Kochar D.K., Sahani *et al*. (2003). Effect of camel milk on glycemic control, risk factors and diabetes quality of life in type-1 diabetes: a randomized prospective controlled study. *J Camel Practice & Res* 10: 45-50

[2] Ahmad S., I. Gaucher, F. Rousseau, E. Beaucher, M. Piot, F. Grongnet, and F. Gaucheron. (2008). Effects of acidification on physicochemical characteristics of buffalo milk: A comparison with cows milk. *Food Chem.* 106: 11-17

[3] Pierluigi Caboni, Cristina Manis, Ignazio Ibba, Marino Contu, Valentina Coroneo, and Paola Scano. Compositional profile of ovine milk with a high somatic cell count: A metabolomics approach. *International Dairy Journal* Volume 69, June 2017, Pages 33-39

[4] Claeys W.L., C. Verraes, S. Cardoen, J.B. De Block, A. Huyghebaert, K. Raes *et al*., (2014). Consumption of raw or heated milk from different species: An evaluation of the nutritional and potential health benefits, *Food Control*, Vol. 42, 188-201

[5] Eddleman H., (1999). Study of the lactoperoxidase system and its functions. President, Indiana Biolab, 14045 Huff St., Palmyra, pp: 112-115.

[6] Elamin F.M. and Wilcox C.J. (1992). Milk composition of Majaheim Camels. *Journal of Dairy Science* Vol. 75, No. 11, 3155-3157

[7] Gorban A.M.S. and Izzeldin O.M. (1997). Mineral content of camel milk and colostrum. *J Dairy Res* 64: 471-474

[8] Hashim I.B. (2002). Acceptance of camel milk among elementary school students in Al Ain city, United Arab Emirates. *Emir. J Agric Sci* 14: 54-59

[9] Heeschen W.H. (1994). Introduction. In: Monograph on the significance of pathogenic microorganisms in raw milk. International Dairy Federation, Brussels pp. 8-11.

[10] ICAR, Indian Council for Agricultural Research (1981). A Handbook of Animal Husbandry. Edited by SHRI. P.J. Joseph for the Indian Council for Agricultural Research, New Delhi. Pg. 99.

[11] Imran M., Khan H., Hassan S.S., and Khan R. (2008). Physicochemical characteristics of various milk samples available in Pakistan. *J Zhejiang Univ Sci B* 9: 546-551

[12] Khanna N.D. and Rai A.K. (1993). Milk production potential of Indian Camel. *Asian Livestock* 18: 19-21

[13] Kittivachra, R.R., R. Sanguandeekul, R. Sakulbumrungsil, and P. Phongphanphanee, (2007). Factors affecting lactose quantity in raw milk. *Songklanakarin J. Sci. Technol.* 29: 937-943

[14] Knoess K.H. (1977). The camel as a meat and milk animal. *World Anim. Rev.* 22: 3-8

[15] Kouniba A., Berrada M., Zahar M., and Bengoumi M. (2005). Composition and heat stability of Moroccon camel milk. *Journal of Camel Practice and Research* 12: 105-110

[16] Magjeed N.A. (2005). Corrective effect of milk camel on some cancer biomarkers in blood of rats intoxicated with aflatoxin B1. *J Saudi Chem Society* 9: 253-263

[17] Mestawet TA, Girma A, Ldnry T, Devold TG, Narvhus JA, Vegarud GE (2012). Milk production, composition and variation at different lactation stages of four goat breeds in Ethiopia. *Small Ruminant Res.* 105: 176-181

[18] Roadhouse, C.L. and J.L. Henderson (1950). The Market Milk Industry. 2nd Edn. Magraw Hill Brok Company, pp: 41-42.

[19] Sankhla A.K., Gupta M..P, Aart, and Dashora P.K. (2000). Proximate composition and physicochemical characteristics of camel milk produced in South Rajasthan, *Indian Journal of Dairy Science* 53: 61-63

[20] Schuhmacher M., Borques A.M., Domingo L.J., and Carbella J. (1991). Dietary intake of lead and cadmium from foods in Tarragona Province, Spain. *Bulletin of Environmental Contamination and Toxicology* 46: 320-328

[21] Sela S., Pinto R., Merin U., and Rosen B. (2003). Thermal inactivation of Escherichia coli in camel milk. *Journal of Food Protection* 66: 1708-1711

[22] Shabo Y., Barzel R., Margaulis M., and Yagil R. (2005). Camel milk for food allergies in children. *Immunology and Allergy* 7: 796-798

[23] Yagil R. and Etzion Z. (1980). Effect of drought condition on the quality of camel milk. *J. of Dairy Res.* 47: 159-166