DIFFERENCE BETWEEN FOREMILK AND TOTAL MILK OF IRAQI LOCAL GOAT BREED IN MICROBIAL LOAD

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ABSTRACT

The current study was carried out on ten local goat breed belonging to a private farmers in Bashika city, 20 km north east of Mosul province. The aim of this work is to evaluate the hygienic and chemical composition of goat's milk, depending on the Total Bacterial Count (TBC) and Total Fungal Count (TFC). Milk samples were collected from each goat every ten days and for three times. The samples represented the fore stripping milk (FM), remained milk (RM), which is free from fore stripping milk, and the total milk which is the mixed of fore stripping milk with the remain milk (MM). The laboratory examination of milk samples revealed that the mean TBC were 3.36 $\log_{10}$ CFU mL^{-1} for FM, 2.8 $\log_{10}$ CFU $mL^{-1}$for RM and 3.3 $\log_{10}$ CFU $mL^{-1}$for MM. The TFC were 2.72 $\log_{10}$ CFU $mL^{-1}$for FM, 2.5 $\log_{10}$ CFU $mL^{-1}$for RM and 2.63 $\log_{10}$ CFU mL^{-1} for MM .

The results also show that there is percentage differences in TBC and TFC between FM, RM and the MM, and were 72.25%, 12. 88% , 68.28 % for TBC and 39.77%, 18.74%, 25.89% for TFC. The chemical composition of goat's milk were estimated as follow: 3.82% fat,3% protein,7.92% solid-non-fat and 4. 33% lactose while milk density, freezing point and electrical conductivity were 1.026 , -52.2 and 8.72 respectively.

Key words: Milk, total Bacterial count, total Fungal count, Sterilization.

The research cited from higher diploma research .

الفرق بين اللبن الطازج والحليب الكلي للماعز المحلي العراقي المكسر في تحميل الميكروبيكال

الملخص

أجريت هذه الدراسة على عشر معزات منتجة للحليب في احد الحقول التابعة لأحد المربين الموجودين في منطقة بعشيقة الواقعة في الشمال الشرقي من مركز الموصل وعلى بعد 20 كيلومتر وكانت هذه المعزات في حالة صحية جيدة ومستمرة في الإنتاج ، والهدف من الدراسة هو لتقييم الحالة الصحية ومعرفة التركيب الكيمياوي لحليب الماعز حيث تم أخذ عينة من القطرات الأولى من الحليب الأول من هذه المعزات (حليب التنثير) كما تم أخذ عينة أخرى من حليب المعزات نفسها بعد حلبها حلباً كاملاً ومن ثم تم خلط الحليب الأول (حليب التنثير) مع (حليب ما بعد التنثير) مباشرة وتم أخذ عينة أخرى من الحليب وتمت دراسة المحتوى الجرثومي والفطريات في كل توع من انواع الحليب السابقة الذكر و لكل معزة على حدة .

كانت اعداد البكتريا في حليب التنثير $\log_{10}$ 3.3 وفي الحليب الكلي $\log_{10}$ 2.8 وفي حليب بعد التنثير $\log_{10}$ 2.72 /ملم حليب . كانت عدد الفطريات في حليب التنثير $\log_{10}$ 2.5 وللحليب الكلي $\log_{10}$ 2.72 وللحليب بعد التنثير $\log_{10}$ 2.63 /ملم حليب. تبين ان حليب الماعز يحتوي على نسبة دهن 3.82% ونسبة البروتين 3% ونسبة المواد الصلبة اللادهنية 7.92% و نسبة سكر اللاكتوز 4.33% و كثافة الحليب 1.026 ودرجة الانجماد 52.2- والناقلية الكهربائية 8.72 .

INTRODUCTION

Goats number in the world during 2013 was 1 005 603 003 and their production of milk was 17 846 118 tons. World goats number during the period 2000-2013 increases to 33.79% with an average per year of2.6%) (20). The role of goat milk to human nutrition is important in many developing countries and especially in the Mediterranean, Eastern Europe, Middle East and South American (17). In developing countries the demand for milk and milk products is increasing in these countries (7). In tropics where there are about 95% of all goats in the world can be obtained from goat's milk since these animals can be adapted to the tropics, where it has high fertility and multiple births, with higher food conversion efficiency than cattle when fed on bad quality feed (13). The number of goats in Iraq is (1,700,000) in 2014 (8) and the sequence of production of goat milk produced in the world comes in the third stage after the production of both cattle and buffalo (12).

The consumption of goat milk and its products became more by consumers of dairy people compared with other dairy products from other animals (16) and many people with allergies, including children are able to drink goat's milk if they cannot drink cow's milk (27).

Goats have a significant role, especially in the lives of small farmers since the size of small goats makes the owner is able to keep a large herd in a small space and their contribution to the great in the maintenance of health and nutrition of the poor families without the need for large areas of pasture has launched the goats (the cow of poor man) (5) because it produces milk and consume a little amount of food and do not need to pastures, as is the case in cattle, sheep. Goats has a great ability to adapt and live in most countries of the world and has a production capacity and multiply in such circumstances and under any system that they perceive productive as possible (22).

The quality and composition of milk are not given importance only by the dairy companies and producers, but is given greater importance of consumers as well as the requirements of good hygiene and lack of contamination to protect human health and preserve the value of vital food and natural raw material and to ensure that manufacturing processes are valid in milk processing ,the milk consider an important food for the human because it contain many of the key elements and also is the main source of many processed foods such as milk, cheese and other products so it is very necessary to focus on obtaining clean milk from the animals at the farm until arrived to the consumer (4) and must be as much as possible try to reduce the content of bacterial milk to the maximum degree possible to get the milk of good quality and safe for human consumption, which increases the shelf life of milk and its derivatives, reduces corruption. The numbers of bacteria in the milk are the first principles which are used by manufacturers and of dairy farmers to assess the efficiency of the production steps of cleaning and sterilization and to maintain the quality and length of duration of use of milk (9). Hence, the achievement of health goals and economic development in the production of milk requires good management of all stages of production, and to produce milk of good quality and few numbers of bacteria begins in the farm from healthy animals and with clean and sterile instruments (25).

So the objectives of this study are to study TBC and TFC content of the FM, RM and MM and to identify the chemical components of local goats milk.

MATERIALS AND METHODS

This study was conducted on ten healthy producing milk goats in a farm belonging to one of the owners in Bashiqam which is located in the north-east of the province of Nineveh, about 20 km. from the center of Mosul city. The examinations were carried out at during July and August 2010, at the department of Veterinary Public Health / College of Veterinary Medicine / University of Mosul. Milk TBC and TFC were counted, and the chemical analysis of milk samples was performed using a milk tester (Ultrasonic Milk Analyzer) USA Ekomilk at the College of Agriculture and Forestry / Department of the food industry, University of Mosul.

Collection of samples:

Ten goats in their second season of production were selected randomly and numbered. Samples of FM, RM and MM were taken from both halves of the goats udder according to (3) from each goat separately in a clean and sterile container, which were cooled immediately by placing them in plastic pack containing ice and then transferred directly to the Department of Veterinary Public Health / college of Veterinary Medicine / for estimation the TBC and TFC content of FM,RM and MM milk samples.

Bacterial examination:

For bacterial and fungal examinations, Nutrient agar (prepared by mixing 28 grams of the powdered agar with one liter of distilled water as instructed by the manufacturer Company ,LAB UK), and Potato dextrose agar **(**prepared by mixing 30 grams of the powdered milk with one liter of distilled water as instructed by the manufacturer) were used. Agars were sterilized at temperature of 121 ° C for 15 minutes (18) . Milk samples were decimally diluted according to the method of (2) by trasfering (1 ml) of the milk

samples to 9 ml peptone water to complete the size to 10 ml, then the dilutions were completed up to 10^6 .
Two plates were used for each dilution to calculate TBC and TFC using 0.1 ml from each dilution to be spread on each types of the two agars. Agars were incubated at two different regimes, at temperature of 37 ° C. for 24 hours for TBC estimation, and at room temperature of 25 ° C. at a period of 3-5 days for TFC (11).

RESULTS

The colony forming units Log $_{10}$(CFU) of TBC for FM,RM and TM milk samples were 3.36 , 2.8 and 3.3 respectively, and the percentage of different TBC between these samples were 72,25% ,12,88% and 68,28% respectively, Table (1&2)

Table 1: Total bacterial count (TBC) of the tested milk samples

Type of milk	log_{10}CFU
FM	3.36
RM	2.80
TM	3.30

Table 2: Percentages of the differences between TBC in tested milk samples

Type of milk	%
FM&RM	72.25%
RM&TM	12.88%
FM&TM	68.28%

While the Log $_{10}$ TFC in the FM,RM and TM were 2.72, 2.5 and 2.63 respectively, and the percentages of different TFC were and39.77%,18.74% and 25.89% respectively, Table (3&4).

Table 3: Total fungal count (TFC) of the tested milk samples

Type of milk	log_{10}CFU
First milk	2.72
Milk after we remove the first milk	2.5
The total milk	2.63

Table 4: Percentages of the different TFC of tested milk samples

Type of milk	%
First milk and the milk after the exclusion of the first milk.	39.77%
First milk and the total milk.	18.74%
The milk after we mixed the first milk with total milk.	25.89%

Dealing with the chemical composition of goat raw milk we found that the mean percentage for fat, protein, total solids, lactose were 3.82 , 3, 7.92 and 4.33 % respectively, while the density of milk and the degree of freezing and electrical conductivity were 1.026, -52,2 and 8.72 respectively .

DISCUSSION

The TBC and TFC usually used to assess the health status of the milk quality and how to save the raw milk. In some countries they use these characters for grading milk according to quality and also help to encourage production of raw milk of higher quality and help to improve standards of public health during milking. The chemical and contamination quality of milk is the main base for dairy products and therefore the production of good quality milk should be given great importance

because of its economic effect and supports the development of the farm and also supports the development of dairy plants if we know that the TBC And TFC in 1 mm is one of the indicators that depend on receipt of the milk for the purpose of manufacturing.

The bacteriological results of our research were lower than that referred by (24), who found that the high TBC of 5,47 Log_{10} ml^{-1}CFU found in goat raw milk was accompanied by a reduction in its protein, fat and lactose contents; to undesirable odor; lowered stability of milk and its products. Our results were also less than that reported by (15) of 4,69 Log_{10} ml^{-1}CFU, and also less than those set by (6) who recommended that the total bacteria should not exceed 6 Log_{10} ml^{-1}CFU, and in milk used for the manufacture 5.7 Log_{10} ml^{-1}CFU. Moreover our results were less than what referred by (19) in Sudan who found that that goat raw milk contains 4.557 Log_{10} ml^{-1}CFU. In the same trend our finding were lower that recorded in market of 7.11 Log_{10} ml^{-1}CFU (21).

As explained by(23) that the isolation of fungi in raw goats milk considered as a an important components of the germs contamination, production of lactic acid, and found that the total fungi in raw goats milk reach 6 Log_{10} ml^{-1}CFU, which in turn exceeds our results of 2.63 Log_{10} ml^{-1}CFU. Our findings were and also less than that found by (1) who stated that the upper and lower limits of bacteria and fungi in their goats milk were 9.15 and 7.2 Log_{10} ml^{-1}CFU for TBC, 7.85 and 5.48 Log_{10} ml^{-1}CFU for TFC respectively, and they found also that the maximum and minimum freezing degree were (- 4,33 and - 0,575,) respectively, with an average (-0,484) and the acidity were 0,79 and 0,185 with an average of 0,231.

Our results were also less bacteriologically than what found by (10) of 5. 11 Log_{10} ml^{-1}CFU in goats milk .

The lower trend in TBC and TFC in our findings could be attributed to the season factor , dry summer pasture and the lower polluted milk samples.

As regarding the proportion of the difference in TBC of FM, RM and MM , they mean that first milk contains 72, 25 %, more bacteria than milk after exclusion the first milk, as well as the first milk contains 12, 88 % more bacteria than the total milk and total milk contains 68,28% more bacteria milk after exclusion the first milk.

On the other side and as regarding the proportion of the difference in TFC of FM, RM and MM means that first milk contains 39,77%, more fungi than milk after exclusion the first milk, as well as the first milk contains 18, 74 % more fungi than the total milk and total milk contains 25,89% more fungi milk after exclusion the first milk, which may reflect that the first milk is more susceptible to contamination than other types of milk (26).

The chemical composition of milk can be influenced by several factors, including, age, stage of lactation, first milk and last milk as indicated by the results of (14), who indicated that the chemical findings in their Jordanian local goat milk were in agreement with ours (in Iraq) regarding fat, protein, total solids, lactose of 4.5 , 2.9 , 9.1 and 5.3 % respectively. The other characters of milk, such as density and degree of freezing for example, give us a sign of fraud that can occur to the milk while the electrical conductivity give us an indication for the detection of mastitis infection in that it increases when the animal are infected by mastitis.

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