MANUFACTURE AND CHARACTERIZATION OF WHITE CHEESE FROM CAMEL MILK / MINERALISATION AND BUFFERING CAPACITY A COMPARAISON WITH COW MILK

B. Camier[1*], E. Beaucher[1], F. Gaucheron[1], G. Konuspayeva[2] and B. Faye [2,3]

[1] UMR 1253 Science and Technology of Milk and Egg, Inra-Agrocampus, 65 rue de Saint-Brieuc, 35042 Rennes Cedex, France
[2] Project Camel Center, FAO, AL-KHARJ, Kingdom of Saoudi Arabia
[3] CIRAD-ES,TA C-Dir/B Campus International de Baillarguet, 34398 Montpellier cedex, France

* : Corresponding author :
Benedicte.camier@rennes.inra.fr

INTRODUCTION

Usually, camel milk is consumed as raw milk, after pasteurization or like fermented beverages (Shubat in Kazakhstan or Chal in Turkmenistan for exemple). An other possible valorisation of camel milk is to transform it in cheese, but the cheese yield was low due to a bad coagulation with traditional bovine coagulant. Recently, it was showed that it was possible to make cheese with camel chymosin (ChyMaxM from Hansen, Denmark).

In this work, white cheeses were made with camel and cow milks with the same procedure. Milks and cheeses were characterized with special attentions paid on the compositions and rates of acidification of milks, and on the compositions and buffering capacities of cheeses. Recoveries of protein, fat, calcium and dry matter in cheeses were also calculated.

MATERIALS AND METHODS

Camel and cow cheeses were manufactured in the project Camel Center (Al KHARJ-KSA) and in Dairy Platform (INRA/Rennes-France) from raw milks, respectively. In this work, as camel milk had lower contents in total nitrogen (TN) and fat than cow milk, raw cow milk was standardized with UF permeate to obtain the same concentration in fat (~20g/kg) and TN (~25g/kg) than camel milk. Then, the same protocol was used to make white cheeses. After heating milk at 40°C, thermophilic starters (Coquard-France) were added. One hour after starters addition, milks were renneted by ChyMax M rennet (50µl/l). The curd was cutted 1h after renneting and moulded in a bag. After draining during 1h, the curd was moulded and pressed during 2h at 1 bar. At the end of the acidification of cow milk (renneting + 5h) and camel milk (renneting +18h), cheeses were stored at 4°C before analyses.

Camel milking

Camel cheeses

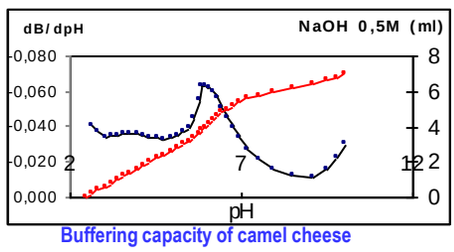
Camel cheeses

Cow cheeses

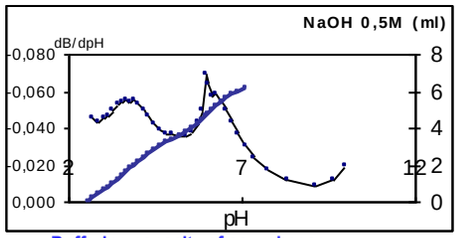
RESULTS

MILK	pH	Dry matter (g/kg)	Fat (g/kg)	Total N (g/kg)	Ash (g/kg)	Calcium (g/kg)
Camel milk (n=3)	6.49 (± 0.05)	96.15 (± 2.9)	20.3 (± 0.6)	26.57 (± 0.6)	8.62 (± 0.05)	1.16 (± 0.05)
Standardized cow milk (n=3)	6.61 (± 0.05)	96.93 (± 1.65)	19.3 (± 1.5)	24.32 (± 0.2)	6.48 (± 0.15)	0.97 (± 0.05)

CHEESE	pH (at the end of acidifcation)	Cheese Yield (kg/100kg milk)	Dry matter (g/kg)	Calcium recovery %	Total N recovery %	Fat recovery %	Dry matter recovery %
Camel cheese (n=2)	5.62 ⇨18h	7.40 (± 0.15)	486.80 (± 5.65)	37.0 (± 0.2)	84.3 (± 2.9)	57.4 (± 2.7)	37.1 (± 2.55)
Cow cheese (n=2)	5.39 ⇨5h	7.30 (± 0.55)	469.75 (± 29.05)	36.6 (± 0.6)	72.9 (± 0.35)	68.3 (± 3.4)	35 (± 1.0)



Buffering capacity of camel cheese



Buffering capacity of cow cheese

CONCLUSION

The acidification with thermophilic starters was faster for cow milk compared to camel milk. With a previous standardization of cow milk in fat and total nitrogen contents, the cheese yields were similar for both milks. However, the recoveries were different : total nitrogen recovery was better for camel milk, although that fat recovery was better for cow milk. Recovery in calcium was similar for both cheeses.
Maximal buffering capacities were determined at pH close to 6.0 for both cheeses (mainly due to organic and inorganic phosphates). It was noted a second maximal peak at pH 4.0 for cow milk but not for camel milk.

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