

CHAPTER 1: INTRODUCTION

“Eggs or chicken, which came first?” No one knows the real answer. However, eggs have been consumed as human food for over two millennium, that is for sure. They are one of the least expensive sources of animal protein (Stadelman, Olson, Shemwell & Pasch, 1988), and a good source of nutrients. The egg proteins provide all the essential amino acids (Toney & Bergquist, 1983) for the human diet and often act as the standard for measuring the quality of all other food proteins (Watkins, 1995). In addition, vitamins A, B, D, E and K, and especially vitamin B-12 (Pszczola, 1999), as well as phosphorus and iron are supplied. Eggs are also an important source of essential unsaturated fatty acids (linoleic 18:2n6) and oleic acid, a monounsaturated fatty acid (Watkins, 1995). However, eggs are lacking in carbohydrates, calcium and vitamin C (Linden & Lorient, 1999). In South Africa, the consumption of eggs was 290 000 tons in the year 2000, which increased about 23% from the last five years (Department of Agriculture, 2001).

The major functional properties of eggs are coagulating, foaming, emulsifying, and contributing nutrients, colour and flavour. In some instances, they are used to control the growth of sugar crystals (Cotterill, Amick, Kluge & Rinard, 1963). There are no other food or ingredients that can completely replace these egg properties (Yang & Baldwin, 1995).

Eggs are a basic ingredient used by bakers. They contribute unique functional properties for bakery products (Gilbertson & Porter, 2001). However, eggs are one of the most common ingredients which affect the spoilage of bakery products (Jones, 1994), and mishandling can introduce serious food safety risks (Gilbertson & Porter, 2001). Pasteurisation, freezing and drying can act as preservation methods for eggs. Apart from the microbiological deterioration, these preservation methods can also be used to slow down the rate of physical and chemical deterioration to retain the natural appearance and nutritive value of the egg contents (Romanoff & Romanoff, 1944).

Changes to the chemical composition and physicochemical properties of eggs may occur during shell egg storage and during pasteurizing, drying, and freezing (Du Preez, 2000). This alteration in the egg components may be reflected in a loss of functionality of albumen (foaming power) and yolk (emulsifying ability) (Li-Chan, Powrie & Nakai, 1995). Hence, the sensory characteristics of sponge cakes namely: appearance of the colour of crust and crumb, flavour and texture of sponge cakes can be influenced by alteration of functional properties.

The main function of eggs in sponge cakes are foaming and coagulating (Bennion & Bamford, 1997). Sponge cakes are low in fat and belong to the intermediate moisture food products (Singh, 1994). The water activity (a_w) is within the range of 0.65-0.85. With these water activity levels, mould growth is the major microbiological spoilage problem (Seiler, 1976). Besides the microbiological matters, staling should also be considered as a factor in the shelf-life of sponge cakes. Under proper storage conditions (at suitable temperature and package), sponge cakes can have a three-week shelf-life (Jones, 1994).

All the abovesaid forms of eggs have their advantages and disadvantages. There are limited information available regarding the comparison of sensory properties and shelf-life of fresh shell egg, frozen egg pulp, spray-dried egg powder and a commercial egg powder mixture on commercial-type sponge cakes over a storage period. Therefore, this has led to the need for a study into the effects of different egg forms on the sensory properties and shelf-life of sponge cakes.

1.1 Problem statement

Fresh shell eggs are usually used at home for baking purposes, while refrigerated-liquid, frozen and dried eggs are used in the baking industry. This is because fresh shell eggs are more difficult to handle and higher labour or machinery costs are necessary for breaking the fresh shell eggs before baking. In addition, fresh shell eggs often have problems with inconsistency of solids and fat contents which are caused by the varying size of fresh shell eggs (Du Preez, 2000). Egg in the refrigerated- liquid and frozen form is widely used as an ingredient in the baking industry (Bennion & Bamford, 1997), since their functional properties are almost similar to fresh shell eggs and their composition are relatively constant (Du Preez, 20). However, the transportation and storage costs of frozen egg pulp are higher than fresh shell eggs and egg powder. Additionally, one must foresee in advance the product demand to allow time for thawing. The thawed product must be consumed rapidly. Therefore, there is an increased chance of waste if large frozen egg containers are involved (Ball, Hamid-Samimi, Foegeding & Swartzel, 1987). Egg powder would be more convenient to use because it is easier to handle, requires less storage space and lowers the transport costs. But the functional properties, especially the foaming power are degraded by heating during the drying process (Powrie & Nakai, 1985). These changes may affect the baking quality and sensory quality of the final products. Thus, other ingredients such as emulsifiers may have to be added to dried egg powder to overcome this problem.

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