

## Functional compounds in experimental Provola Ragusan cheese

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**Summary:** *The aim of the work was to evaluate the effects of olive cake in the diet of dairy cows in terms of Provola cheese quality. Provolas in the experimental group are found to be better in both fatty acid profile and polyphenol content. For this reason, it could be well liked by consumers.*

**Keywords:** *Provola cheese, olive cake, polyphenols, fatty acids.*

### Introduction

Provola cheese is one of the most famous and highly nutritional dairy products in southern Italy. It is also popular in the entire peninsula because it is a common ingredient in many gastronomic preparations. Olive cake, a by-product of olive mill waste, is a natural source of beneficial fatty acids, phenolic compounds and natural antioxidants [1]. The use of olive cake in the feeding of dairy cows is studied [2], but little information exists regarding the quality of the resulting cheese. The aim of this work was to evaluate the effects of olive cake supplementation in the diet of dairy cows in terms of the quality of obtained Provola cheese. In particular, the fatty acid profile and total polyphenol content of both olive cake and Provola cheese samples were evaluated in order to verify the real effect of olive cake supplementation in the finished product.

### Experimental

The experiment was carried out during the period from March 2021 to July 2021 on 460 healthy multiparous dairy cows divided into two homogeneous groups named CTR and BIO. The cows were farmed in a commercial dairy farm located in Ragusa (Sicily (Italy)). The experimental group (BIO) received a concentrate supplemented with 8% pitted olive cake (OC) of the drattle matter dose; the control group (CTR) received a concentrate with no olive cake supplementation. Four representative Provolas samples (80 x 500 g) were analysed monthly for each group. Each representative sample was obtained from five Provolas randomly selected from 20 Provolas. Total lipid content, fatty acid profile and total polyphenols were determined in olive cake and Provolas cheese samples. Briefly, lipid extraction of olive cake was performed according to AOAC method 920.39, while lipid extraction of Provolas were performed according to the Folch method [3] with some modifications. Fatty acid methyl esters (FAME) were prepared by transmethylation of OC and Provola lipid extracts according to ISO 5509 2000 method and analyzed by gas chromatograph (GC). The total polyphenol contents of olive cake and Provolas cheese samples were determined spectrophotometrically using Folin-Ciocalteu reagent according to

the methods of Singleton, V. L et al. [4] and Shetty et. al. [5] respectively. Fifteen parameters of interest were modeled using an analysis of variance (ANOVA); a principal components analysis (PCA) was performed to find the parameters that best described the variability of the samples.

## Results

The total lipid and polyphenol content of OC is respectively 180.80 g/kg and 10.18 g/kg, in agreement with Dal Bosco et. al. [6]. The OC fatty acid profile was characterized by a high amount of C18:1n-9 (66.63%), C18:2 (10.66%) and C16:0 (16.14%). Provolas total lipids content was 20% in average. Moreover, lipids content showed seasonal variability, but no correlation with diet was observed. The Provolas polyphenol content in the analyzed samples ranged from  $92.07 \pm 1.91$  mg/kg to  $165.84 \pm 7.90$  mg/kg for the BIO group, and from  $72.11 \pm 0.46$  mg/kg to  $112.26 \pm 6.38$  mg/kg for the CTR group. The lower polyphenol and lipids content recorded in May can be attributed to seasonal physiological changes in animal metabolism and variations in climatic conditions. In each case, the total polyphenol content of BIO samples was always higher than CTR samples. The fatty acid profile of BIO Provolas was characterized by of C16:0 (30.90%, average amount), C18:1 n-9 (19.90%), C18:0 (12.84%) and C14:0 (11.24%), while CTR Provola was characterized by of C16:0 (32.91%, average amount), C18:1 n-9 (19.60%), C18:0 (10.84%) and C14:0 (11.60%). According to PCA results BIO samples were separated from CTR samples on PC1. The first have highest values of C20:1, C18:0, and C22:0, whereas the last have highest values C16:0 and C14:0. On PC2 the months of March April and May at the top and June and July at the bottom can be distinguished.

## Conclusions

A significant result of this research is the increased content of total polyphenols and fatty acid in BIO Provola compared to CTR. This provides added value to the final product. In conclusion, the nutritional and health composition of Provola cheese obtained from feeding dairy cows with olive cake supplementation is superior to that obtained from a conventional diet.

## References

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