

# Fatty acid and fat-soluble antioxidant concentrations in milk from high- and low-input conventional and organic systems: seasonal variation

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## Abstract

**BACKGROUND:** Previous studies showed differences in fatty acid (FA) and antioxidant profiles between organic and conventional milk. However, they did not (a) investigate seasonal differences, (b) include non-organic, low-input systems or (c) compare individual carotenoids, stereoisomers of  $\alpha$ -tocopherol or isomers of conjugated linoleic acid. This survey-based study compares milk from three production systems: (i) high-input, conventional (10 farms); (ii) low-input, organic (10 farms); and (iii) low-input non-organic (5 farms). Samples were taken during the outdoor grazing (78 samples) and indoor periods (31 samples).

**RESULTS:** During the outdoor grazing period, on average, milk from the low-input systems had lower saturated FAs, but higher mono- and polyunsaturated FA concentrations compared with milk from the high-input system. Milk from both the low-input organic and non-organic systems had significantly higher concentrations of nutritionally desirable FAs and antioxidants—conjugated linoleic (60% and 99%, respectively) and  $\alpha$ -linolenic (39% and 31%, respectively) acids,  $\alpha$ -tocopherol (33% and 50%, respectively) and carotenoids (33% and 80%, respectively)—compared with milk from the high-input system. Milk composition differed significantly between the two low-input systems during the second half of the grazing period only; with milk from non-organic cows being higher in antioxidants, and conjugated linoleic acid, and that from organic cows in  $\alpha$ -linolenic acid. In contrast, few significant differences in composition were detected between high-input and low-input organic systems when cows were housed.

**CONCLUSIONS:** Milk composition is affected by production systems by mechanisms likely to be linked to the stage and length of the grazing period, and diet composition, which will influence subsequent processing, and sensory and potential nutritional qualities of the milk.

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