Season and altitude effects on milk fatty acid profile in Sarda dairy sheep flocks

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ABSTRACT

Diet plays a major role in modulating the fatty acid composition of ruminant milk. It is also well known that the intake of fresh forages has a positive influence on polyunsaturated fatty acid (PUFA), particularly CLA and omega-3, compared with diets based on dry forage and concentrates. Altitude influences, directly, grass availability and botanical composition of the pasture, and, indirectly, the amount of concentrate supplemented to the diet. Therefore, the altitude where farms are located at may give indirect information about the type of feeding system trough analysis of milk fat. The objective of this survey was to investigate variations in the milk fatty acid profile, focusing on the content of vaccenic acid (VA), conjugated linoleic acid (CLA) and n-3 fatty acid (FA), of Sarda dairy ewes flocks located at different altitudes throughout Sardinia.

Bulk milk samples were collected in spring (April) and in summer (July) from 36 flocks located at different altitudes: 3 flocks in the lowlands (Low), 3 flocks in the hills (Hill) and 3 in the highlands (High) in 4 provinces (Sassari, Nuoro, Oristano and Cagliari) of Sardinia (Italy). Milk fatty acid profile was analyzed by gas-chromatography. Data were analyzed with a linear model with altitude (A), season (S), province (P) and altitude x season as fixed factors. The interaction was never significant. The season influenced significantly almost all fatty acids analyzed. The proportion of short chain FA (C4-C10) decrease (10.0 vs 7.0 mg/100 mg FA; $P<0.01$) and that of medium chain FA increase (43.2 vs 45.5 mg/100 mg FA; $P<0.10$) from spring to summer. The long chain FA did not vary between spring and summer but the concentration of oleic acid (C18:1 *cis*9) increased significantly from spring to summer (22.3 vs 25.1 mg/100 mg FA; $P<0.01$). The proportion of n-3 FA was higher in spring than summer (1.2 vs 0.7 for n-3 FA; $P<0.01$). The variation in n-3 FA in milk fat was mainly due to the variation in α-linolenic acid (ALA; 18:3n-3) which decrease from 1.0 to 0.5 mg/100 mg FA from spring to summer. The same pattern was showed by vaccenic acid (VA; *trans*-11 18:1) that decrease from 1.6 vs 0.8 mg/100 mg FA. No variation in *cis*9, *trans*11 CLA has been observed between spring and summer (1.0 vs 0.8 mg/100 mg FA). A reduction of PUFA (5.64 vs 5.10; $P<0.10$), n3/n6 ratio (0.38 vs 0.21) and content of C20:5 n-3 (0.13 vs 0.07 mg/100 mg FA) from spring to summer has been observed. Unexpectedly, the milk FA profile was not affected by altitude, except for C18:1 c9, probably because of the low number of samples analyzed.

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