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SENSORY EVALUATION OF
NEW ZEALAND COMMERCIAL WHOLE MILK POWDERS

A Thesis presented in partial
fulfilment of the requirements for
the degree of Doctor of Philosophy
in Food Technology at Massey University

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ABSTRACT

Whole milk powder is a multi-million dollar export earner for New Zealand. Over recent years, there has been a change in emphasis for whole milk powder from a commodity to a consumer product. This has made it increasingly important to understand its sensory properties which are essential to ultimate consumer acceptance.

A sensory profile for New Zealand whole milk powders was established in a systematic fashion through group discussions using a trained panel. The final profile included thirty-two attributes to describe the appearance, aroma, flavour and texture of both powders and reconstituted milks.

Three different sensory scales were used in association with the profile throughout one dairying season. These were a 0-10 linear scale, a semi-structured linear scale and magnitude estimation scaling. A comparison was made of these three scales according to usage factors and their sensitivity to differences between samples. The semi-structured linear scale was the easiest scale to use but was not very sensitive to sample differences. Magnitude estimation was not sensitive to sample differences and there were problems associated with its usage. The 0-10 linear scale was easy to use and sensitive to sample differences.

Relevant sensory data from one complete dairying season were compared with data from instrumental measurements of colour and texture made on both powders and reconstituted milks. Reflectance measurements made using a Hunterlab D25 colorimeter and calculated indices of the particle size distribution were the only measurements which related closely to sensory properties of whole milk powders.

The effect of seasonal changes in the sensory properties of whole milk powders was studied over two dairying seasons. Highly significant seasonal changes occurred in physical properties of whole milk powders, such as colour. In the aroma and flavour of both powders and reconstituted milks, the most significant seasonal changes were in the sweet, buttery and cooked/caramelised notes. Changes were greatest at the beginning and end of the dairying season.

The effects of certain processing variables on the sensory properties of whole milk powders were also studied. Processing variables which changed the physical structure of the powder were found to have a highly significant effect on colour, free-flowing properties and particle size. Addition of vitamins and minerals had a highly significant effect on the aroma and flavour of both powders and reconstituted milks. This was confirmed by data from experimental powders containing controlled levels of vitamins and iron which were made at the New Zealand Dairy Research Institute. Powders containing vitamins and iron were characterized as 'lactone-like', 'vitaminized' and 'oxidised'. Changes in the aroma and flavour characteristics were much greater in instantized powders. Some of these effects were thought to be associated with oxidation of soybean lecithin in these particular powders.

Using a simplified version of the profiling method established in this project, it should be possible to match products to market requirements far more effectively than the present single score grading system.

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- 182: Raw data from the 1979/80 and 1980/81 dairying seasons. For detailed list of appendices see Fiche 1 (in pocket inside back cover of thesis).