

PHYSICOCHEMICAL PROPERTIES OF IRAQI DROMEDARY CAMEL'S MILK

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ABSTRACT

Camel milk has proved as the closer to human milk than other livestock milk. This study intended to examine the physicochemical properties of dromedary camel's milk. Thirty milk samples collected from 2 dromedary camel herds in Badiat Alsamawah/ Al Muthanna governorate/ Iraq. The physical and chemical analysis was done on each milk sample and data were reported and analyzed. The variations were seen in the physical and chemical properties of fresh camel milk. The pH, specific gravity and freezing point were ranged between 6.1 and 6.5 (6.3133 ± 0.154), 1.0123 - 1.0615 (1.0282 ± 0.0098), and (-) 0.439 – (-)1.361 (-0.6132 ± 0.1928) respectively. The percentages of total fat, SNF (Solid Not Fat), Protein and lactose were ranged between 1.59 - 13.9 (4.1343 ± 2.88), 1.59 - 20.36 (9.428 ± 2.8833), 7.15 – 2.74 (3.576 ± 1.1087) and 11.74 - 4.15 (5.3406 ± 1.6513) respectively. In conclusion, some physical and biochemical values of fresh dromedary milk were determined in this study. Moreover, the effect of food and environment on the milk quality was also approved. The authors recommend another future study that correlates between the nature of food and the quality of camel milk during the different lactation period.

INTRODUCTION

The total population of the camelids in the world is 27.735.941 according to 2014, FAO statistics. Moreover, the worldwide estimated production of camel's milk is 2.9 million tons/year. The total estimated population of dromedary camelids in Iraq changed from 1961 to 2014. In 2014, it was estimated to be about 65.085 thousand (1) (Table.1). These camels are owned by

Bedouins and usually domesticated in a different desert and semi desert areas of Iraq. These camels are used for working, milk and wool production; besides, many people are requested camel's milk because of its therapeutics and nutritional properties. Recently, many products of camel's milk have spread worldwide (2, 3). Relatively, the camels have an extended lactation period around 17 months. Feeding circumstances and natural environment effect on the production of the camel's milk and she-camel can produce a half liter a day, and the highest milk production was observed in the third month (4). Contrasting other milk producing animals, she-camels have the ability to produce milk under the extremely hostile conditions of hot, drought and lack of pastures (5, 6). Camel's milk has certain antibodies that help in fighting diseases like cancer, HIV/ AIDS, Alzheimer's and hepatitis (7, 8). Camel feed and species influence the structures of camel's milk. The chemical composition of camel's milk was similar to that of cow milk and can be used for making different products such as butter, cheese and milk tea (9, 10). Compared with other animals, camel's milk had not been given attention in research in Iraq because of the lower yield and the difficulties that face the researcher in collecting milk from the camel. Therefore, this study designed to investigate the physicochemical properties of dromedary camel's milk in Badiat Alsamawah/ Al Muthanna governorate/ Iraq.

Table. 1: Shows the total estimated population of dromedary camelids in Iraq from 1961 to 2014 according to FAO, (2014) (1).

Year	Total number	Year	Total number
1961	200000	1988	50000
1962	200000	1989	57000
1963	200000	1990	59000
1964	200000	1991	14000
1965	202000	1992	10000
1966	217000	1993	8000
1967	205000	1994	6400
1968	225000	1995	5400
1969	250000	1996	5000
1970	266000	1997	6500
1971	245000	1998	8000
1972	220000	1999	8500
1973	210000	2000	9000
1974	190000	2001	8000
1975	165000	2002	10000
1976	140000	2003	7000
1977	115000	2004	7000
1978	90000	2005	30000
1979	69562	2006	51000
1980	70000	2007	51000
1981	75000	2008	58293
1982	80000	2009	58000
1983	80000	2010	60000
1984	70000	2011	62000
1985	55000	2012	65000
1986	41000	2013	57489
1987	45000	2014	62085

MATERIALS AND METHODS

Sample collection

This study was conducted during the period extended from March to June 2017. Two herds of dromedary camel exist in Badiat Alsamawah/ Al Muthanna governorate/ Iraq, were used in this study. These herds were depended on natural grazing; meanwhile, only pregnant and lactating she-camel was feed with a concentrated food that prepared by Bedouin's women and called it a ball of food (Dahareeb) (Figure.1). Milk samples (250 ml) were collected in sterilized bottles and transferred in a cool box to the laboratory of clinical pathology/ College of Veterinary Medicine/ Al Muthanna University and the physical and chemical analysis were done.



Figure.1: Shows the balls of food (Dahareeb), the concentrated food provided for pregnant and lactated she-camel

Parameters analysis

Physical parameters of milk samples were measured as follows: the pH of the milk was tested using the titrating acidity method according to Association of Official Analytical Chemists (11). While, the specific gravity and freezing points measured using the milk analyzer (Lactoflash funke Gerber/ Germany). The fat, SNF (Solid Not Fat), Protein and lactose of the milk were also measured using the automatic Milk analyzer and expressed as percentages.

RESULTS AND DISCUSSION

The means of physical and chemical parameters is presented in figure.2. The results of the physical test presented in figure.3. The pH values of fresh milk were ranged between 6.1 and 6.5 (6.3133 ± 0.154). The specific gravity and freezing point measurements were ranged between 1.0123 and 1.0615 (1.0282 ± 0.0098) and $-0.439 - (-) 1.361$ (-0.6132 ± 0.1928) respectively. These results are relatively analogous to the previous studies with minor differences or within the range of values (7,12, 13,14,15,16). The minor variations in the pH values of camel's milk might occur due to the nature of grazing area, the weather and period of lactation.

The chemical composition of camel's milk samples presented in the figure.4. A wide range of variations was seen in the chemical properties of fresh milk. The percentages of total fat, SNF (Solid Not Fat), Protein and lactose were ranged between 1.59 - 13.9 (4.1343 ± 2.88), 1.59 - 20.36 (9.428 ± 2.8833), 7.15 - 2.74 (3.576 ± 1.1087) and 11.74 - 4.15 (5.3406 ± 1.6513) respectively. The percentages of the measured parameters revealed a wide range in the values of fat and SNF. These results are higher than the results reported previously for the camel's milk as well as for buffalo milk (14, 17). Similar differences were also seen in the Bacterian's milk that reported by

other researchers (8, 15, 19, 20). However, (21) reported the influences of the nutritional system on the value of the camel milk. Moreover, they approved that the non-traditional food transitional system for the camel herds was greatly affected the nutritional quality of camel's milk. A previous study, (15) approved that the hot summer season effected on the milk content and she-camel would secrete highly diluted milk with low fat. Meanwhile, this study mentioned about the natural phenomena by which the young she-camel are provided with sufficient nutritional value and water for an excellent adaptation in a desert environment, in addition, a water content of forage would also affect water constituent of milk.

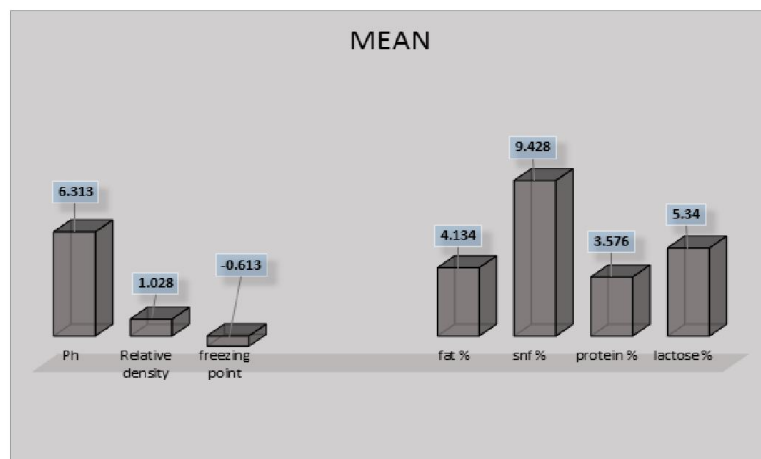


Figure.2: The distribution of means of the physical properties (pH, Relative density and freezing point) and the chemical properties (fat, SNF, protein and lactose) of camel's milk sample

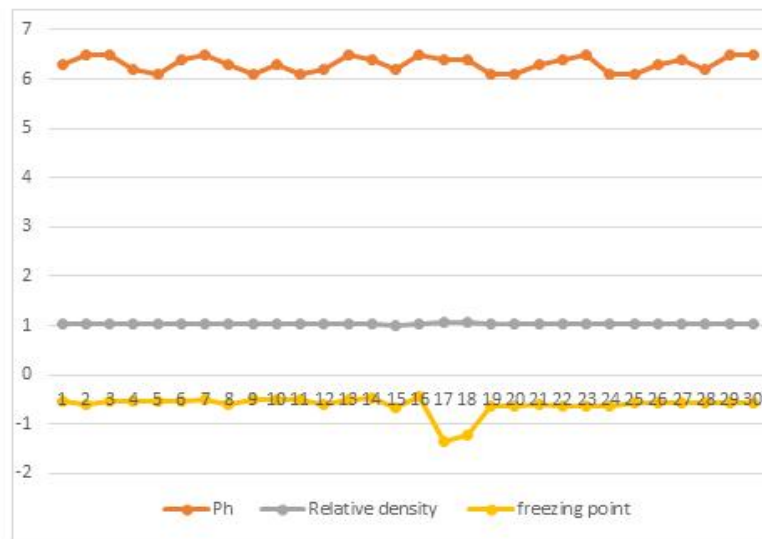


Figure.3: Show the distribution of pH, Relative density and freezing point values of camel's milk samples.

The result of this study found that the percentage of fat in camel milk was ranged between 1.59 - 13.9 (4.1343 ± 2.88). These result showed a considerable variation in fat content between examined samples. These results are in agreement with the results of (13), who, approved the direct relationship between the total solids content of camel's milk. Moreover, there was an elevation in the percentage of total solids, fat content, and vice versa. Similar observations have also been approved by (7) and showed that nutritional status and the water supply also affect the fat content of the camel milk. The values of total protein and lactose reported in this study were ranged between 7.15 – 2.74 (3.576 ± 1.1087) and 11.74 - 4.15 (5.3406 ± 1.6513) respectively. These values are higher than previous values reported by (7) and (13), which also affected by animal food and water supply.

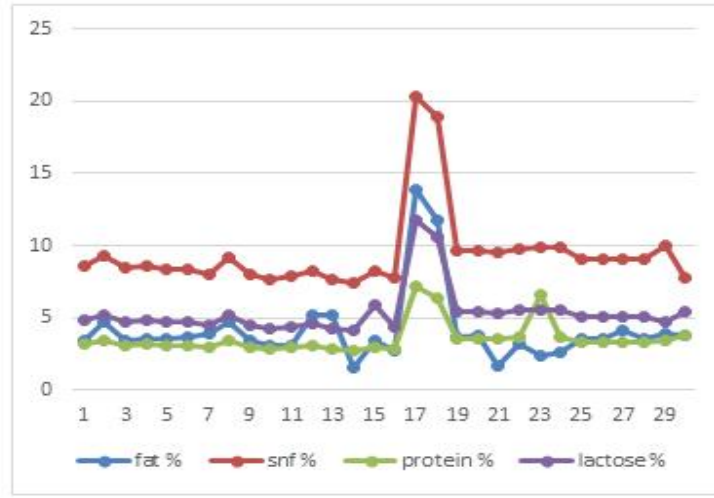


Figure.4: Show the distribution of fat, SNF, protein and lactose values of camel's milk samples. In conclusion, this study determined some physical and biochemical values of fresh dromedary milk. Moreover, it approved the effect of diet and environment on the quality of the milk. The authors recommend another future study that correlates between the nature of food and the quality of camel milk during the different lactation period.

الخصائص الفيزيوكيميائية لحليب الإبل ذو السنم الواحد في العراق

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الخلاصة

أثبت بان مكونات حليب الإبل مقارب إلى الحليب البشري عن حليب الحيوانات الأخرى و يستخدم لعلاج الاطفال المصابين بالتوحد، ومرض السكري من نوع ١ ، والتهاب الكبد الفيروسي النوع B، وبعض أمراض المناعة الذاتية ويتم هضمه بسهولة من قبل الأفراد اللذين يعانون من فرط حساسية لاكتوز الحليب. فضلا عن ذلك فان حليب النوق غنية بالفيتامينات والمعادن، وخاصة B ، C ، والحديد. هدفت هذه الدراسة لمعرفة الخصائص الفيزيائية والكيميائية لحليب الإبل. حيث تم جمع ثلاثون عينة من حليب النوق من قطيعين من الإبل في بادية السماوة / محافظة المثنى / العراق. تم إجراء التحليل الفيزيائي والكيميائي لكل عينات الحليب وتم جمع البيانات وتحليلها. شوهدت الاختلافات في الخصائص الفيزيائية والكيميائية لحليب الإبل الطازج. تراوحت درجة الجاذبية ونسبة الانجماد المحدودة بين ٦.١ و ٦.٥ (٦.٣١٣٣ ± ٠.١٥٤) و ١.٠١٢٣ - ١.٠٦١٥ (١.٠٢٨٢ ± ٠.٠٠٩٨) و (-٠.٤٣٩) - ١.٣٦١ (٠.٦١٣٢ ± ٠.١٩٢٨) على التوالي. وتراوحت نسبة الدهون الكلية (SNF) والبروتين واللاكتوز بين ١.٥٩ - ١٣.٩ (٤.١٣٤٣ ± ٢.٨٨) ، ١.٥٩ - ٢٠.٣٦ (٩.٤٢٨ ± ٢.٨٨٣٣) ، ٧.١٥ - ٢.٧٤ (٣.٥٧٦ ± ١.١٠٨٧) و ١١.٧٤ - ٤.١٥ (٥.٣٤٠٦ ± ١.٦٥١٣) على التوالي. في الخلاصة، اظهرت هذه الدراسة

بعض القيم الفيزيائية والبيوكيميائية لحليب النوق الطازج. وعلاوة على ذلك، تم توضيح تأثير الغذاء والبيئة على جودة حليب النوق. يوصي المؤلفون دراسة مستقبلية أخرى والتي تربط بين طبيعة تغذية الابل ونوعية حليبها وخلال فترة الرضاعة المختلفة.

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