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The application of dispersive liquid-liquid microextraction in the analyses of the fatty acid profile in bovine milk in response to changes in body condition score.

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Highlights

- A novel microextraction method for fatty acids in milk is proposed
- Relationship between fatty acid profile and body condition score is examined
- Palmitic acid can be used to determine optimum body condition score

Abstract

Dispersive liquid-liquid microextraction (DLLME) was used prior to gas chromatography flame ionization detection (GC-FID) for the extraction of five fatty acids from milk taken from cows with different body condition scores. Optimum extraction conditions were: 300 μ L of chloroform (extraction solvent), and 1 mL methanol (dispersive solvent). The procedure was optimised using Design of Experiments (DoE). The analytes were separated on a GC capillary column containing a polyethylene glycol stationary phase (15 m x 0.53 mm x 1.2 μ m). Enrichment factors were in the range of 8-15 and limit of detection (LOD) was 0.04 μ g/mL. Calibration graphs showed good linearity with coefficients of determination higher than 0.994% and relative standard deviations lower than 7%. This method provided a simple and rapid derivatisation and extraction method for the determination of fatty acids in bovine milk. It showed that there was a significant difference in the palmitic acid content of milk from cows that had an optimum body condition score (10.85 mg/mL) compared to cows that had a high body condition score (5.73 mg/mL).

Keywords: Dispersive liquid-liquid microextraction, fatty acid, milk, dairy, body condition score

1. Introduction

Bovine milk is an important source of energy, protein, vitamins, and essential minerals for humans. The composition of milk has a direct influence on the nutritional quality and processability of any subsequent dairy products. In particular, different fatty acids have nutritional benefits [1]. Poly unsaturated fatty acids (PUFA) play a vital role in

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