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INTRODUCTION

Camel milk is an important **nutritional source for inhabitants in arid and semiarid areas**, but its fatty acids (FA) profile, and particularly conjugated linoleic acid (CLA), is not well known.

The *cis*-9, *trans*-11 C18:2, major CLA isomer in ruminants milk, has anticarcinogenic properties. For this reason, CLA and its precursor, the vaccenic acid (VA, *trans*-11 C18:1), are important for human health and have been considered as components of functional foods.

The main objective of this study was to have a **first approach to the CLA and VA content of camel milk**. In addition, the general FA profile of camel milk fat was also evaluated.

MATERIAL AND METHODS

- **Four primiparous and 13 multiparous Tunisian Maghrebi dairy dromedaries** (*Camelus Dromedarius*) at the beginning of lactation (31 ± 11 DIM).
- **Semi-extensive system**: camels grazed in an halophyte pasture (6% CP) in the Southeast of Tunisia and received a daily supplement of olive cake (1 kg), wheat bran (0.5 kg) and barley grain (0.5 kg).
- **Camel-calves** were allowed to suckle *ad libitum* from their dams during the first 4 month of lactation.
- **Milk samples** were taken by milking the camels after a 24-h separation period from their calves. Milk let-down was induced by allowing the calf to suck only the right teats of the udder, whereas the 2 left teats were manually milked.
- **Gas chromatography** was used to analyze the milk FA profile. After an alkaline transesterification, FA methyl esters were injected into a GC (HP 6890, Agilent) equipped with a capillary column (CP-Sil-88; 100 m × 0.25 mm i.d.).

RESULTS

Milk yield was greater in multiparous than in primiparous camels (3.4 ± 0.46 vs. 1.0 ± 0.18 L/d). **Milk FA profile was similar regardless of lactation number** (Table 1). The predominant saturated FA were palmitic (26.9%) and stearic (16.8%), whereas the main unsaturated FA was oleic (29.6%), which is partially due to the use of olive cake in the diet.

Compared to cow and ewe milk, camel milk had **lower contents of saturated (52.6%) and short-chain FA**, while **unsaturated FA, particularly MUFA (42.1%), were greater**. The n-6/n-3 ratio (Figure 1) was relatively high (7.3), but falls within the normal range observed in ruminants not supplemented with n-3 FA sources.

Milk fat contents of *cis*-9, *trans*-11 CLA (1.1%) and VA (2.7%) (Figure 1) were in accordance with those observed in dairy cows receiving moderate quality pastures. The ratio of CLA/VA was high (0.40) and both **CLA and VA were correlated** ($y = 0.23x + 0.447$, $R^2 = 0.60$) indicating, as in ruminants, that the VA could be the main precursor of CLA (ruminic acid) in the mammary gland.

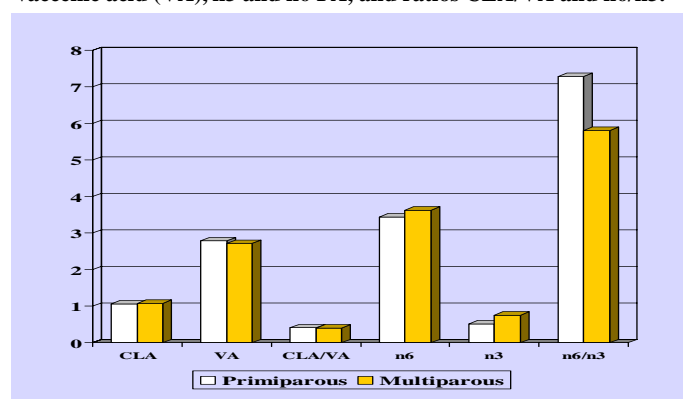


Table 1. Main FA in milk of camels grazing in a halophyte pasture and supplemented with olive cake.

Fatty Acid	Primiparous	Multiparous
C12:0 (Lauric)	0.38 ^b ± 0.03	0.47 ^a ± 0.02
C14:0 (Myristic)	5.85 ± 0.78	6.72 ± 0.45
C16:0 (Palmitic)	25.39 ± 1.06	27.40 ± 0.61
C16:1 (Palmitoleic)	6.05 ± 0.75	6.63 ± 0.48
C18:0 (Stearic)	18.19 ± 1.27	16.25 ± 1.02
C18:1 (Oleic)	31.03 ± 2.56	29.04 ± 1.48
C18:1t11 (VA)	2.79 ± 0.38	2.72 ± 0.21
C18:2 (Linoleic)	3.09 ± 0.25	3.36 ± 0.14
C18:3 (Linolenic)	0.47 ± 0.13	0.71 ± 0.07
C18:2c9t11 (CLA)	1.06 ± 0.14	1.08 ± 0.08

^{a, b} Means with different superscript within a row differ ($P < 0.05$).

Figure 1. Milk content (% of total FAME) of *cis*-9, *trans*-11 CLA, vaccenic acid (VA), n3 and n6 FA, and ratios CLA/VA and n6/n3.



CONCLUSIONS

- Milk FA profile is similar in multiparous and primiparous camels.
- Camel milk has less saturated and more unsaturated FA than usual in cows and ewes.
- Levels of CLA and VA are not too high, but in accordance with the camel nutrition conditions.
- As in ruminants, CLA and VA are correlated.
- Fatty acids profile of camel milk reinforces its health benefits.