

## **The formation and the characterization of flavour compounds of the Emmental cheese manufactured in Poland**

This dissertation presents a comprehensive characterization of the Emmental cheese produced in Poland at the selected stages of the manufacturing process, as well as of the mature cheese commercially available. Particular attention was paid to the determination of the profile of volatile compounds and the content of free short-chain fatty acids, free amino acids and biogenic amines. Organoleptic assessment was also conducted. The same analyses were performed on the Emmental cheeses produced in Switzerland and France purchased in trade.

The scientific objective of the dissertation was to verify the hypothesis that it is possible to distinguish the Emmental cheese manufactured in Poland from the cheeses produced in Switzerland and France based on the analysis of flavour compounds. The practical aim of the conducted experiments was to determine which stages of the manufacturing process have the greatest influence on the formation of substances that are important for taste and odour of the Emmentaler z Zakopanego cheese and, if necessary, to elaborate recommendations for the manufacturing practice in order to improve its flavour.

It was determined that the gross composition, the physico-chemical characteristics and the organoleptic properties of the Emmental cheese produced in Poland were typical for this type of cheese. The profiles of flavour compounds of cheeses of different origin revealed significant qualitative similarity. The Emmentaler manufactured in Poland was more similar to the cheese of Swiss than French origin in respect of the contents of flavour compounds from the groups of free volatile fatty acids and free amino acids.

Principal component analysis (PCA) of the selected results of chemical analysis and organoleptic assessment of the cheeses of Polish, Swiss and French origin showed that it was possible to clearly differentiate between them and that confirmed the hypothesis posed in this dissertation. The volatile compounds typical for the Emmental cheese produced in Poland were methional, octanol, 2- and 3-octen. The most appropriate to distinguish the Emmentaler z Zakopanego cheese from the cheeses of Swiss and French origin was octanol.

It was demonstrated that the stage of the manufacturing process crucial for the formation of flavour compounds in Emmental cheese was the warm room. During this stage there was observed the greatest increase in the amount of flavour compounds. In the cheese after the warm room the highest number of volatile compounds was determined, including 7 from 13 substances considered as key for the odour of Emmentaler.

It was concluded that the ripening period of 2 to 3 months is sufficient for the formation of the organoleptic properties of the Ementaler z Zakopanego cheese similar to those of the cheese of Swiss origin. However, the results of the chemical analysis indicate that the ratio of propionate to acetate equals below 1 in it. In Ementaler z Zakopanego cheese examined during production this value is appropriate after 3 months of ripening – equals almost 2. Therefore, it is reasonable for Ementaler z Zakopanego cheese to ripen for at least 3 months. However, it should not be prolonged to 6 months because it involves both positive and negative changes of its flavour characteristics.

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