Influence of the botanical composition of grass, hay or silage on the fatty acid composition of milk

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INTRODUCTION

Milk composition in terms of components considered beneficial to human health can be directly influenced by dairy cattle feed. This applies in particular to certain fatty acids like omega 3 and conjugated linoleic acids (CLA), whose concentration in milk could be increased following the addition of oilseeds to the diet. This study aims to assess the effect of the botanical composition of the herbage and the conservation method on the fatty acid composition of milk.

MATERIAL AND METHODS

Table 1. Overall picture of the 4 trials

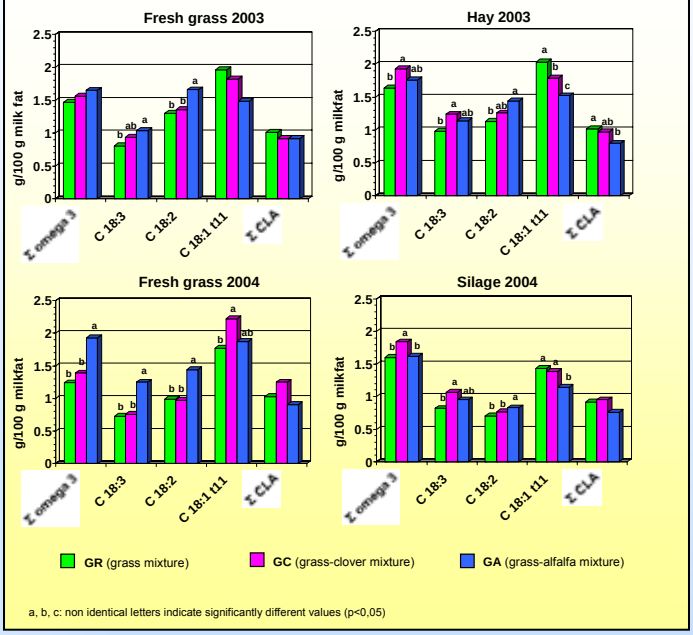
	Trial 1 2003	Trial 2 2003	Trial 3 2004	Trial 4 2004
Animals	3 x 5 cows	3 x 5 cows	3 x 5 cows	3 x 5 cows
Fodder	Fresh grass A, B or C	Hay A, B or C	Fresh grass A, B or C	Silage A, B or C
Cut	2nd cut, all fodder collected at the same age			
Feeding	Manger			
Supplement	Minerals only			
Botanical Composition (1st / 2nd trial year)	**A: Grass mixture (GR)** (ray-grass 90 / 68%, meadow fescue 5 / 1%, cocksfoot 3 / 18%, timothy 2 / 1%, white clover 0 / 2%, dandelion 0 / 9%) **B: Grass-clover mixture (GC)** (red clover 30 / 39%, white clover 1 / 2%, ray-grass 65 / 45%, cocksfoot 2 / 7%, meadow fescue 0 / 3%, dandelion 0 / 3%) **C: Grass-alfalfa mixture (GA)** (alfalfa 31 / 57%, red clover 16 / 2%, ray-grass 49 / 33%, cocksfoot 3 / 7%, meadow fescue 1 / 1%, dandelion 0 / 1%)			

RESULTS AND DISCUSSION

Fatty acid content of fodder

- The fatty acid profile of fresh grass was only slightly influenced by the botanical composition.
- Haymaking led to losses of fatty acids (mainly C18:3 and C18:2) varying between 10% (GR) and 35% (GL).
- Ensiling did not cause an absolute loss of fatty acids but rather a different distribution, i.e. a reduction in C18:3 and an increase in palmitic acid C16:0.

Fig. 1. Fatty acids in milk from cows fed fresh grass, hay or silage of different botanical composition



a, b, c: non identical letters indicate significantly different values (p<0,05)

Fatty acids in milk

- The milk produced from the **grass-alfalfa (GA)** mixture was:
  - richer in mono- and polyunsaturated FA and less concentrated in saturated FA than milk produced from the other mixtures
  - significantly more concentrated in linoleic acid (C18:2 c9c12), α-linolenic acid (C18:3 c9c12c15) and ω-3.
- Hays: the **grass mixture (GR)** provided the milk richest in CLA and trans-vaccenic acid (C18:1 t11).
- Silages: the **grass-clover mixture (GC**) provided milk significantly richer in α–linolenic acid and ω 3.
- Conservation led to an increase in the saturated fatty acids in milk (approx. 5 to 6 points-%) at the expense of the mono-unsaturated fatty acids.

CONCLUSIONS

The botanical composition of the herbage influences the fatty acid composition of milk. Alfalfa in fresh grass proves to be favorable for the presence, in milk, of fatty acids considered to be beneficial to human health, such as omega 3.