

CHAPTER 1 - INTRODUCTION

Cheddar cheese is a popular savoury food flavourant, though its high cost makes it an expensive food ingredient. Cheddar cheese flavour is produced by fatty acids and amino acids, and their reaction products, present in small but specific concentrations. This delicate mix of flavour chemicals is not easily replaced by a blend of pure chemical flavour compounds, unlike some blue cheeses for instance, in which the main flavour can be approximated by a single ketone (Moskowitz & La Belle, 1981). Enzyme modified cheese (EMC) overcomes this problem to a large extent. It is a highly accelerated ripened cheese product, in which the same cheese flavour compounds are created as in normally ripened cheese. EMC is added to foodstuffs as a cheese flavour, and since it is many times stronger than regular cheese, it is added in far lower quantities, and becomes a cheap but effective alternative. EMC is used in a variety of food products from maize snacks to instant sauces.

EMC is manufactured from curd or cheese, and normally ripened in less than 24 h by adding extra enzymes and using elevated ripening temperatures. It is produced either in the form of a slurry or a spray dried powder. The flavour of the EMC is derived from the breakdown products of proteins and lipids and their interactions. The decompositions and reactions occurring in naturally ripened cheese, are not all accelerated at the same rate, so that the end product has a flavour similar to normal Cheddar but is not balanced. This is not a problem, as long as it is only used to add a cheesy flavour to a food product.

In South Africa, EMC is used in products such as snack dustings for extruded maize snacks though it is often omitted from formulations due to its high price (pers. comm. - R. Ponquett, CEO FlavourCraft, 1999). EMC has a high price locally because it is imported from countries such as the United Kingdom, with whom South Africa has a poor exchange rate. There is a need in South Africa for cheaper EMC, made locally and using local ingredients. Milk and cheese curd are readily available, so is the relatively simple technology to produce EMC. However, the enzymes required to produce EMC, still have to be imported. So far, Cerevac is the only South African company that produces EMC commercially, but its recipes and methods are secret. Other companies wanting to produce an EMC would need to learn the technology for themselves. As such, no scientific literature exists on the feasibility of producing an EMC in South Africa.

The chemistry of EMC flavour production is complex and is based primarily on the enzymes and additives used during production. From the large body of literature the best additives can be ascertained, though which and how much enzyme to use is not so clear. Takafuji (1993) isolated, extracted and purified his own enzymes for EMC production but specialised enzyme preparations are available that eliminates these steps. The enzyme preparations normally come with recommended usage levels but this means that typically a number of trials will be needed to find the optimum usage levels. These levels can be determined using parameters such as free fatty acids (FFA) and free amino nitrogen (FAN). FFA and FAN are commonly used since they give a measurement of the degree of protein and lipid breakdown which, together with their reaction products, are the basis for cheese flavour.

Much work has been done on what contributes to flavour in cheese (e.g. Kristoffersen, Mikolajcik & Gould, 1967; Law, 1984; Fox, Law, McSweeney & Wallace, 1993). However, little or no sensory work has been done on EMC. This may be due to the assumption that since EMC is a cheese replacer the sensory studies used for cheese would apply to an EMC. This is not necessarily the case. Firstly, EMC may not have a balanced flavour which means that sensory studies on cheese may not be applicable to EMC. Further, while sensory testing can be done on cheese, EMC must be evaluated in a food base, since that is how it will be ultimately consumed. Also, it appears that protein breakdown products are the most important in Cheddar cheese flavour (Fox, O'Connor, McSweeney, Guinee & O'Brien, 1996), whereas in a Cheddar EMC the lipid breakdown products are the most important (BioCatalysts, 1996).

1.1 STATEMENT OF THE PROBLEM

EMC is an expensive imported material that should be cheaper to produce using local ingredients yet no published work exists on producing an EMC in South Africa. EMCs also need to be evaluated using taste panels but there are no published studies of sensory work done on EMC.

1.2 OBJECTIVES

1. To produce an EMC using local dairy ingredients and commercial lipase and protease preparations.
2. To measure the change in FFA and FAN content as a function of incubation time during EMC production. To evaluate whether the manufacturer recommended enzyme concentrations and incubation times are optimum for the available substrate and conditions.
3. To evaluate the sensory properties of different batches of EMC made with combinations of lipase and protease.
4. To evaluate whether either proteolysis or lipolysis is the major contributor to flavour production in an EMC.