

BIOGENIC AMINES AS A QUALITY INDEX FOR LIGHTLY PRESERVED MEAT PRODUCTS: ACRONYM (BIAMINDEX)

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Introduction

The overall aim of the present project proposal is to develop a methodology whereby sensory deterioration to a 'rational sensory rejection point' (a products 'shelf-life') can be established through monitoring chemically the production of biogenic amines by the natural microflora in 'lightly preserved meat products'. Thus, a quality indexing method can be established giving a sound chemical methodology for the prediction of 'sensory based product shelf-life' (Figure 1). This will enable improvement in product quality, potentially enhance designated shelf-life, and certainly reduce product waste.

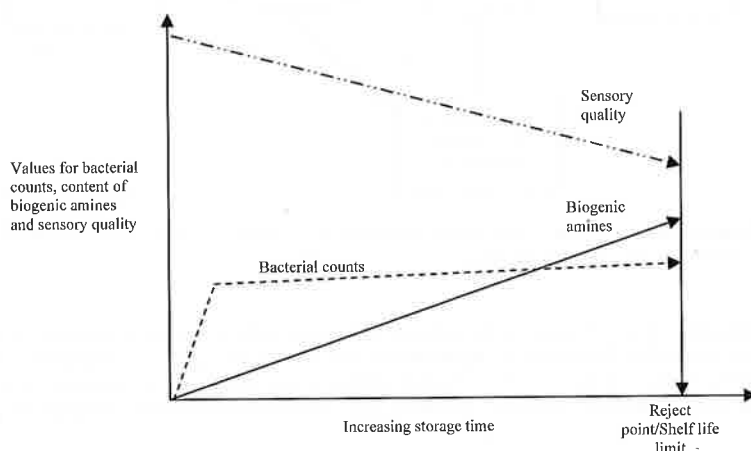


Figure 1: Schematic of the project: Biogenic amines as a quality index for lightly preserved meat products.

It has previously proven extremely difficult to apply conventional total or selective microbial counts for the prediction/indexing of 'shelf-life' as defined by sensory/consumer assessment for many types of food products (McMullen and Stiles 1989). Particularly, in the case of 'lightly preserved meat products', the use of such microbial counts has proven highly ineffective in the prediction of the limit of sensory defined shelf-life. These products, predominated by lactic acid bacteria (LAB), will on the one hand exhibit a comparatively long shelf life but on the other hand the exact sensory shelf life is difficult to predict as the numbers of bacteria tend to plateau and ultimately decrease over storage time. Thus, a correlation with the consistently decreasing sensory quality has not been data analytically viable.

Materials and Methods

In the present project we will monitor and utilise the production of biogenic amines produced by LAB, as well as Enterobacteriaceae, in lightly preserved meat products while stored vacuum packed in modified atmosphere packaging and under aerobic storage. As the biogenic amines produced by these bacteria increase consistently with storage (Jørgensen *et al.*, 2000), they may be used in combination with measurements of sensory deterioration over storage time to predict and derive a quality index, allowing the designation of a 'rational reject point' which will designate the products 'point of sale' shelf-life (Figure 1). Additionally, measurements of the opened product will allow the indexing of the products shelf-life in the consumer context (Muñoz and Chambers, 1993). The composition of the bacterial flora in this product as well as the ability of representative bacterial isolates to produce amines will be examined. The effect of parameters such as pH, content of salt, storage temperature and atmosphere composition on bacterial production of

amines will be analysed by use of pure and mixed bacterial cultures growing in laboratory media as well as in meat extracts of 'lightly preserved' meat products.

Subsequently, the project will examine the sensory quality and shelf life of products on the basis of expert and consumer sensory analyses of products in close collaboration with the meat industry. The sensory data will be compared with other product data including traditional total microbial counts, selective counts for lactic acid bacteria as well as indicative counts for amine producing bacteria and chemical data, specifically the content of biogenic amines, pH and salt content in addition to processing data including time/temperature relationships during processing and distribution of products.

A multivariate data analytical strategy utilizing regression based predictive/causal analysis (e.g. Partial Least Squares Regression or PLSR) will be utilized in the linkage of the various data sets (Martens and Martens, 2001), leading ultimately to the development of a 'biogenic amine based sensory quality index', BiAmIndex in acronym (Figure 2).

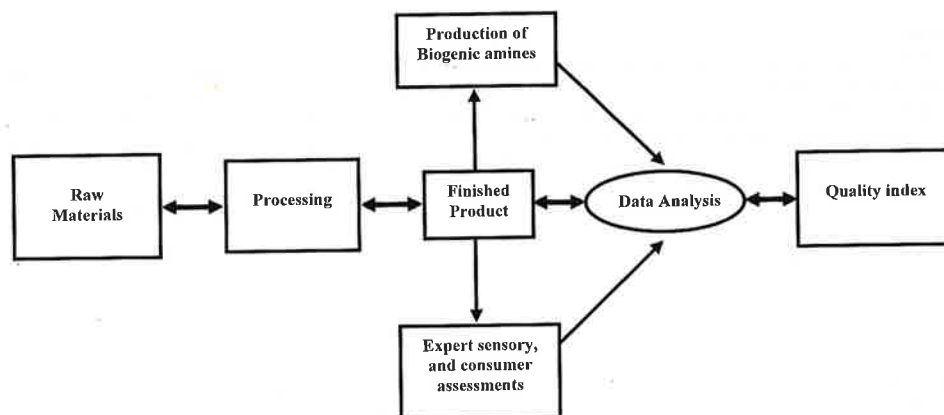


Figure 2: Schematic of the use of biogenic amines and sensory/consumer measurements in the product production chain as a quality index for 'lightly preserved meat products'.

Results and Discussion

Overall, there is a pressing need for the development and evaluation of new methods for the prediction and indexing of decreasing consumer/sensory based shelf-life quality in 'lightly preserved' meat products. The development of such an index will enable the shelf-life of these products to be controlled efficiently and ultimately, we postulate, may allow shelf-life extension from a sensory perspective, via more efficient quality control of these products during production.

Acknowledgements

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References

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