Influence of sodium reduction on physico-chemical, microbiological and sensory properties of ripened Gouda cheese

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Introduction

Excessive sodium intake has been linked to health risks such as hypertension and coronary heart diseases. In the Western diet, processed foods are the most significant source of sodium intake. The contribution of cheese to the mean daily intake of NaCl per person per day is 9.9 % according to the data of the Belgian Food consumption survey of 2004. Producing low sodium cheeses has significant repercussions in manufacture and quality. In addition to its preservative effect, salt in cheese exerts a major influence on cheese composition, regulating and controlling the microbial activity, ripening rate, texture, flavour, and quality. The aim of this research was to research the impact of sodium reduction and added yeast extract on physico-chemical, microbiological and sensorial parameters to get insight in the quality of Gouda cheese.

Material and methods

Gouda cheeses with and without yeast extract (Maxarite™ Delite) (2 – 2.5 kg) were made on pilot scale. Cheeses were salted with three different brines and ripened at 13°C. The brine types were:

- Conventional brine (NaCl) during 14 h
- Shorter brine time (NaCl) during 7 h
- KCl brine (1/3 of the Na was replaced by K) during 14 h

During the 8 weeks ripening period, the influence of sodium reduction on cheese quality was examined. Directly after salting (day 1), after 4 weeks of ripening (day 28) and after 8 weeks of ripening (day 56), cheese parameters such as dry matter, pH, sodium content, potassium content, chloride content, proteolysis and microbiological parameters (lactobacilli) were followed. After 8 weeks of ripening, the sensory characteristics of the different cheeses were examined.

Results

There is a significantly sodium reduction between the reference cheeses and the other brine type cheeses (fig. 1). There was a sodium reduction against the reference cheese of:

- shorter brine time: 20.50 ± 4.97%
- KCl brine: 24.46 ± 1.67%
- shorter brine time with yeast extract: 23.69 ± 2.64%
- KCl brine with yeast extract: 31.62 ± 2.91%

There was an increased proteolysis in the cheeses with added yeast extract compared to the cheeses without yeast extract (fig. 2). This increase can be caused by a faster secondary proteolysis with an increase of amino acids. The brine type didn’t influence the proteolysis.

No statistically significant differences could be found for dry matter, pH, fat- and protein content and microbiological parameters between the different cheeses.

According to the sensory test with a trained panel (fig. 3), there are no significant differences in saltiness, bitterness, texture and preference between the different cheeses. Triangle tests shows only differences between the cheeses without yeast extract brined in a conventional brine and during a shorter time. Consumers found that reference cheeses with and without yeast extract had a better overall taste than the cheeses brined in KCl. This was in contrary with the triangle test and the test with a trained panel. The higher degree of proteolysis, in cheeses with yeast extract, had no significant influence on the sensory parameters of the cheeses.

Conclusions

Sodium reduction can be obtained by using a shorter brine time or a KCl brine. Added yeast extract to the curd had no significant difference in physico-chemical and microbiological parameters. Cheeses with yeast extract had a significant increase in proteolysis but no significant sensorial differences could be found after 8 weeks of ripening.

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