

Traditional cattle feeding stuffs: fatty acid profile

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Keywords: fatty acids, hay, meadow, forage, feeding stuffs

Introduction Dietary polyunsaturated fatty acids (PUFA) are perceived to be healthier than saturated fatty acids. Therefore, in order to be able to manipulate the fatty acid profile of meat and/or milk, to respond to the consumer demands, knowledge of the fatty acid profile of feeding stuffs for cattle is of major importance (LeDoux *et al.*, 2002; Petit, 2002). In this work a preliminary study was made of the fatty acid profile of the cow's diet in a traditional farm production system.

Materials and methods A farm that produces beef from the "Barrosã" breed, located near Montalegre (north of Portugal) was monitored for a year (autumn 2002 – 2003). Two samples, of each feeding stuff given to the cattle, were collected and analysed for the fatty acid profile: wheat straw (ws), high-quality hay meadow (hhm), forage rye (fr), forage wheat (fw), regional white corn (rwc), concentrate (c), low-quality hay meadow (lhm), highland grassland (hg), regional yellow corn (ryc), meadow (m) and low-quality meadow (lm). The extraction was performed by soxhlet with hexane followed by an acid derivatisation using sulphuric acid:methanol reagent. The methylated fatty acids were then extracted by diethyl ether followed by water and chlorophyll removal. The extracts were then analysed in duplicate by GC with FID detector and a SUPELCO column (SP-2560). The fatty acid quantification was carried out using internal standard calibration with undecanoic acid (C11:0) as internal standard. For GC calibration, a SUPELCO 37 commercial FAME mix solution was used.

Results Fatty acids were only considered if the amount found in at least one of the samples analysed was higher than 5% of the total fatty acids (TFA) content: C12:0; C14:0; C16:0; C18:0; C20:0; C21:0; C22:0; C24:0; C18:1n9c; C18:2n6c; C18:3n3. The uncertainty of the results obtained in this study was evaluated taking into account the repeatability and reproducibility. The relative average deviation for the TFA was less than 7% and 15%, respectively. The data were analysed using principal components analysis by SPSS v11.0 program (Figure 1). The fatty acid profiles show three different groups: forage (rwc, ryc, c, fr, fw), meadow (hg, m, lm) and hay (hhm, lhm, ws). Analysis of the TFA data (Table 1) explains these three groups: the forage group with TFA > 10000 µg/g; the meadow group with a 2000 < TFA < 7500 µg/g and the hay group with a TFA ≈ 1000 µg/g. Moreover, this last group had a MUFA (monounsaturated fatty acids) content higher than the PUFA content, in contrast to the other two groups.

Conclusions From a nutritional point of view, the results obtained are in accordance with expectations. The TFA and PUFA contents were highest in the most nutritive feeding stuffs.

References

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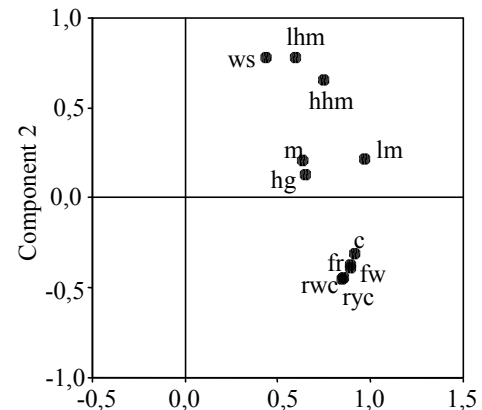


Figure 1 Component plot

Table 1 Total fatty acid content and MUFA percentage for the feed stuffs

Feed stuff	Total (µg/g)	MUFA (%)
Regional white corn	43208	16.6
Regional yellow corn	31681	16.7
Concentrate	30611	34.0
Forage rye	10566	17.9
Forage wheat	15057	18.6
Highland grassland	7429	24.1
Meadow	5552	27.8
Low-quality meadow	2190	48.0
High-quality hay meadow	1348	62.5
Low-quality hay meadow	1084	71.8
Wheat straw	1070	85.6