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DEVELOPMENT OF
A MUTTON-BASED PROCESSED MEAT PRODUCT
FOR EXPORT FROM NEW ZEALAND TO THAILAND

A thesis
presented in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy in Product Development
at Massey University

NINNART CHINPRAHAST

1988

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ABSTRACT

There is a need for the development of processed meat products from New Zealand mutton so that marketing of the country's sheepmeats can be diversified and expanded, if possible to new overseas markets. Thailand, a country with a relatively big population, may be one of the importing countries for mutton-based processed meat products from New Zealand. However, there was a possibility that the Thai people might be unlikely to accept the products made from this unfamiliar meat with strong aroma and flavour.

There had never been research into the development of processed meat products made from New Zealand mutton for the Thais. Therefore, this thesis studied whether any product could be made acceptable to the target Thai consumers who were the middle and upper classes in the Bangkok area. The steps of the systematic product development process were followed to guide how such a product could be designed. In brief, the process started from surveying the Thai market for some suitable products, identifying the product (meatballs) to be developed using mutton, development of the formulation in New Zealand, improvement of the formulation in Thailand, and finally it ended with consumer testing of the developed product in the target market in Bangkok.

Different types of sensory panels were used at various stages of the development. These included: a laboratory panel (n=12) in Bangkok to identify important sensory attributes and the ideal profiles of some potential products in the Thai markets, a laboratory panel (n=8) to control the formulation development in New Zealand, a small household consumer panel (n=17) in New Zealand to test for acceptance of the intermediate product made by the selected formulation, a focus group panel (n=6) in Bangkok to optimise the formulation and a 'home use' consumer test panel (n=488) in Bangkok to test whether the final product was acceptable to the consumers.

The success of the development was believed to rely heavily on the formulation process which combined the use of appropriate experimental designs with the sensory evaluation methods. Experimental designs controlled by a laboratory taste panel using the ideal profile technique were used to formulate the meatball product. A mixture design was used to choose the appropriate kinds and levels of meat and meat fat to be mixed with mutton. A full

factorial design studied the texture development varying three ingredients - salt, phosphate and tapioca starch. Empirical equations relating the quantitative characteristics, determined either by subjective tests or objective tests, to the ingredient contents were derived so that the formulation could be directed systematically. A Plackett and Burman design was then used in the flavour development for screening of suitable spices. A quarter fractional factorial design was finally used to study the effects of the six ingredients, i.e. three texture improvers and three spices, on the sensory attribute acceptability of the product. An optimum formulation was selected and tested for acceptance by a small household consumer panel. This intermediate product was not highly acceptable.

A series of focus groups were therefore conducted in Thailand to optimise the formulation. The focus group panels provided valuable information as to how the product could be improved and, as a result, the prototype formulation was obtained and then used in a production trial to make the final product for a consumer test in Bangkok. The consumer test panel played its role at the final stage of this project to identify whether the developed product was acceptable.

The meatball product developed was acceptable to the target Thai consumers. It was believed that the product was successfully made by trimming of the mutton fat to reduce the strong aroma and flavour; this resulted in the high proportion (75%) of mutton which could be used with pork and pork fat (replacing mutton fat). Added ingredients also significantly improved the sensory characteristics of the product. Tapioca starch, sodium tripolyphosphate and particularly salt helped improve the texture and the spices, white pepper, garlic, onion and ginger, helped improve the aroma and flavour.

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