

# NMR in Dairy Lipid Research: Improving the fatty acid profile of sheep milk by olive cake supplementation

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The aim of this study was to investigate the effect of an oil rich by-product to the fat quality of sheep milk. A mixture of skins, pulp, woody endocarp and seeds obtained after extraction of olive-oil (namely olive cake) was prepared according to a method developed earlier. Thirty lactating Chios ewes were selected at random to form three balanced groups and allocated to the following feeding regimes: (a) no inclusion of olive cake (G1 group), (b) inclusion of 500 g/day/ewe (G2 group) and (c) inclusion of 1000 g /day/ewe (G3 group), while the other ingredients of the diet were similar and according to animal requirements. Milk samples were collected from each ewe after four weeks on the diet treatment and analysed for the content of different fatty acids (FA) and cholesterol using 1D <sup>1</sup>H-NMR spectroscopy. More specifically, the organic phase of lyophilized milk was extracted according to previously developed method [1] and the FA composition and cholesterol content identified and quantified by peak integration using appropriate calculations [2]. The effect of inclusion of olive cake was tested using one-way analysis of variance and *Tuckey* pairwise comparison between groups (IBM-SPSS ver. 22). Total saturated FAs were affected ( $P<0.001$ ) by olive cake feeding with the supplemented animals producing less saturated milk (mean values expressed in g/100g of milk fat were 78.6, 73.0 and 69.7 for G1, G2 and G3, respectively). Mono-unsaturated FAs, were significantly ( $P<0.001$ ) increased in milk from both G2 and G3 animals compared to the control group (mean values of 18.7, 24.4 and 27.3 g/100 g milk fat from G1, G2 and G3, respectively). Total unsaturated FAs were also increased when olive cake included in the diet ( $P<0.001$ ), while significant was the differences between the G2 and G3 milk (mean values of 21.3, 27.0 and 30.2 g/100g fat for G1, G2 and G3, respectively for total unsaturated FA). However, no differences between treatment groups were identified for linoleic and linolenic acids or cholesterol content of sheep milk. Content of conjugated linoleic acid (CLA) isomers were affected by olive cake supplementation (Figure 1), demonstrating an increase in CLA isomers content in milk from supplemented animals. Overall, the present study using innovative NMR method showed that the inclusion of oil rich by-product in animal diets affects positively the content of milk fat in beneficial FA and the total fat unsaturation in sheep milk.

## References

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