

Variation in the fatty acids profile of the meat by adding hempseed cake in the diet of multiparous cull cows

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The **AIM OF THIS WORK** was to study the effects of the inclusion of hempseed cake in multiparous cows diet on the fatty acids (FA) composition of their meat.

The hempseed cake, a byproduct of hempseed oil production process, is rich in fat (around 10% of the dry matter) and has a favorable fatty acids profile (unsaturated fatty acids for over the 80% of the total) (Baldini et al. 2018). Therefore, its use may contribute to enhance the properties of bovine meat.

In this work, 18 multiparous cows were considered. They were divided into two groups fed on different diets (Figure 1). Within the same group, whether A or B, half cows were provided with hemp cake, while the rest was given a soybean meal instead.

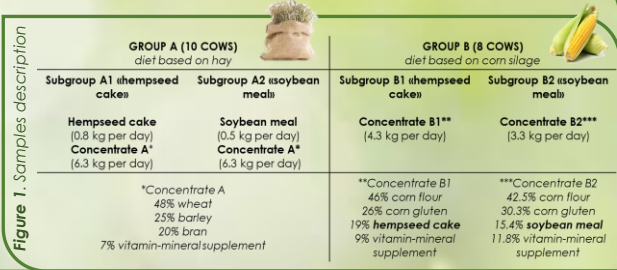


Figure 1. Samples description

Material and Methods

The total lipid fraction was extracted from samples of *m. longissimus thoracis* by following the procedure reported elsewhere (Falch et al., 1957). Fatty acids were esterified, methylated and quantified through GC-MS (GCMS 5977E, Agilent Technologies). The separation was performed through a HP 88 column (100 m x 0.25 mm x 0.25 µm).

The statistics was carried out by using the software R vers. 4.0.0 with a model that considered the experimental factor (hempseed cake vs soybean meal) as fixed, and the type of forage (whether hay or corn silage) as a block factor.



Figure 2. GCMS 5977E

Results

The dataset of all the fatty acids analyzed is displayed in Figure 3. The results obtained for the hempseed cake group, considering the FA mainly present in the meat, i.e. palmitic (C16:0), stearic (C18:0) and oleic (C18:1n-9c) acid, as well as those favorable for the human health such as linolenic acid (C18:3n-3) and the total unsaturated fatty acids (PUFA) were comparable to those found for the soybean meal group (P>0.05). The n-6/n-3 ratio was not affected by the use of hempseed cake either.

On the other hand, myristic acid (C14:0) turned out to be statistically higher for the group provided with hempseed cake (Figure 4). Therefore, as for C14:0, the quality of the meat has been enhanced by providing the cows with hempseed cake.

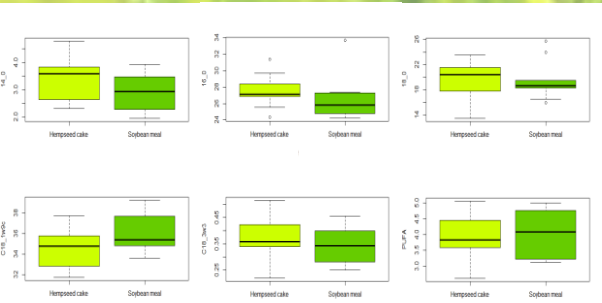


Figure 4. Box plots of the FA mainly present in the meat

In **conclusion**, from an overall point of view, the fatty acids profile was not improved by adding hempseed cake in the diet of Italian Simmental cull cows.

Figure 3. Results of the quantification of the fatty acids in the meat

FA ¹	HC (%)	SM (%)	RMSE
C10:0	0.11	0.11	0.023
C14:0	3.47 a	3.03 b	0.425
C15:0iso	0.17	0.17	0.036
C15:0anteiso	0.25	0.17	0.126
C14:1n-9c	0.28	0.32	0.154
C15:0	0.39	0.40	0.060
C16:0iso	0.22	0.20	0.057
C16:0	27.50	26.57	2.553
C16:1n-7c	0.32	0.34	0.047
C16:1n-9c	3.12	2.76	0.677
C17:0anteiso	0.63	0.66	0.097
C17:0	1.06	1.11	0.213
C17:1	0.53	0.57	0.122
C18:0	19.22	19.36	3.206
C18:1 ²	1.79	1.78	0.578
C18:1n-9c	34.54	35.96	1.985
C18:1n-7c	1.02	1.05	0.198
cis-C18:1 ³	0.61	0.60	0.147
C18:2n-6t	0.57	0.55	0.119
C18:2n-6c	2.32	2.33	0.328
C19:1	0.11	0.11	0.039
C20:0	0.18	0.17	0.096
C18:3n-3	0.37	0.35	0.087
C20:1n-9	0.10	0.07	0.037
CLA c9,t11	0.21	0.26	0.120
C20:3n-6	0.11	0.12	0.045
SFA ⁴	53.50	52.27	2.626
MUFA ⁵	42.51	43.64	2.798
n-6 PUFA ⁶	3.49	3.60	0.487
n-3 PUFA ⁷	0.50	0.50	0.140
PUFA⁸	3.99	4.09	0.518
n-6/n-3	7.95	7.50	3.286

¹ Fatty acids with a concentration lower than 0.1% have not been reported
² trans-C18:1 as sum of 10-, 11-, 12-, 13-, 14-, 15-
³ cis-C18:1 as sum of c11-, c12-, c13-, c14-, c15-18:1
⁴ SFA (saturated fatty acids) considered: C10:0 + C12:0 + C13:0 + C14:0iso + C14:0 + C15:0 + C15:0iso + C15:0anteiso + C16:0 + C16:0iso + C17:0 + C17:0iso + C17:0anteiso + C18:0 + C20:0
⁵ MUFA (mono unsaturated fatty acids) considered: C14:1n-9c + C16:1n-9c + C16:1n-7c + C18:1n-9c + C18:1n-7c + cis-C18:1 + C19:1 + C20:1n-9 + C20:1n-7
⁶ PUFA n-6 = C18:2n-6t + C18:2n-6c + C18:3n-6 + CLA + C20:3n-6 + C20:3n-4 + C20:4n-4 + C22:4n-4
⁷ PUFA n-3 = C18:3n-3 + C20:3n-3 + C20:3n-3 + C20:5n-3 + C22:5n-3
⁸ PUFA (polyunsaturated fatty acids) n-3 PUFA = n-4 PUFA

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