

CHAPTER 3: OBJECTIVES & HYPOTHESES

3.1 Objectives

- To compare the moisture, protein, fat and ash content (%), pH, foaming overrun, coagulation and water-holding capacity of fresh shell egg, frozen egg pulp, spray-dried egg powder and a commercial egg powder mixture.
- To compare the sensory characteristics and the shelf-life of sponge cakes which were baked with fresh shell egg, frozen egg pulp, spray-dried egg powder and a commercial egg powder mixture and stored at two temperatures (21°C and 31°C).

3.2 Hypotheses

- The protein content, pH, foaming properties, coagulation properties and water-holding capacity of egg ingredients will directly affect the sensory characteristics of sponge cakes.
- The sensory characteristics will have noticeable differences among the sponge cake samples. The functional properties of dehydrated egg products are altered by processing and it is therefore expected that the products baked using dried egg powder will be more firm and compact. The colour and flavour of sponge cakes would be more pale and milder respectively, than the products which are baked with fresh shell egg and frozen egg pulp. This is because the colour and flavour are degraded during spray-drying (Bergquist, 1995).
- The shelf life of the sponge cakes will also have differences. This is because the protein of the egg product will denature during high temperature drying (i.e. Pan drying and spray drying). Hence, the water-binding capacity is reduced (Cheftel *et*

al., 1985) which increases the water activity (free water) of the final product. In addition, high water activity will speed up the physical (staling) and microbiological (mould growth) spoilage (Jones, 1994). Therefore, differences in the shelf-life of sponge cake samples are expected.

4.1 Experimental Design

The experiment was divided into Phase 1 (Figure 6) and Phase 2 (Figure 7). The moisture, protein, fat and ash content (%) of each egg ingredient were determined in Phase 1. The moisture content of the individual egg samples was also determined at the end of the formation of the sponge cakes (47 °C, 11 g/100 g) to determine the effect of oven time and water holding capacity were also determined for all egg samples. The storage stability samples were analyzed in Phase 2. Specific volume, index of volume and water activity were determined on Day 0. In addition, texture analysis (firmness) were conducted every four days from Day 0 to Day 24, whereas the staling and mould counts were determined every four days from Day 12 onwards. The sensory characteristics of sponge cakes were evaluated every four days from Day 0 to Day 16 only, due to positive yeast and mould counts found on Day 16.



Figure 6 The measurements of Phase 1 to characterize the frozen whole egg, frozen egg pulp, spray-dried egg powder and egg powder mixture samples