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Impact of parity on the profile of fatty acids with potential importance for human health in camel (*Camelus dromedarius*) milk

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Abstract

The aim of the present study was to investigate the influence of parity on the proportion of fatty acids with potential health significance in camel milk fat. Milk samples were collected from four multiparous and four primiparous camels in intensive husbandry at mid-lactation stage. Fatty acid methyl esters were analysed by gas chromatography in conjunction with a flame ionisation detector. Parity had a significant effect on fat and total solids content ($p<0.05$); mutiparous camels produced milk with lower fat and total solids content. In contrast, protein and ash content were not affected by parity ($p>0.05$). Primipara camels produced milk richer ($p<0.05$) in odd and branched chain fatty acids, monounsaturated fatty acids, C17:0, C15:0, omega-3 fatty acids, oleic acid, vaccenic acid and α-linolenic acid, while poorer ($p<0.05$) for total short-chain fatty acids, total medium-chain fatty acids, total saturated fatty acids, C6:0, C10:0, C14:0, c9-C16:0, C16:0 and iso-C16:0. In addition, the desaturation index for C16, which is an indicator of Δ9-desaturase activity, and the atherogenicity index were lower in primiparous camels ($p<0.05$). Parity had no effect on conjugated linoleic acid content ($p>0.05$). Overall, the milk fat of primiparous camels appears to have a relatively high nutritional value, as it contained higher levels of beneficial fatty acids and lower levels of saturated fatty acids.

Key words: camel milk; conjugated linoleic acids; desaturation index; odd- and branched chain fatty acids; parity

Introduction

Milk fat contains a large number of fatty acids, some of which are of great interest (Mahmoudi et al., 2022). Saturated fatty acids, especially C12:0, C14:0 and C16:0, are commonly attributed negative effects on human health, while other fatty acids such as linoleic and α-linolenic acids and oleic acid (c9-C18:1) are said to have beneficial effects and to prevent the onset and development of some chronic diseases. Several studies have recently focused on conjugated linoleic acids (CLA), which have been shown to have anti-carcinogenic, anti-obesity, anti-diabetic and anti-hypertensive properties. CLA is a term used for a large group of positional and geometric isomers of linoleic acid characterised by a conjugated system of double bonds separated by a single bond (Crumb, 2011). The c9, t11 CLA (rumenic acid) is the major isomer and accounts for about 75-90 % of the total CLA in bovine milk fat (Blaško et al., 2010). Rumenic acid in milk fat is primarily a product of endogenous synthesis by the enzyme Δ9-desaturase, the substrate being vaccenic acid (t11-C18:1) (Crumb, 2011). Recent studies suggest that the intake of vaccenic acid may extend beyond the health benefits associated with CLA (Field et al., 2009; Hanuš et al., 2018).

Odd- and branched-chain fatty acids (OBCFA) are another group of fatty acids of great interest. BCFA are known to reduce the incidence of necrotising enterocolitis (Ran-Ressler et al., 2011), regulate postembryonic development (Kniazeva et al., 2008) and have antitumour effects on cell lines of T-cell lymphomas (Cai et al., 2013). BCFA are derived from the cell membranes of rumen bacteria. OBCFA are primarily saturated fatty acids with an odd number of carbon atoms and a methyl group in the iso or anteiso position.

Dairy products from ruminants are the main food source for OBCFA, vaccenic acid and CLA. Several studies have investigated different ways to modify the fatty acid profile in ruminant milk fats, especially to increase the proportion of nutritionally desirable fatty acids. Many factors such as diet (Cruz-Hernandez et al., 2007), production system (Lopez et al., 2019), stage of lactation (Craninx et al., 2008; Bilal et al., 2014; Antunović et al., 2022) and parity (Bilal et al., 2014; Peng et al., 2008) have been shown to influence the FA profile in ruminant milk fat. In the dromedary camel (*Camelus dromedarius*), there are few studies on fatty acids with potential health significance compared to other ruminant species. Furthermore, there is very little information on factors influencing the profile of these fatty acids in camel milk. The aim of this study was therefore to investigate the influence of parity on the contents of fatty acids with potential consumer health significance in mid-lactation camel milk.

Materials and methods

Gross milk composition analysis

The total nitrogen content of milk samples was determined according to Kjeldahl method. Fat content was analysed by Gerber method. The oven-drying method at 105 °C was used for the determination of ash content. Samples were incinerated at 560 °C for 6 h to determine ash content (AOAC, 2000).

Animals and milk samples collection

Twenty-four milk samples were collected at mid-lactation from four primiparous and four multiparous Tunisian camels (*Camelus dromedarius*). One sample was collected from each camel in the third, fourth and fifth month after birth. The camels were kept under an intensive production system. They were kept indoors all day and fed a feed mixture (alfalfa pellets, fresh alfalfa, oat hay, olive cake and date waste) and commercial concentrates. The concentrate offered consisted of barley, soya, minerals, bran and vitamin complex.

The animals were milked in the early morning after approximately 14 hours of separation of camels from their calves. The samples were immediately stored in an icebox and then taken to the laboratory where they were frozen at -20 °C until analysis.

Fatty acid methyl ester transesterification

Fatty acid methyl esters were directly transesterified according to the method described by Golay et al. (2007). 1 mL of standard solution (500 mg tritridecanoin TG C13/ 250 mL methyl tert-butyl ether) and 1 mL methanolic sodium methoxide (5 % solution) were added to 400 µL milk. The mixture was shaken for 10 seconds. The reaction was stopped by adding 400 µL of hexane and then neutralised with 3 mL of an aqueous solution (disodium hydrogen citrate (0.1g/mL)/sodium chloride (0.15 g/mL). The sample was centrifuged at 1750 rpm for 5 min at 4 °C, and then 500 µL of the supernatant was removed and used directly for chromatographic determination.

Fatty acids analysis

Fatty acid methyl esters were quantified using a gas chromatograph (Perkin Elmer, Beaconsfield, UK) equipped with a VF-23ms, a flame ionisation detector and a fused-silica capillary column (30 m length × 0.25 mm internal diameter × 0.25 µm film thickness). Purified helium with a column inlet pressure of 20 psig and a split ratio of 1:20 was used as the carrier gas. The temperature programme used for the GC was as follows: 60 °C/1 min, increase to 130 °C at 10 °C/min, ramp to 170 °C at 10 °C/min and then increase to 230 °C at 10 °C/min where the temperature was maintained for 5 min. The detector and injector temperatures were set to 270 °C and 250 °C respectively. The individual fatty acids were identified and quantified by comparing the methyl ester chromatograms of the milk fat with the chromatograms of a pure fatty acid methyl ester standard (reference butter fat BCR-164, Fedelco Inc., Madrid, Spain).

Calculations and statistical analysis

Data on fatty acid content, desaturation indices and atherogenicity index were analysed one-way using ANOVA with the SPSS package (IBM SPSS Statistics, version 22).

The activity of the Δ9-desaturase enzyme in the mammary gland was calculated according to Kelsey et al. (2003) as product of Δ9-desaturase/ (product of Δ9-desaturase+substrate of Δ9-desaturase): c9-C14:1/C14:0+c9-C14:1, c9-C16:1/C16:0+c9-C16:1, c9-C18:1/C18:0+c9-C18:1 and c9,t11-C18:2/t11-C18:1+c9,t11-C18:2. The atherogenicity index was calculated according to Chilliard et al. (2003) as follows: (C12:0+4×C14:0+C16:0)/(MUFA+PUFA).

Results and discussion

Chemical composition

The effects of parity on gross chemical constituents are shown in Table 1. Fat and total solids content were significantly affected by parity, while protein and ash content remained unchanged. Multiparous camels produced milk with lower fat and total solids contents. These results are partly consistent with our previous study (Chamekh et al., 2020b), where we investigated the influence of parity on the composition of gross milk from camels kept in intensive and semi-intensive systems throughout lactation. Indeed, we found that all gross chemical components were significantly higher in the milk of primiparous camels. Nagy et al (2017) recorded the highest fat, protein and total solids contents in the milk of primiparous camels reared in an intensive husbandry system. However, Mustafa et al (2014) reported that parity had no effect on the fat content of milk from camels reared in intensive husbandry, while fat content in the traditional pasture system decreased with increasing lactation number. These authors observed that protein content decreased with increasing lactation number.

Table 1. *Effect of parity on chemical composition (%) of camel milk*

Chemical composition (%)	Primiparous (*n*=12)	Multiparous (*n*=12)
Fat	**2.72±0.11**[a]	**2.53±0.08**[b]
Protein	2.82±0.10	2.78±0.08
Total solid	**11.34±0.13**[a]	**10.96±0.08**[b]
Ash	0.85±0.007	0.85±0.01

Means followed by different uppercase letters in the same row are significantly different (p<0.05).

Fatty acids composition

FA proportions (g/100 g of total FA) in milk fat from multiparous and primiparous camels are shown in Table 2 and Table 4.

Milk fat from primiparous camels contained relatively lower levels of total short-chain fatty acids (SCFA), total medium-chain fatty acids (MCFA), total saturated fatty acids (SFA), caproic acid (C6:0), decanoic acid (C10:0), myristic acid (C14:0), palmitoleic acid (c9-C16:1) and palimitic acid (C16:0) than that from multiparous camels. However, there were no differences between primiparous and multiparous camels in the levels of butyric acid (C4:0), octanoic acid (C8:0), decenic acid (C10:1), lauric acid (C12:0) and myristic acid (c9-C14:1).

Studies on the influence of parity on the fatty acid composition of camel milk are scarce. Dowelmadina et al. (2018) reported that parity had no effect on the fatty acid composition of camel milk. Our results are in partial agreement with those of Abdelsalam et al. (2017), who observed that milk from camels in the first parity contained less C14:0 and C16:0 and more c9-C16:1 than that from camels in the second and third parities, while C8:0, C10:0, C12:0 and c9-C14:1 were unchanged.

Bilal et al. (2014) reported that milk from primiparous animals contains lower levels of C6:0, C8:0, C10, C12:0, C14:0 and C16:0. Similarly, Mierlita et al. (2011) reported that the levels of SCFA, MCFA, SFA, C12:0, C14:0 and C16:0 in sheep milk fat increased with increasing lactation number. In contrast. Peng et al. (2008) reported that primiparous yak produced milk with higher levels of C12:0 and C14:0. Miller et al. (2006) suggested that the mammary gland was more metabolically active in primiparous cows than in primiparous cows; they showed that the expression of fatty acid synthase and acetyl-CoA carboxylase genes was lower in the mammary gland of primiparous cows than in primiparous cows. The low levels of fully (C6:0, C10:0 and C14:0) and partially (C16:0) de novo synthesised fatty acids in the milk of primiparous camels might be related to differences in lipid metabolism of primiparous and multiparous camels.

Total polyunsaturated fatty acid (PUFA), total omega-6 (n-6), omega-6/omega-3 ratio, rumenic acid, total cis,cis-CLA, total trans,trans-CLA and total CLA contents were not affected by parity. The levels of t10-C18:1 and the two unresolved groups of trans-C18:1 (t-4 plus t-5 and t-6 to t-9), described as potentially unhealthy trans fatty acids, were also not affected by parity. In contrast, total monounsaturated fatty acids (MUFA), stearic acid (C18:0), oleic acid (c9-C18:1), vaccenic acid, linoleic acid (C18:2n6), total omega-3 fatty acids and α-linolenic acid (C18:3n3) were significantly affected; the amounts found in multiparous animals were significantly lower than in primiparous camels. The ratio of omega-6 to omega-3 was within the recommended limits for human nutrition in primiparous and multiparous camels. Abdelsalam et al (2017) showed that the parity number of camels had no effect on MUFA, PUFA, rumenic, elaidic, stearic and oleic acids. Dowelmadina et al (2019) reported that milk from fourth parity camels contained high levels of α-linolenic acid compared to that from first, second, third and fifth parity camels. The differences between our

Table 2. Effect of parity on fatty acid composition of camel milk (g/100 g of total fatty acids)

Fatty acids	Primiparous (*n*=12)	Multiparous (*n*=12)
C4:0	0.05±0.01	0.05±0.01
C6:0	**0.08±0.02**[b]	**0.20±0.01**[a]
C8:0	0.10±0.01	0.14±0.02
C10:0	**0.09±0.02**[b]	**0.25±0.03**[a]
C10:1	0.02±0.01	0.02±0.01
C12:0	0.92±0.05	0.83±0.04
C14:0	**10.01±0.6**[b]	**12.90±0.7**[a]
*c*9-C14:1	1.19±0.08	1.37±0.08
C16:0	**26.08±0.84**[b]	**30.17±1.20**[a]
*c*9-C16:1	**8.01±0.38**[b]	**10.05±0.74**[a]
C18:0	**11.93±0.75**[a]	**9.44±0.66**[b]
*t*4-*t*5 C18:1	0.16±0.02	0.15±0.02
*t*6 to *t*9 C18:1	0.73±0.06	0.84±0.07
*t*10-C18:1	0.53±0.05	0.47±0.09
*t*11-C18:1	**1.28±0.09**[a]	**0.95±0.08**[b]
*c*9-C18:1	**22.65±1.34**[a]	**17.12±1.15**[b]
*t*15-C18:1	0.02±0.01	0.02±0.01
*c*11-C18:1	1.53±0.07	1.39±0.06
*c*12-C18:1	0.18±0.03	0.17±0.03
*c*13-C18:1	0.02±0.01	0.04±0.01
*c*14+*t*16-C18:1	0.22±0.03	0.18±0.02
*t*9, *t*12-C18:2	0.36±0.03	0.30±0.03
*t*11, *c*15-C18:2	0.45±0.15	0.40±0.14
Linoleic acid	**2.42±0.11**[a]	**1.91±0.12**[b]
C20:0	0.09±0.03	0.07±0.02
α-linolenic acid	**0.50±0.03**[a]	**0.35±0.02**[b]
*c*9, *t*11-C18:2	1.09±0.07	0.91±0.08
C22:0	0.11±0.02	0.09±0.01
*c*11, *c*14, *c*17-C20:3	0.20±0.02	0.18±0.01
*c*5, *c*8, *c*11, *c*14 C20:4	**0.10±0.01**[a]	**0.06±0.01**[b]
C24:0	0.18±0.02	0.15±0.02
NI	2.98±0.67	2.88±0.52
Total omega 3	**1.15±0.05**[a]	**0.93±0.05**[b]
Total omega 6	2.98±0.18	2.70±0.20
Ratio n6/n3	2.59±0.14	2.90±0.15
Total *trans* C18:1	**2.72±0.13**[a]	**2.43±0.11**[b]
Total CLA	1.38±0.07	1.21±0.06
SFA	**55.93±1.12**[b]	**59.06±1.00**[a]
MUFA	**36.66±0.59**[a]	**33.23±0.52**[b]
PUFA	**5.41±0.16**[a]	**4.41±0.15**[b]
SCFA	**0.23±0.05**[b]	**0.39±0.05**[a]
MCFA	**15.66±0.32**[b]	**18.06±0.42**[a]
LCFA	**85.09±0.56**[a]	**81.13±0.50**[b]

Means followed by different uppercase letters in the same row are significantly different (p<0.05).
NI: not identified; CLA: conjugated linoleic acid; SFA: saturated fatty acids; MUFA: mono-unsaturated fatty acids; PUFA: polyunsaturated fatty acids; SCFA: short chain fatty acids; MCFA: medium chain fatty acids; LCFA: long chain fatty acids.

results and those of the two studies mentioned above may be due to the husbandry system and the stage of lactation, which strongly influence the fatty acid profile in camel milk, especially the unsaturated fatty acids. The significant influence of these two factors on the fatty acid composition of the milk samples used in this study has already been compared with other samples from a semi-intensive system at different stages of lactation in our previous article (Chamekh et al., 2020a).

In cows, several studies have reported that parity has no effect on the fatty acid composition of milk (Secchiari et al., 2003; Kgwatalala et al., 2009). Bilal et al. (2014), on the other hand, reported that vaccenic acid, oleic acid, α-linolenic acid and rumenic acid were higher in milk from cows at first parity. Mierlita et al. (2011) reported that MUFA, PUFA, vaccenic acid, rumenic acid, oleic acid, linoleic acid and α-linolenic acid decreased with increasing lactation number. Zhu et al (2018) suggested that multiparous cows may have a more mature rumen microbiome compared to primiparous cows. Furthermore, Pitta et al. (2016) showed that the rumen microbiome evolves as the lactation of the dairy cow progresses. On the other hand, Buitenhuis et al. (2019) reported that rumen bacteria affect most C15:0, C17:0, rumenic, α-linolenic and linoleic acids. Accordingly, the differences observed in the present study were probably due to differences in rumen microflora between primiparous and multiparous camels. Otherwise, several studies have shown that high levels of α-linolenic acid are associated with the production of specific long-chain unsaturated fatty acids that inhibit de novo fatty acid synthesis in the mammary gland (Baumgard et al., 2000; Heck et al., 2009). Consequently, the lowest content of C14:0 and C16:0 in the milk of primiparous camels could be a consequence of the highest content of α-linolenic acid.

The atherogenicity index of milk fat from multiparous camels was significantly higher than that of milk fat from primiparous camels. These results are in agreement with those of Abdelsalam et al (2017) who indicated that the atherogenicity index was lower in primiparous camels than in later parities. The atherogenicity index characterizes the atherogenicity of dietary fats; fat with a higher atherogenicity index value is more harmful to human health. In this study, the increase of this index in the milk fat of multiparous camels was probably related to the higher content of C14:0 and C16:0 and the lower content of oleic acid, vaccenic acid and α-linolenic acid. Consequently, we could assume that primiparous camels produced milk with higher nutritional quality.

Rumenic acid, which is present in milk, is synthesised in the mammary gland by Δ9-desaturation of vaccenic acid (Soyeurt et al., 2008). In addition to the endogenous synthesis of rumenic acid, the Δ9-desaturase catalyses the introduction of a cis-9 double bond between the 9th and 10th carbon atoms of fatty acids with a chain length of 10 to 18 carbon atoms (Soyeurt et al., 2008). Fatty acid ratios representing the ratio of product to product and substrate can therefore be used to calculate Δ9-desaturase activity (Kelsey et al., 2003). In the present study, the influence of parity was determined in four desaturation indices (Table

3). The C14, C18 and CLA indices were not affected by parity; however, the C16 index was significantly affected. Primiparous camels have a relatively lower C16 index than multiparous camels, suggesting that Δ9-desaturase activity is lower in camels at first parity. Our results are in partial agreement with those of Kelsey et al. (2003), who observed lower values of C14 and C16 indices for primiparous cows. However, Bilal et al. (2014) recorded a lower C14 index for cows in the first parity compared to later parities. Mierlita et al. (2011) reported that Δ9-desaturase activity for C14, C16 and C18 were higher in primiparous sheep. We are not aware of any published studies that have investigated the influence of parity on desaturation indices.

The effects of parity were also assessed for OBCFA (Table 4). This group of fatty acids, which is said to have numerous beneficial effects on human health, has long been neglected in camel milk. Chamekh et al. (2020a) have recently reported that camel milk is a good source of OBCFA. Milk fat from primiparous camels contained lower levels of iso-C16:0 and higher levels of C17:0, C15:0, total anteiso-BCFA, total OCFA and total OBCFA. The levels of total BCFA, total iso-BCFA, anteiso-C13:0, iso-C13:0, iso-C14:0, anteiso-C15:0, iso-C17:0, anteiso-C17:0, c10-C17:1 and C19:0 were unchanged at the same parity. The main source of OBCFA is rumen bacteria; consequently, these differences between Primipara and Multipara can be attributed to differences in rumen microflora (Buitenhuis et al., 2019). To our knowledge, there are no studies on the effects of parity on the OBCFA profile in camel milk. In cows, Craninx et al. (2008) showed that the levels of iso-C14:0, iso-C15:0 and iso-C16:0 were higher in milk lipids from animals in the first and second parities than in cows in later parities, while the levels of C15:0, anteiso-C15:0, iso-C17:0 and C17:0 were not affected. Peng et al (2008) reported a small difference in total OCFA content in favour of multiparous yaks. These authors also reported that milk from multiparous yaks was enriched in C15:0, iso-C16:0, iso-C14:0 and iso-C17:0, while C17:0 was not affected.

Conclusion

The results of the present study showed that parity had a significant effect on the proportions of fatty acids of potential importance for consumer health in camel milk. Thus, the levels of total OBCFA, total OCFA, total anteiso-BCFA, C17:0, C15:0, total omega-3, oleic acid, vaccenic acid, MUFA, linoleic acid and α-linolenic acid were higher in milk from primiparous camels, while the levels of SFA, C14:0, c9-C16:0, C16:0 and iso-C16:0 were higher in milk from multiparous camels. In addition, the indices of atherogenicity and C16 desaturation were higher in multiparous camels. Primiparous camel milk appears to have a relatively high nutritional value. The results of this preliminary study suggest that further research with a larger number of samples is needed to confirm the effects of parity on the fatty acid composition of camel milk.

Table 3. *Effect of parity on desaturation indices and atherogenicity index*

Index	Primiparous (*n*=12)	Multiparous (*n*=12)
C14 index	0.11±0.01	0.1±0.01
C16 index	**0.23±0.01**^{a}	**0.26±0.01**^{b}
C18 index	0.66±0.03	0.64±0.01
CLA index	0.46±0.01	0.49±0.02
Atherogenicity index	**1.59±0.07**^{b}	**2.19±0.14**^{a}

Means followed by different uppercase letters in the same row are significantly different (p<0.05).
CLA: conjugated linoleic acid.

Table 4. *Impact of parity on odd- and branched-chain fatty acids profile in camel milk (g/100 g of total fatty acids)*

Fatty acids	Primiparous (*n*=12)	Multiparous (*n*=12)
anteiso-C13:0	0.11±0.04	0.08±0.02
iso-C13:0	0.09±0.01	0.06±0.02
iso-C14:0	0.28±0.04	0.44±0.19
anteiso-C15:0	0.97±0.04	0.87±0.05
C15:0	**1.89±0.15**^{b}	**1.24±0.12**^{a}
iso-C16:0	**0.49±0.04**^{a}	**0.61±0.04**^{b}
iso-C17:0	0.22±0.06	0.17±0.06
anteiso-C17:0	0.68±0.05	0.62±0.04
C17:0	**0.74±0.05**^{b}	**0.56±0.04**^{a}
c10-C17:1	0.12±0.02	0.11±0.01
C19:0	0.11±0.05	0.12±0.06
Total *iso*-BCFA	1.10±0.11	1.28±0.26
Total *anteiso*-BCFA	**1.76±0.07**^{b}	**1.56±0.05**^{a}
Total BCFA	2.86±0.15	2.84±0.28
Total OCFA	**4.93±0.22**^{b}	**3.83±0.16**^{a}
Total OBCFA	**5.72±0.25**^{b}	**4.87±0.23**^{a}

Means followed by different uppercase letters in the same row are significantly different (p<0.05).
Total iso BCFA: all iso-branched-chain fatty acids (iso-C13:0 to iso-C17:0).
Total anteiso BCFA: all anteiso-branched-chain fatty acids (anteiso-C13:0 to anteiso-C17:0).
Total BCFA: all branched-chain fatty acids (iso-C13:0 to iso-C17:0 and anteiso-C13:0 to anteiso-C17:0).
Total OCFA: all odd-chain fatty acids (C13:0 to C19:0).
Total OBCFA: all odd- and branched-chain fatty acids.

Utjecaj pariteta na profil masnih kiselina devinog mlijeka (*Camelus dromedarius*) u pogledu potencijalne važnosti za ljudsko zdravlje

Sažetak

Cilj ove studije bio je istražiti utjecaj pariteta na udio masnih kiselina s potencijalnim zdravstvenim značajem u masti devinog mlijeka. Uzorci mlijeka prikupljeni su od četiri višerotke i četiri prvorotke koje su držane u intenzivnom sustavu u srednjem stupnju laktacije. Metilni esteri masnih kiselina analizirani su plinskom kromatografijom u kombinaciji s plamenoionizacijskim detektorom. Paritet je značajno utjecao na udio masti i ukupnu suhu tvar ($p<0,05$) pri čemu su multiparne deve davale mlijeko s nižim udjelom masti i ukupne suhe tvari. Dok paritet nije utjecao na sadržaj proteina i pepela ($p>0,05$). Mlijeko primiparnih deva sadržavalo je veće udjele ($p<0,05$) masnih kiselinaa neparnog i razgranatog lanca, jednostruko nezasićenih masnih kiselina, C17:0, C15:0, omega 3, oleinske, vakcenske i α-linolenske kiseline, dok je sadržavalo niže udjele ($p<0,05$) kratkolančanih, srednjelančanih i zasićenih masnih kiselina, C6:0, C10:0 C14:0, c9-C16:0, C16:0 i izo-C16:0. Štoviše, indeks nezasićenosti za C16, koji je pokazatelj aktivnosti Δ9-desaturaze, i indeks aterogenosti bili su niži ($p<0,05$) u deva prvorotkinja. Paritet nije utjecao na udio konjugirane linolne kiseline ($p>0,05$). Zaključno, čini se da mliječna mast prvorotkinja ima relativno visoku hranjivu vrijednost budući da je sadržavala veće udjele korisnih masnih kiselina i manje udjele zasićenih masnih kiselina.

Ključne riječi: devino mlijeko; konjugirane linolne kiseline; indeks desaturacije; masne kiseline neparnog i razgranatog lanca; paritet

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