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Factors affecting the fatty acid profile of permanent grasslands

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Permanent grasslands are traditionally used as forage for ruminants in many European countries. The fatty acid profile of permanent grasslands can influence the nutritional quality of milk and meat products from ruminants. This study used available data (n=144) collected in the years 2003-2016 by three research institutions from Italy, France and Switzerland to explore factors able to affect the fatty acid profile of semi-natural and biodiversified pastures used as grazing areas by commercial dairy herds. The dataset was built up to match a large altitude range (15-2500 m a.s.l.) and botanical diversity. The dataset included 14 variables comprising: herbage fatty acid profile [C16:0 (%), C18:0 (%), C18:1c9 (%), C18:2n6 (%), and C18:3n3 (%)], herbage proximate composition [dry matter (DM, g/kg), crude protein (CP, g/100g DM), neutral detergent fibre (NDF, g/100g DM), and acid detergent fibre (ADF, g/100g DM)], herbage botanical composition [grasses (*Poaceae*, %), legumes (*Fabaceae*, %), and forbs (%)], herbage phenology (BBCH scale), and site altitude (m a.s.l.). Data were analysed by Principal Component (PC) Analysis using IBM SPSS Statistics v. 25 for Windows. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of sphericity were used to verify the adequacy of data analysis. The sum of the first three linear components accounted for 70.7% of the total explained variance. Considering factor loadings > 0.6 (or < -0.6), the herbage C16:0, C18:0, C18:1c9 and C18:2n6 contents, the DM, NDF, and ADF contents, and herbage phenological stage were positively related, whereas herbage C18:3n3 and CP contents were negatively related to the 1st PC (45.6% of explained variance). Legumes were positively related to the 2nd PC (13.1% of explained variance) and grasses and forbs were positively and negatively related to the 3rd PC (12.1% of explained variance), respectively. In conclusion, regardless the altitude, the variation in the fatty acid composition of semi-natural grasslands in on-farm conditions appeared to be much more related to herbage phenology (and consequently to the proximate composition and nutritive value), rather than to the botanical composition. The latter played anyway a role, even if less relevant than the herbage phenological stage.

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