

Sensory milk properties at the farm level – the terroir dimension

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Introduction

In recent years, the Danish milk market has shown an increase in the consumption of organic milk as well as a growing variety of milk with specific features including farm milk. The production of milk from a single farm and pasture-based (PB) feeding regimes is of special interest as it implies a “sense of place” or terroir.

The PB feeding regimes vary with season and might also vary on a day-to-day basis. It is therefore important to understand the impact of the feed on the sensory properties of the milk (Croissant et al., 2007).

This study aims at demonstrating how analytical sensory analysis can provide important information about the influence of breed, season and variation in farm management from PB feeding regimes on the sensory properties of organic farm milk.

Experimental

The study was performed in 2007 and 2008 during two seasons (spring/autumn) representing 28 milk samples from 7 organic farms with either Holstein or Jersey cows. PB feeding regimes were based on pastures with varying amounts of white clover together with perennial ryegrass and supplement feeding with silage and concentrates.

Descriptive sensory analysis were performed on the fresh pasteurized unhomogenized full-fat milk with a trained panel (N=9-10, 3 replicates in 2 sessions). The descriptive sensory data were analysed by ANOVA and PCA.

Results and Discussion

Significant results for the descriptive sensory analyses were found as expected for breed. In general the results revealed a larger variation in sensory flavour properties of spring milk and milk from Holstein cows. When comparing the two seasons within each year, a tendency of the milk being characterized as having a ‘greener’ odour, ‘sweet’ and ‘maize-like’ flavour in spring and a more ‘bitter’ taste in the autumn was found (results not shown here).

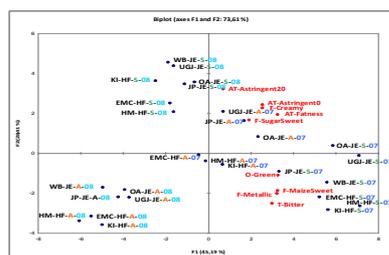


Fig. 1. Biplot (PCA) of descriptive sensory milk data from grazing studies on seven organic farms (EMC-, HM-, JP-, KI-, OA-, UGJ-, WB-) with either Holstein (-HF-) or Jersey cows (-JE-). Data from two seasons (autumn: -A-, spring: -S-) and two years (-07-, -08)

Exploring selected sensory descriptive data where significant breed related attributes such as appearance were removed for both years reveals the variation between seasons as illustrated in Fig. 1.

The results show a greater variation between seasons in 2007. In spring 2007 the farm milks had in general a more pronounced ‘maize sweet’ and ‘metallic’ flavour, a more ‘bitter’ taste and a more ‘green’ odour, whereas the farm milks in spring 2008 were characterized by a more ‘astringent’ flavour. In general there is a tendency to less pronounced sensory characteristics of the farm milks in autumn compared to spring grazing.

The results of the refined sensory data where attributes strongly correlated to breed are removed also reveal a tendency to differences between breed (milk from Jersey cows placed in the upper right corner of the biplot and milk from Holstein cows placed in the lower left corner). The explained variation in season and breed is however not clear and suggests complex relationships to production related parameters.

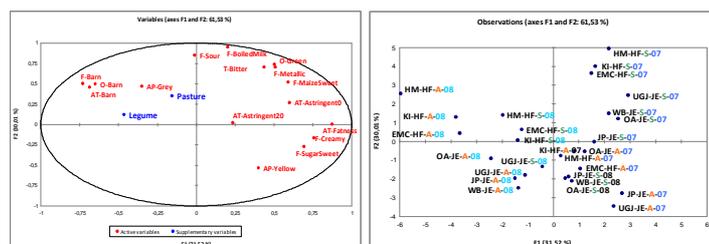


Fig. 2. Projection of the feed related data ‘amount of pasture in the ration’ (‘Pasture’) and ‘amount of white clover in the grass’ (‘Legume’) to a PCA of descriptive sensory milk data from seven organic farms (EMC-, HM-, JP-, KI-, OA-, UGJ-, WB-) with either Holstein (-HF-) or Jersey cows (-JE-). Data from two seasons (autumn: -A-, spring: -S-) and two years (-07-, -08)

Fig. 2 shows the projection of feed related parameters amount of pasture in the ration (‘Pasture’, varying between 15-89%) and amount white clover in the pasture (‘Legume’, varying between 5-44%) to a PCA of all sensory data. Feeding with high amounts of pasture in the ration is found to be associated to ‘barn-like’ characteristics (both odour, flavour and aftertaste) of the milk.

Relations to other production conditions such as composition of the supplement feed might also have an impact on the sensory characteristics of the milk and is currently being investigated.

Conclusion

- A sensory analytical tool can provide important information about the sensory properties of organic farm milk, reflecting time and place
- Seasonal variations appear to be an important factor in the terroir dimension of milk
- The terroir dimension of milk may be more actively used in relation to communication of the sensory properties to the consumer

References

Croissant, A. E., Washburn, S. P., Dean, L. L., Drake, M. A. (2007). Chemical properties and consumer perception of fluid milk from conventional and pasture-based production systems. *J. Dairy Sci.*, 90, 4942-4953.

Acknowledgements

The project ‘Organic Milk of High Quality – Development of Production Concepts Based on grazing of the Dairy Cows and Gentle Treatment of the Milk during Handling and Processing’ (2006-2009) is funded under the DARCOF III programme by the Danish Government. The authors wish to thank Carlo Piga and Rosaria Romano for assistance with the data analyses.