

# Influence of different livestock production systems in caprine milk and cheese odd and branched chain fatty acids (OBCFA) composition

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Odd and branched chain fatty acids (OBCFA) are produced by rumen biochemical mechanisms and by mammary lipogenic activity of ruminants. Although OBCFA represent a lesser component of milk (about 2-3% of total fatty acids), they are recognised as important bioactive components because of their positive role in gastrointestinal microbial ecology and their potential anti-cancer activity. A number of dietary factors affect rumen microbial populations and the related microbial fatty acids, including OBCF. In this study, we investigated about the influence of the livestock production system on milk and cheese fatty acid composition of three different small goat farms. In the organic Alpine farm (OA), the diet was characterized by restricted grazing natural fresh grass and by alfalfa hay forage plus a mixture of maize and pressed barley grains, supplied twice a day. In the conventional mountain Alpine farm (CA), goats were fed ad libitum with local polyphyte grass hay, alfalfa hay, distributed once a day, and concentrate distributed twice a day. Finally, in the conventional Saanen farm (CS), goats were fed by local ryegrass hay based diet, offered ad libitum, and alfalfa hay, offered once a day, plus commercial feed, distributed individually twice a day. Bulk raw milk samples were twice a month sampled from March to October and cheese samples, originating from acid curdling processes, were monthly collected in the same period. Fat was extracted according to Folch (1957) and fatty acids methyl esters prepared by base catalysed methanolysis of glycerides as described by Christie (1982). Later, fatty acids were analysed by gas-chromatography, using a FID detector. Data were analyzed by one way ANOVA and multivariate statistic (PCA). Results showed significant differences in the composition of fatty acids in goat milk and cheese. Particularly, OBCFA showed a satisfactory discriminant capacity for the livestock production system. Samples coming from the conventional Saanen (CS) farm resulted enriched in SFA and PUFA, whereas alpine milk and cheese (OA and CA) are higher in MUFA and OBCFA. The highest OBCFA value (4.66%) was detected in milk of animals fed with the highest quantity of fiber, incoming from fresh grass and forage, in OA farm. On the contrary, Saanen goats, not grazing and fed with a higher quantity of concentrate, produced a milk lacking in OBCFA (3.92%). CA milk showed intermediate OBCFA values (4.45%). The highest values of C13:0 and C15:0 resulted in OA milk (0.13% and 1.14%, respectively) at statistical different level ( $p < 0.05$ ), compared to CA and CS farm. The C17:0 values resulted higher in OA (0.70%) and in CA (0.75%) and statistically different ( $p < 0.05$ ) from CS (0.57%); we obtained similar results for C17:1, higher in OA and CA milk (0.33% and 0.32%, respectively), than in CS (0.22%). Cheese samples mirrored the same trend for OBCFA values than observed in milk. Generally, single OBCFA values followed the same trend of milk, with higher values ( $p < 0.05$ ) in OA and CA than in CS. The C17:1 showed a significant difference in fresh cheese and C15:0 followed the same tendency of values of milk, with highest values in OA samples.

Considering the whole of OBCFA, there are no statistically significant differences between OA and CA samples (4.95% and 4.82%, respectively) in fresh cheese. However, these samples showed a statistical difference ( $p < 0.05$ ) if compared to cheese samples coming from the conventional farm (4.14%).