THE DESIGN OF A NEW BACON PRODUCT

A thesis presented in partial fulfilment of the requirements for the degree of Master of Technology in Food Technology at Massey University, Palmerston North, New Zealand.

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ABSTRACT

An initial examination of the New Zealand domestic meat market showed that the bacon industry was most in need of help from the development of new products. Per capita consumption of bacon and ham, products which provided almost 70% of the bacon industry's revenue, were shown to be declining. The aim of the project was to design new cured meat products which would replace bacon as the major revenue centre for the industry.

A market survey and two consumer surveys were carried out in Palmerston North with the aim of determining the reasons for the apparent decline in bacon and ham consumption. The three surveys were extended to include beef, sheep meat and pork cuts as well as ham, bacon and smallgoods so that the most consumer-acceptable cuts could be identified.

The market survey showed that the industry was in fact selling their bacon and ham through the most important retail outlets and while poor advertising and packaging might have been partly responsible for the decline in per capita consumption of bacon and ham, they did not appear to be the major cause.

The first consumer survey was carried out to see whether any changes in socio-economic factors such as household size, gross income of the household head or age of the housewife were responsible for the decline in consumption of bacon and ham. Trends evidenced in the New Zealand society since 1966, rather than contributing to the apparent decline in consumption of these products, were in actual fact favouring the consumption of these two meats.

The second consumer survey evaluated the attitudes of thirty Palmerston North housewives towards bacon and ham as well as a number of other meats. This survey identified the reasons for the apparent decline in consumption of bacon and ham. Bacon, in particular, was seen to have intermediate properties, intermediate between fresh meat and smallgoods.

The data from this second survey was examined by way of Principal component factor analysis and the following variables were isolated as being common to all meats: preference, nutrition, flavour, prestige and length of cooking. An analysis of main meal and snack meats identified additional variables which were unique to each meat group and still other variables were isolated for individual meat cuts. Together, these were hypothesised to be the blueprints for the individual products which enabled consumers to identify each meat product from a whole host of other meat products.

The consumer-acceptable meats were examined and the attributes responsible for the success of these products were identified and new cured products were designed, and these attributes were built into them.

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CHAPTER 1

NEW PRODUCT DESIGN

It is by no means always clear why companies need new products at all: or if they do, how many they need. An examination of the retail shelves in New Zealand indicates that firms have varying philosophies regarding the benefit of new products - some firms are particularly energetic but most tend to be conspicuous by their lack of new product development. Why this difference in attitude to new products? Most likely because of the different views that companies have of new products, as a way to either high profits or dismal failure.

There is little doubt that most new products fail. One Neilsen (78) analysis over 14 years showed that 54% of the new products on the United States market were withdrawn after test marketing, and one can assume that a few more were withdrawn after failing at the national launch stage. Krausher, Andrews, and Eassie in 1971 (55) noted that 410 new food products were introduced into the United Kingdom grocery trade in 1965. Five years later 60% of them had disappeared.

The reasons for their failure are many and varied, but they have had one thing in common, the new products failed to be better than existing ones (53). It would appear that too many new products were introduced indiscriminately, and there is a need for a method to determine more clearly what new products should be developed.

1.1. WHY DEVELOP NEW PRODUCTS?

Three justifications have been put forward for the development of new products: the product life cycle, the demands of technological change, and the need to grow (53).

The product life cycle theory says that any product's life is in four stages - introduction, growth, maturity and decline (60). A product's sales will grow until the needs it meets are satisfied, after which it is likely to grow only as fast as the population. When a new product emerges which will better meet these needs, then the sales of the product will decline. In its original form

the theory has been shown to be relevant in a number of United States markets. (81) In a sense, it is bound to be valid, if taken to mean that every product introduced will reach a peak at some time and eventually disappear. The timing will of course vary for each product, spanning centuries for some basic food products such as potatoes and meat and weeks for others like the novelty ice-creams.

The second quoted reason for developing new products is related to technological change. In most industries, the rate of technological change has been accelerating over recent years and nowadays few companies could survive for very long without some product innovation. For instance, every time a new food preservation method is found, it has repercussions throughout the food industry.

The third reason for developing new food products is, for most companies, the only really valid one. Despite the costs, problems, and risks, they need new products to grow at the rate they have set themselves.

1.2 REQUIREMENTS OF SUCCESSFUL NEW PRODUCTS

For a product to be successful it requires two main characteristics, namely -

1. It must be salient to peoples' needs and desires. This first factor is self explanatory, though it must be emphasised that both the functional and the nonfunctional wants of the consumer must be considered.
2. It must be a unique blend of appeals. (53) This depends to a large extent on the brand. It is this singularity which enables the media to create a personality for the product giving it real and identifiable appeals. Without this consumers may feel cheated, leading to the subsequent failure of the product.

The new product may appeal to a specific sense, such as smell, touch, taste, sight or it can and is more likely to appeal to a combination of senses. This combination of senses to which the product is to appeal must be experimentally determined for the effective development of the product and the communications.

The product should also have a reason for existing, i.e. it must appeal because of what it contains or what it does. For instance, a food product could appeal because of its convenience, quality of ingredients, protein content, suitability for a specific age group or because of its low calorie content.

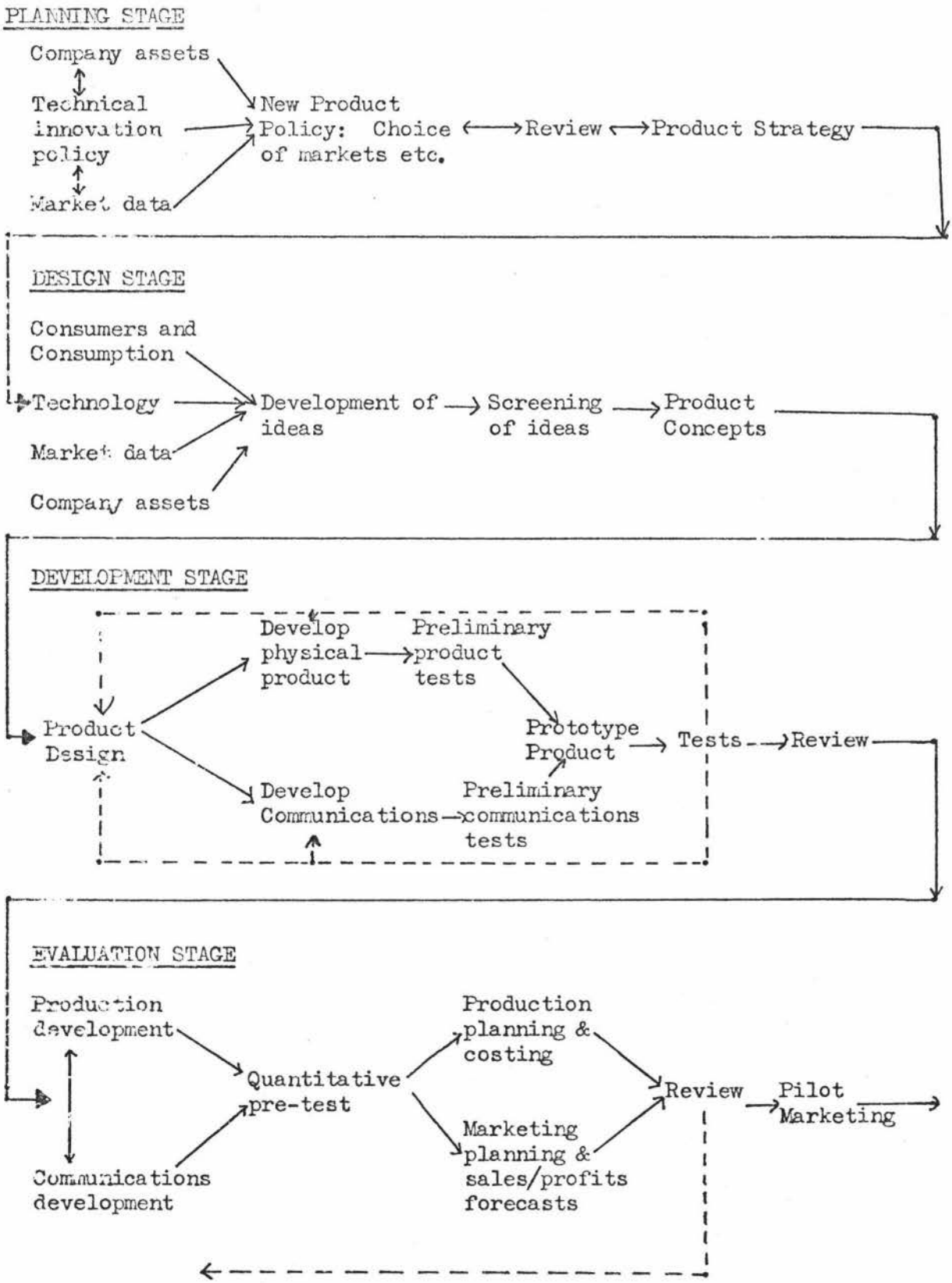
Finally, the product must appeal through the emotions. This type of appeal can make up a very large part of the personality of the product. It results from the nature of the associations which people have about the product. For instance, the emotional characteristics of a food could be changed by the way in which it is cooked - plain New Zealand or Continental. In cooking the food Continentally, the prestige rating of the food is heightened compared with plain New Zealand style cooked food.

1.3 THE DESIGN OF A SUCCESSFUL NEW PRODUCT

In design, the first problem centres around the question "How do you know that the product area selected or the product ideas developed are what the customer wants?" The next problem is to design the product which is wanted by the customer. General consumer requirements can be isolated with the aid of consumer research. How these consumer requirements are translated into actual products depends on company policy, the availability of skilled personnel and market opportunities. It is the interaction of these last three elements which results in the different products on the market which supposedly meet the same consumer requirements.

Four main stages can be isolated in the development of any new product. They are - planning, designing, development and evaluation. (24) These four stages represent a gradual refinement of ideas to the point where the product becomes a reality, and a gradual move from uncertainty towards a reasonable predictability (see Fig. 1). These four stages should be looked at separately as they represent logical steps in the development of the product, after which the project should be evaluated to decide which direction additional research ought to take or whether in fact the project should be stopped because the project is unlikely to succeed in its objectives. Each stage

Fig. 1 The Stages in Product Development.



represents an increasing degree of commitment by management to the product in terms of time and more importantly, company resources. Top management as well as the development team needs to examine the project at the completion of each stage.

1.3.1. Planning At the beginning of any new product development, the long-term company objectives are considered by the development team as these broadly define both the product areas which are to be examined and also define the markets at which the products are to be aimed. Having defined the product areas and markets to be researched, the development team then examines the existing technology and possible future trends, market structure, consumer behaviour and attitudes in the market. They obviously will not be able to obtain all this information from the literature and must undertake a certain amount of research to fill in the grey areas.

Every company has, or should have, long term financial, consumer, and technological objectives which are used in the definition of each product's objectives. Obviously no company wants to lose money as a result of a new product venture. How do they prevent such a mishap? Firstly they establish acceptable rates of return for any new product and secondly they develop only those products which meet a clearly defined consumer need which their existing marketing set-up and technological expertise can handle. Financial considerations might be such that the company management feels that it would be sufficiently rewarding for the company to either change its marketing policies or to develop new technological skills.

Once the product area has been defined, the team then suggests a whole range of product ideas which may be developed by a range of group techniques. At this stage of the programme, emphasis is on the production of as many ideas as is possible.

Screening of the product ideas is a natural development of the idea generation stage. The product ideas are evaluated by considerations of finance, the consumer, the market and technology. In the new marketing context, the consumer takes a central role in the development of new products, and as a result the other three objectives have tended to take a back-seat position until the actual ideas have been produced and then these three objectives have

been used to remove any products which are either not profitable or cannot be marketed through the company's existing marketing set-up. The screening stage is a semi-quantitative method of defining which products should be developed. It must be stressed that personal feelings concerning the worth of a particular product idea can and do creep into the selection process, unless very strict guidelines are established for the selection of the product. These guidelines should be established before any products are considered by the project team.

1.3.2. The design of the product This stage is characterised by a single process - the refinement of general product concepts to detailed product specifications.

The designer of a new product is always faced with certain constraints within which he must operate. The variables associated with finance, processing, raw materials, the market and the consumers inevitably lead to design restrictions. Financial considerations determine the cost of the project, the final price of the product, its expected rate of return, and can even determine the raw materials which may be considered in its design.

Probably the most important variable which must be considered in the design of a new product is the consumer. The designer is faced with the problem of determining the consumer's wants, the senses and emotions to which the product has to appeal and the use the consumer has for the product. The designer can only determine this by questioning the consumers, studying past behaviour or by psychological tests. He then has to translate this information into product requirements. At present there is a scarcity of information about the importance of the emotions in the selection of different foods. Little attempt has been made to transfer the consumer information into quantitative information which can be used in designing a product.

As well as these consumer variables, other variables to be taken into consideration in design are raw materials, their nutritional and functional properties; processing and its effect on the raw material properties, and market variables such as pricing and distribution.

How is this multitude of variables taken into consideration in the design of a new food product? At present there is no single quantitative technique

enabling the product designer to do this, although specific techniques have been developed to tackle certain aspects of the design phase. Linear programming has been applied in the formulation of new food products using nutritional and functional properties of the raw materials. (86) Multi-dimensional scaling, factor analysis, and multiple regression have been used in the definition of new product areas, but these three techniques have not been used in a predictive manner for the design of new products.

The most successful application of linear programming has been in the formulation of foods, where the problem is to formulate a food product either at minimum cost, or such that profit is maximised, from a mixture of raw materials of known cost, nutritional composition and sometimes physical and chemical properties, subject to product specifications of nutritional composition, physical, chemical and organoleptic properties. (90) This is the typical animal feedstuff application - a blending problem.

Factor analysis, multi-dimensional scaling, and multiple regression are essentially mathematical techniques which enable the designer to extract the most important common variables which consumers associate with specific products. Having isolated the most common variables of importance to the consumer, the designer is then able to concentrate on these variables in the final design of the product. Multi-dimensional scaling has the additional advantage of providing a multi-dimensional picture of products already on the market, and enables the designer to see at a glance new product opportunities.

The design stage of the new product requires the definition of the objectives which the product must meet, i.e. the synthesis of appeals which the product must be aimed at, the needs which it must satisfy and most importantly the form of the actual physical product, its shape, packaging, colour. These objectives become a design brief for the product development team. They are also used in the design of the communications which are an integral part of the product and both must be developed in parallel for perfect harmony between product and message to be realised. It is vital that the product and message are in harmony to ensure that the potential consumer will not be confused by different appeals, with the product claiming one thing and the communications another - diverging claims by product and message could lead to final product failure because of unfulfilled consumer needs.

Clearly then, some technique must be found which will enable the designer to draw upon all the information about the raw materials, processing, the consumer, market and finance and to use this in the design of new products. At present, much of the effort is being concentrated on the consumer and his requirements and more specifically his organoleptic requirements. The organoleptic properties would appear to be the most difficult to quantify and for this reason little or no work which comprehensively includes all the organoleptic variables both objective and subjective has been published.

1.3.3. Product development The product development stage is a natural extension of the design stage and is essentially the transformation of the product specifications, i.e. the product design, into a physical product reality. The physical product and communications are produced apart and then brought together as the prototype new product. (53)

If the design is all it should be, then the development team will have a clear idea of what raw materials are to be included in the product, their quality, the type of process to be used for making the product, the colour and form of the product plus all the other sensory attributes which the product is supposed to have, the packaging and finally the market and method of distribution. Knowing exactly who the product is aimed at is essential as it enables the team to select a specific type of panelist for subsequent testing of the product. This in turn increases the likelihood of success because it has met the approval of the people at which the product was initially aimed.

The development stage goes through a natural evolution from the position of a theoretical product to a reality. In other words, the development team has a model product before them, and they attempt to make it a reality, always mindful of the fact they may have to modify the model in the light of subsequent experimentation.

At the start of any development programme it pays to "play" with the raw materials to obtain a "feel" for the materials as this enables a more effective and systematic programme to be developed for the project. Having got a "feel" for the materials, the team then proceeds with the development on the laboratory scale until such time as the new product is judged to meet the specific design

requirements. Once this stage is reached, then the product is produced on an increasingly large scale until sufficient has been produced for a market test. Going to large scales ensures that every effort is made to prevent scale-up problems and that the final mass-produced product does in fact meet the original or modified design criteria. Adequate testing must be carried out at all stages of the development as this is the only way of keeping the product to the original specifications. The final test before the product is finally handed over to the production people is the market test as this is the last chance for the development team to correct any product mistakes and the last chance for the management to say yea or nay to the launching of the product.

1.3.4. Evaluation The product and message are each tested separately, the results are fed back, and if necessary, either the strategy or even the product and messages are redesigned, from which a revised product or message arrives for testing. This cycle is continued until the new product and message comply with the criteria established for them, at which time the message and product are combined for further testing. This further testing generally takes the form of a market test. Basic to this whole process is the idea of evaluation - at the end of each test the results are evaluated to see whether the product is approaching the criteria established for it; if not, then the product or message is modified to more clearly meet these objectives. At the end of each test the management can take the decision to either continue with the project or drop it. This is critical at the end of the market test.

The aim of the present project was to examine the New Zealand domestic meat market with the idea of identifying product opportunities, i.e. sections of the industry in need of product development, and once this had been done to examine the financial, market and consumer requirements for the new products with the aim of producing products which would help the particular section of the industry, and products which would clearly meet the consumers' requirements. It was envisaged that the products would have to be new, if the project was to have any lasting benefit to the industry.

1.4. THE DESIGN OF A NEW MEAT PRODUCT

The following elements must be considered in the design of any new product -

(a) The company and its objectives
(b) The market and trends within the market
(c) The technology; and finally
(d) The consumer - his or her needs and attitudes

In the present project there were no company objectives to meet as the project was not aimed at any one company, but rather at a whole industry - the New Zealand bacon and smallgoods industry and in particular the Manawatu section of this industry. Consequently, industry objectives had to replace company objectives for the present project. This in turn meant that the terms of reference for the project had to be such as to benefit the whole industry - though at some stage of the project, consideration of the above four elements might have limited the study to a specific section of the industry.

How can product areas, and in the context of the project, industry areas, be defined for subsequent product research? One method is to call upon the product life cycle concept to define the sections of the industry which require additional product research. According to this concept almost every product goes through four stages, similarly, the product's profits go through associated stages of development - the introduction stage is characterised by low profits, the growth stage by increasing profits, the maturity by steady profits and the decay stage by declining profits. If product life cycles are developed for all the major meat types, the products which effectively encompass the New Zealand meat market, then this should provide some indication of the areas which ought to be examined for new product development.

If only those product areas which are in the decay stage of their life cycles were selected, then this would ensure that only those product areas which most need new products did in fact get them. Clearly then, the new products would meet one of the major objectives of the project, namely that of meeting the needs of a section of the meat industry.

The three other objectives, namely, the market, the consumer and the technology

must also be met for the product to be a success. Consider first the market as this requires an examination of the following factors at least, if the project is to be appraised thoroughly -

1. The products
2. The price of the products
3. The place through which the products are sold
4. The promotion of these products

One of the terms of reference of the project is that the products must be new. How can this be ensured? Obviously a thorough knowledge of all the meat products on the local market would prevent product duplication of existing products. Moreover, it would be beneficial to examine products which are selling well on the Palmerston North market and to compare these with products whose sales are declining to enable some of the attributes of the more successful products to be built into the less successful products, thus creating new products which would be more competitive on the local market.

The price of all the meat products available on the local market is an important variable in that they establish upper and lower bounds within which the price of any newly developed products must fall, if they are to be at all competitive with similar existing products.

The market share of the different retail outlets is another important marketing variable which must be monitored by the industry if it is to maintain its share of the market. The industry must sell its products through the retail outlets which command the largest share of the market both the present and future. The industry must maintain a flexible approach to market channels so that it can constantly modify its policy in the light of emerging trends. One of the purposes of the present project was to examine channel trends.

The various market channels have specific requirements for the product and the industry must be aware of these if it is to take advantage of changes in importance of the different market channels. The supermarket outlets for instance, require a completely different product to that sold in the butcher shop. The most noticeable requirement is the packaging - virtually non-existent in the butcher shop, in complete contrast to the often elaborate

packaging in the supermarkets.

The final marketing variable to be considered in the project was promotion. No attempt was made to study the promotional strategies of the different companies supplying the Palmerston North market, but only the effect of their promotional campaigns by evaluating consumer brand awareness and also their brand preference to bacon and ham in Palmerston North.

In this way, it was planned to establish the effectiveness of previous promotion and whether or not the industry should consider a more effective promotional scheme in the future.

A consumer's needs have been shown to be dependent on a number of socio-economic variables, such as per capita income, marital status, number of children in the family, number of people working and finally the occupation of members of the household. (89) Very little information is available in New Zealand on the effects of the different socio-economic factors on the purchase of meat and the present project set-out to determine which socio-economic variables were important in determining the types of meat purchased by the Palmerston North housewives.

While socio-economic data is meaningful to the marketer as it enables him to segment his market, it is not particularly helpful to the product designer as the information is passive in nature. The product designer requires information which is active providing him with the requisite directions in which he must go to make his product. Measurement of attitudes towards products provides the product designer with the requisite directional information, but it must be remembered that attitudes to products tend to be modified and reflected by the socio-economic predicament of the consumer.

The present project set out to determine attitudes common to 24 meat cuts so that there would be a common base from which to design new meat products. Very little information was available on the attitudes of New Zealand housewives to meat and for this reason a survey was carried out to obtain the required information.

It must be stressed that no effort was made to measure the meat consumption

of the catering sector and it is appreciated that this sector accounts for a substantial proportion of total meat consumption in New Zealand.

CHAPTER 2

AN EVALUATION OF THE PALMERSTON NORTH MEAT MARKET

This chapter is concerned with a market evaluation of Palmerston North, as regards meat selling.

The New Zealand domestic meat market was examined to define the areas which needed further research. The survey concentrated on the Palmerston North market and an attempt was made to find data on the importance of the various retail outlets in the sale of meat, the prices of the different meats, the manufacturers supplying the Palmerston North market with processed meat products, the brand awareness of the local consumer and also their brand preference.

2.1. MEAT CONSUMPTION IN NEW ZEALAND

Red meat forms a major part of the average New Zealander's diet; a comparison with the consumption figures of other major meat eating countries illustrates just how important meat is to the New Zealander. In 1970 the average New Zealander ate 246.4 lb (110.0 kg) of red meat, (75) his American counterpart some 183.6 lb (81.96 kg), in Britain (33) he ate 113.8 lb (50.80 kg), while his Australian counterpart, a person who comes from a similar cultural background, consumed 171.8 lb (76.68 kg). The average New Zealander consumed 34.2% more red meat than the next largest consumers, namely the Americans. (14) For more details see Appendices 1, 2, 3 and 4.

The red meat consumption patterns in the respective countries are quite different. In Britain, the people seem to have the most balanced meat consumption pattern, with beef and pork products being the most popular meats, each accounting for 25% of the total meat consumption, followed closely by mutton and lamb which accounted for 16.6% of all meat consumption. The pattern in New Zealand, Australia and U.S.A. is more extreme, and is largely a reflection of the agriculture in these countries. In New Zealand and America, beef is the most consumed meat, accounting respectively for 39.1% and 61.0% of all red meat eaten in these countries, whereas in Australia, sheep meat

tends to be the most consumed meat. Pork and pork products are the second most consumed meat in America, accounting for 30.9% of the total, whereas in New Zealand and Australia they account for only 11.8% and 7.9% respectively. Beef is the second most consumed meat in Australia, 32.2% of the total, while sheep meat is the second most popular meat in New Zealand. The sheep meat consumption patterns in New Zealand and Australia are markedly different. Lamb accounts for 88.4% of all sheep meat eaten in Australia and only 23.7% in New Zealand, i.e. mutton is a much more popular meat in New Zealand than in Australia (see Fig. 2 for further details).

Smallgoods consumption on a percentage basis is quite small in New Zealand compared with the other countries, suggesting that this is a product line with possibilities for further expansion in New Zealand.

In New Zealand, total meat consumption went through four distinct phases between the years 1954 and 1970, as shown in Fig. 4. Phase 1, 1954-1958, was characterised by a 1% increase in total per capita meat consumption from 234.5 lbs/capita/annum to 237.6 lbs/capita/annum. Phase 2, 1958-1962, was characterised by a dramatic increase in total meat consumption from 237.6 to 262.2 lbs/capita/annum, an 11% increase in total meat consumption in this period. Total meat consumption fell from 262.2 to 245.7 lbs/capita/annum between the years 1962-1965 - phase 3. This drop represented a 10.7% decrease in meat consumption from the high of 1962. Phase 4 showed a gradual increase in meat consumption in the years 1965-1970. The overall trend in the 16 years between 1954 and 1970 was for a 10.6% increase in red meat consumption from 234.5 to 247.7 lbs/capita/annum (for further details see Appendices 1 and 2).

The consumption patterns of the different red meats showed very few marked trends in the 16 years under study, i.e. 1954-1970 (see Appendices 1 and 2). Beef consumption dropped from 42% to 40% in this period, while mutton consumption also dropped from 30 to 27%. Lamb consumption on the other hand increased in the same period from 3.9 to 8.6%. Sausage consumption showed a marginal increase of some 2%, while the consumption of pork and pork products remained almost constant throughout this period, the histories of individual pork products showed marked fluctuations.

Poultry consumption has gone through two distinct phases between the years

Fig. 2 Red Meat Consumption Patterns in New Zealand, Australia, United Kingdom and United States. (%), (1969)

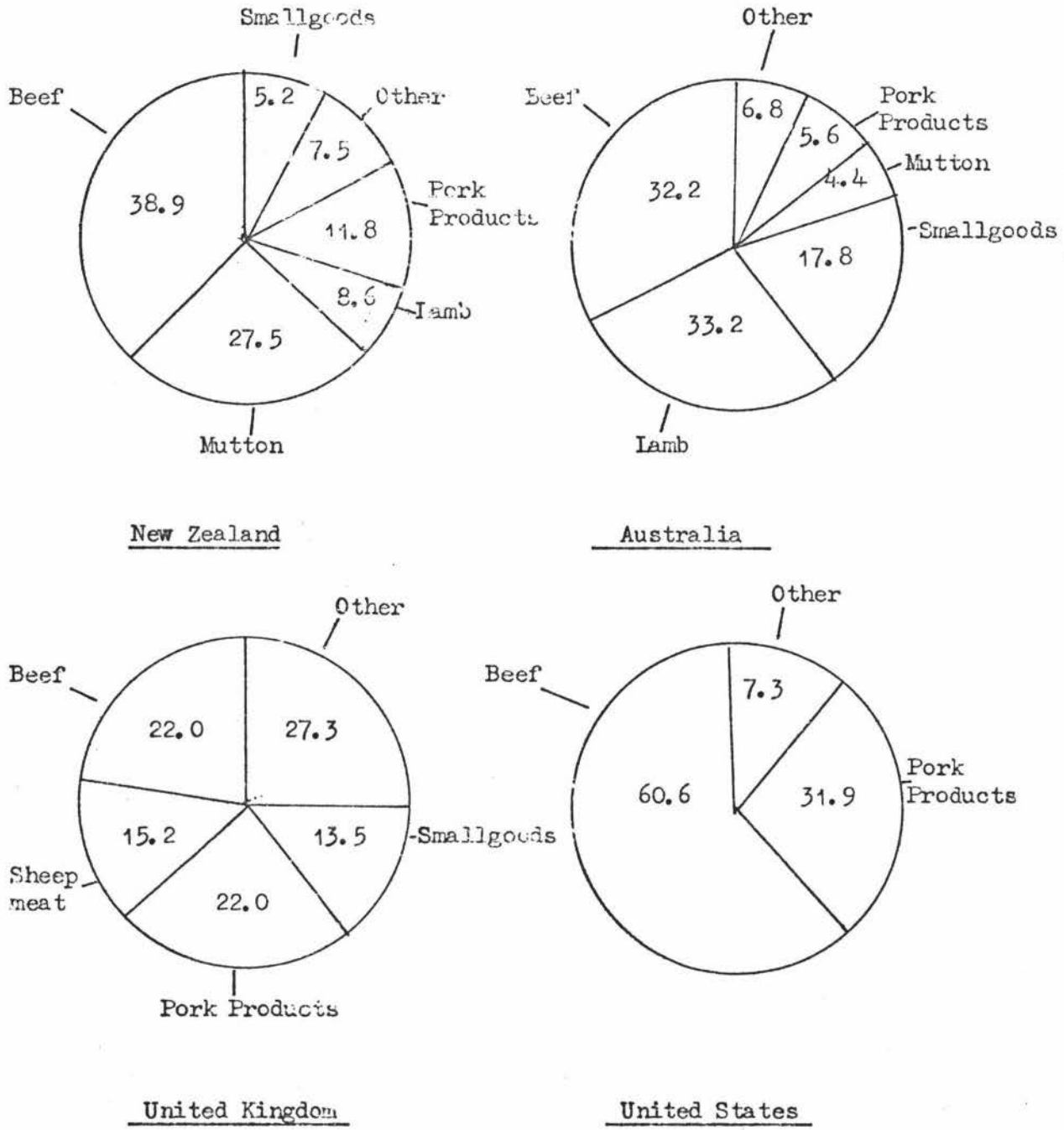
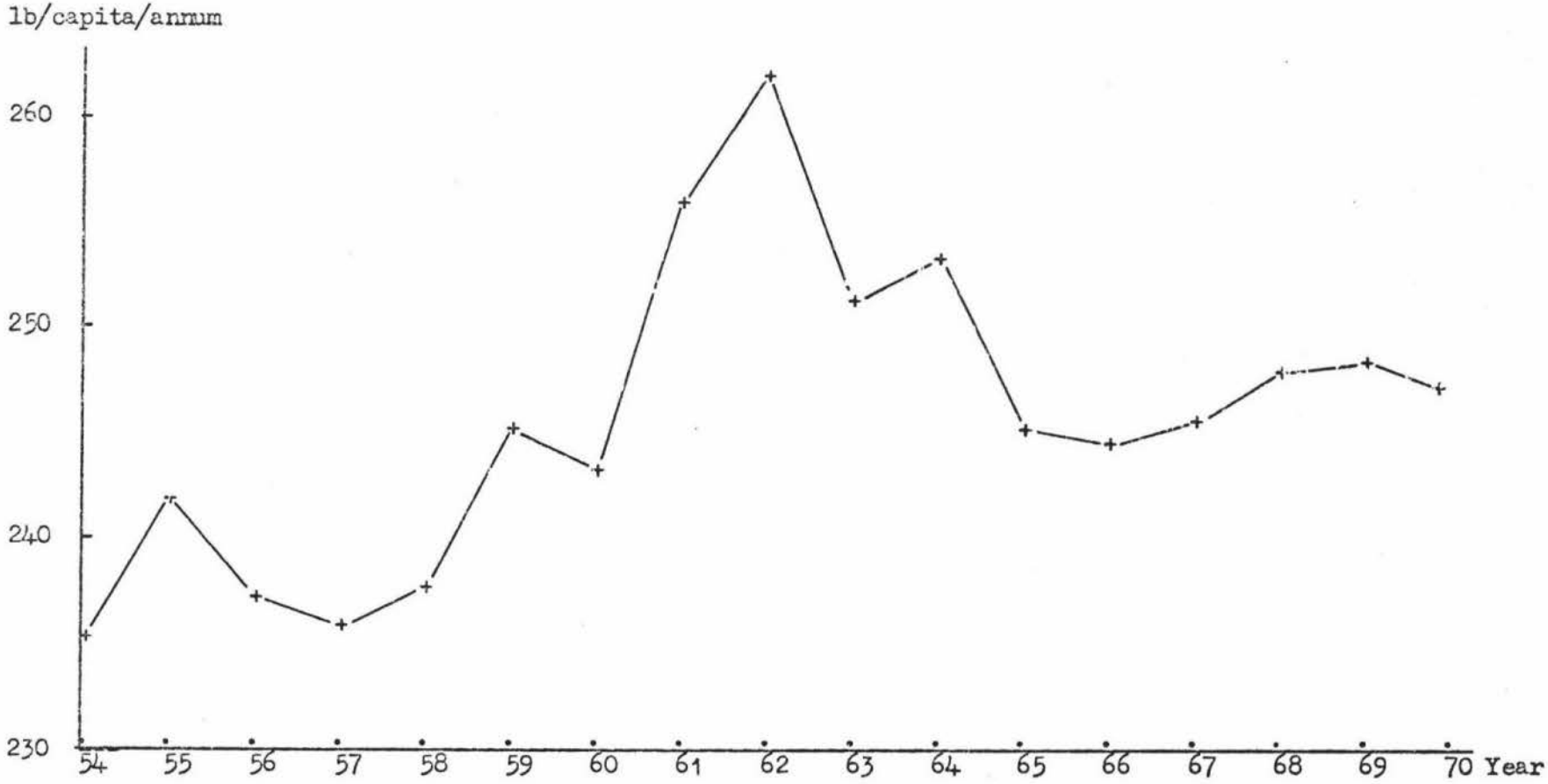


Fig.3 Total Per Capita Consumption of Red Meat in New Zealand 1954-70.

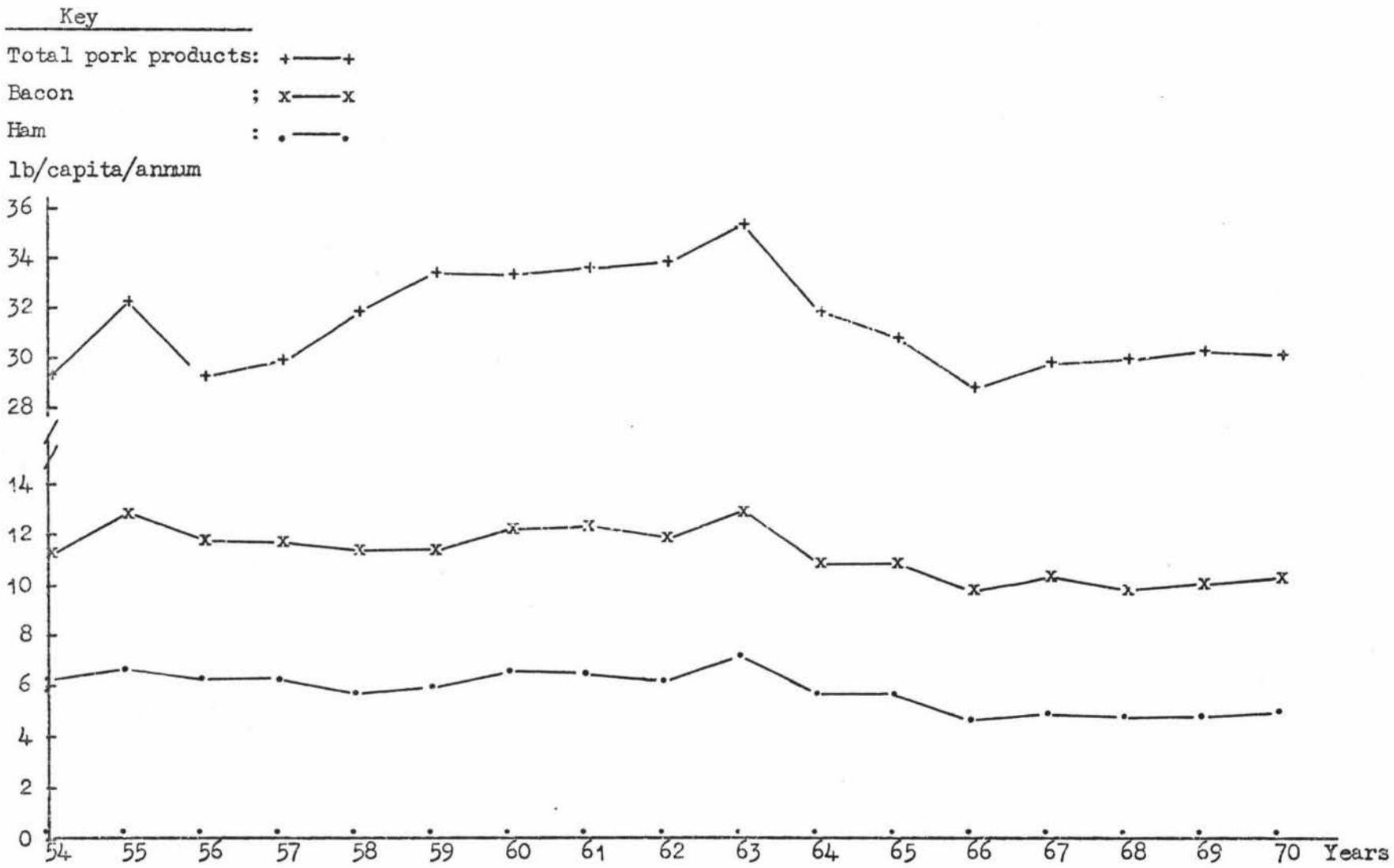


1954 to 1970. The first stage showed a very slight rise between 1954 and 1963 from 4 lbs to 5 lbs/capita/annum. The second phase has seen a dramatic rise from 5 lbs in 1963 to 13 lbs in 1973, a 62% increase in poultry consumption. (67) The Poultry Research Institute has estimated that poultry consumption in 1975 will be approximately 20 lbs/capita/annum. They ascribe this dramatic increase to the establishment of the Kentucky Fried Chicken outlets throughout much of the country. This phase of rapid increase in consumption has also been attributed to the aggressive brand development of some companies such as General Foods and their Tegel Chicken brand, and to the price drops associated with the entry of large companies into the production of broiler chickens.

Pork and pork products tended to go through three phases, the first evidenced by a rise in consumption over the years 1954 to 1958, followed by a gradual decline up to 1966 and the third phase is largely characterised by a static consumption which has been forecasted to last up until 1980. This overall trend is attributable to the increased consumption of pork and chopper (old sow meat), as bacon and ham consumption has tended to fall from the high of 1955 right throughout the whole period under consideration. There have been the occasional upturns, but the overall trend has been for a decline in consumption of these two products. Bacon and ham consumption in 1970 had fallen by approximately 10% from the high consumption figures of 1955. (75) These two products are the only two products to have shown such a marked decline, the others had a maximum decline of only 3% (see Fig. 4 and Appendix 2).

An examination of the consumption trends of the different meats indicates that the product area requiring additional product research is the ham and bacon group where consumption fell by 10% in the period 1955-1970. As the statistical information used in the above analysis was only as recent as 1970, it was felt that more recent consumption data was needed before any decisions could be made as to the product area to be researched. For this reason two subsequent surveys were carried out. The first, a market survey, was designed to provide information on the total weight of the different meat types sold through the different retail outlets in Palmerston North, and the second, which will be discussed in detail in Chapter 4, was designed to obtain information on the consumption of a number of meat cuts by people in Palmerston North.

Fig.4 Total Per Capita Consumption of Pork Products in New Zealand 1954-70.



2.2. MARKET SURVEY OF PALMERSTON NORTH

This section of the report presents the results obtained from a market survey carried out in Palmerston North, and forms part of a programme of market research aimed at determining the sales and consumption of meat in Palmerston North, and in particular the sales and consumption of pork and pork products.

The aim of the survey was to provide market data on -

(a) The trends in market shares of the different retail outlets selling meat
(b) Total volume of the different types of meat sold in Palmerston North
(c) The manufacturers supplying meat to the Palmerston North market
(d) The processed meat products sold on the Palmerston North market
(e) Pricing and packaging of the different processed products
(f) The present market value of ham, bacon and smallgoods
(g) Brand awareness and brand preference by Palmerston North consumers to bacon and ham

The market survey of Palmerston North was carried out in the third week of April, 1974, and two subsequent surveys were carried out in November of 1974 and April of 1975 to examine any new trends in the market and to substantiate the findings of the first survey.

At the time of the initial survey, there were 37 butcheries, five major supermarkets, six smaller city supermarkets, 14 suburban supermarkets, 20 grocery stores and 63 dairies which sold some type of meat. Every retail outlet, except 10 of the grocery stores and 33 of the dairies, were visited during the course of the survey. All the major meat outlets were included because the first stages of the survey highlighted a considerable variation between similar retail outlets and if the results were to have any statistical significance it was essential that all the major outlets were to be visited. Because the dairies and groceries did not command a significantly large share of the market to warrant a visit to each one, the city was divided into four sectors and a proportionate number of these retail outlets was selected from each sector.

The manager of each shop was approached by myself and asked if he would be prepared to co-operate in the interview. Most managers accepted quite readily,

but some 20% had to be assured that their identity would remain anonymous. This was particularly true of the larger retail outlets. The managers were asked to provide sales information on total beef, sheep, pork, bacon, ham and smallgoods sales for the week prior to the interview. While some managers provided information with more historical content, i.e. several months prior to the survey, others were prepared to give only the previous week's sales data, their main objections being time and a certain reluctance to divulge too much information in case the information ended up in the wrong hands. The following analysis was based on the sales figures for the week of April 1974. The sales figures were based on the weight of each meat sold in each retail outlet.

2.3. IMPORTANCE OF RETAIL OUTLETS IN THE SALE OF MEAT IN NEW ZEALAND

The importance of the various outlets in the meat trade are constantly changing. An Australian survey for instance found that most people (93%) had a preference for purchasing their meat from butchers, while only 7% preferred self-service outlets. Specialist butcher shops were preferred for the following reasons - better quality meat, visual inspection was easier, better all-round service, and the consumers disliked frozen meat. The people who purchased their meat from self-service outlets stated that they did so mainly because the quality was better and also because the meat was cheaper than at most butcher shops. (45) Yandle in a survey in Christchurch in 1965 found that 68% of his respondents shopped at suburban butcher shops, a further 7% bought their meat from city butcher shops, and only 6% of the people bought their meat from self-service or supermarkets. (101)

The consumer survey in Palmerston North, described in Chapter 3, showed significant differences from Yandle's survey, as can be seen in Table 1.

Table 1: Customer Patronage of the Different Retail Outlets in the New Zealand Meat Trade

Type of shop	Christchurch 1965 (Yandle's results)	Palmerston North 1974 (Consumer survey)
	%	%
Suburban butcher	68	32
City butcher	7	15
Supermarket	6	15
Meat works retail shop	3	20
No regular shop	16	18
	100	100

If one can assume that the Palmerston North market is similar to the Christchurch market in 1965, then it is quite clear from the above that there has been a marked change in the importance of the different retail outlets. Supermarkets, city butchers and the meat works retail shops all seem to have gained at the expense of the suburban butchers. There have been significant social changes in the intervening ten years, with the most significant being the "working wife", which has probably meant that these women have either bought their meat at the city butchers during their lunch hours or they have bought their meat at the larger supermarkets which have late night shopping on Thursday evenings. The other significant change has been concerned with the apparent rise in price of meat during the last ten years. In this same period the meat works retail shops did have a pricing policy which gave them a certain advantage over butcher shops with the result that many housewives started buying their meat at these shops. The demise of the suburban butcher shops can be attributed to three factors; first the emergence of the working housewife, the second to the pricing policy of the meat works retail shops and thirdly the change in shopping hour policy by the supermarkets.

From the market survey of the retail shops in Palmerston North, the average volume of the meat types sold by the different retail outlets was determined. The volume of meat sold during one week in April 1974 by the 37 butcheries, the five major city supermarkets, the six smaller city supermarkets and 30 of

the 63 dairies was used to estimate the percentage of each type of meat sold through each type of retailer.

Table 2 clearly shows the importance of the different retail outlets in the sale of fresh meat. The butchery trade would appear to be still a very important retail outlet for meat, but more so for fresh meat than the processed meat. Bacon and ham have had traditional links with the dairies and corner grocery shops and for this reason one can assume that the consumers see bacon and ham as more grocery-type items than as meat-type items, hence the low sales of these two meats relative to other meats sold by the butchery trade. A number of butcheries were making their own bacon and selling it at some 20 cents/lb less than butcheries which purchased their bacon from the large bacon companies and for this reason were able to gain a larger market share of the bacon trade.

The other major outlets for meat are the supermarkets which appear to have a more even share of the sale of all the types of meat. The meat works retail shop seems to have a very similar image in the customer's mind to the ordinary butcher shop in that these shops, two in the case of the Palmerston North market, sold more in the way of fresh meat than processed meat products. The dairies are minor outlets for processed meats, only accounting for between 8 and 10% of all the bacon, ham and smallgoods sold in Palmerston North, and as there are some 63 dairies, the turnover per shop is extremely small. However, they do provide the companies with an outlet for their products during the weekend, a time according to many of the dairy proprietors that much of their bacon and particularly ham is sold. The dairy proprietors report that they have lost a large part of their trade in bacon, ham and smallgoods to the supermarkets and the figures in Table 2 when compared with the findings of Yandle would tend to substantiate this, provided the Palmerston North market was similar to the Christchurch market in 1965.

The super-butchery as mentioned in Table 2 represents an evolution in the butchery trade. In contrast to all the other butcheries, this particular butcher's shop has an attractive decor and most importantly sold a variety of bakery products. In addition to these factors, they include customer satisfaction in their services, and as a result they were able to gain a significant section of the meat business in Palmerston North.

Table 2: Weight of meat sold through each retail outlet

Retail Outlet	Beef		Sheep Meats		Pork		Smallgoods		Bacon		Ham	
	lbs/wk	%	lbs/wk	%	lbs/wk	%	lbs/wk	%	lbs/wk	%	lbs/wk	%
Butcheries	40 330	45.2	24 230	44.8	5 880	50.0	5 640	33.6	810	31.7	740	23.6
Super Butchery	6 530	7.3	1 320	2.5	600	5.2	840	5.0	450	5.1	50	1.6
Major Supermarkets	26 910	20.2	18 580	34.4	3 050	26.6	3 725	22.2	2 380	27.1	775	24.8
Works Retail Shops	14 100	15.8	9 230	17.0	1 760	17.0	2 350	14.0	600	6.8	180	5.8
Minor Supermarkets (City)	1 400	1.6	700	1.3	140	1.2	800	4.8	970	11.1	800	25.6
Minor Supermarkets (Suburbs)	-	-	-	-	-	-	1 745	10.4	870	10.1	330	10.6
Dairies	-	-	-	-	-	-	1 680	10.0	690	8.1	250	8.0
Total	89 200	100.0	54 065	100.0	11 430	100.0	16 780	100.0	8 780	100.0	3 125	100.0

Table 3 shows that city butcher shops generally had a higher weight throughput of most meats. Beef sales by the city butcher shops were almost 100% higher than those of the suburban butcheries. The suburban butcheries seemingly sold more sheep meat and smallgoods than their city counterparts. The different meat sales patterns of the city and suburban butcheries may have been due to the customers who patronised them. City butcher shops tend to be patronised by working housewives and unmarrieds, while suburban butcheries tend to be visited by the elderly and also non-working housewives. The sales of the super-butchery were not included in Table 3 as its sales were three times greater than any other butchery in Palmerston North.

Table 3: Relative importance of the city and suburban butcher shops

	Average turnover/week lb/week		Percentage of total meat sold through butcheries	
	City butcher	Suburban butcher	City butcher	Suburban butcher
Beef	1 570	890	39	61
Sheep meat	627	671	26	74
Pork	167	150	29	71
Smallgoods	462	539	24	76
Bacon	60	30	42	58
Ham	20	13	27	73

Though the city butcheries tended to sell more meat per establishment than suburban butcheries, the latter commanded the largest share of the butchery trade by virtue of their numbers.

2.4. MANUFACTURERS SUPPLYING THE PALMERSTON NORTH MARKET WITH MEAT

The supply of meat to the Palmerston North market varies according to the type of meat under consideration. Beef and mutton for instance are supplied

by two companies: The Manawatu Meat Company based in Feilding, Meat Packers (N.Z.) Limited which is based in Wanganui, and also by the local abattoir. The Manawatu Meat Company supplies approximately 30% of all the beef and sheep sold in Palmerston North; Meat Packers (N.Z.) Limited supply a further 20% and the local abattoir supplies some 25%. 20% of the meat consumed in Palmerston North is brought into the city by consumers who purchased meat from the two freezing works, one of which is situated at Longburn, the Co-operative Wholesale Society Limited and the other at Feilding, namely Thomas Borthwick & Sons (A'Asia) Limited. There are indications that a further 2-3% comes from home-killed farm animals. (101)

Pork for the fresh pork trade is killed at the Longburn branch of the Kiwi Bacon Company Limited. The companies supplying fresh pork either buy their pork or have their own animals killed at the factory.

New Zealand produced processed products are supplied by 15 companies, four of whom specialise in continental smallgoods. The following: Brook's Smallgoods Limited, J. C. Hutton (N.Z.) Limited, Feilding Bacon Company, Gould Bros. Limited, Kiwi Bacon Company Limited, Peach Products Limited, Tiki Bacon Company and the Wanganui Mild Bacon Company all supply the Palmerston North market with a range of bacon and ham products. Peach Products Limited sell their bacon and ham under two brand names, "Peach" and "Vienna", while Feilding Bacon Company sells its bacon and ham under two brand names, "Kowhai" and "Rata". All the above companies supply the Palmerston North market with fresh pork and beef sausages, plus saveloys and saveloy-type products, and also a range of luncheon-type sausage products. Meat Packers (N.Z.) Limited also supply the market with the same range of sausage-type products. J. Wattie Canneries have just entered the market with frozen "easy peel" pork sausages and there is every indication that they will expand their range of sausage-type products (see table 4).

Table 4: Manufacturers supplying processed products

Company	Brands
Bell's Continental Smallgoods	Bells
Alliance Freezing Company Southland Limited	AB, Bejam
Brooks Smallgoods Limited	Brooks
J. C. Hutton (N.Z.) Limited	Huttons
Feilding Bacon Company	Kowhai, Rata
Gould Bros. Limited	Goulds
Kiwi Bacon Company Limited	Kam, Kiwi
Peach Products Limited (Subsidiary of R. & W. Hellaby Limited)	Peach, Vienna
Prepared Foods Limited (Subsidiary of Salmon & Spraggon Limited)	Prepared Foods
Meat Packers (N.Z.) Limited (Subsidiary of New Zealand Refrigerating Company)	Tenderkist
"Metzlers" Continental Sausages Limited	Metzlers
Tiki Bacon Company (Subsidiary of Thomas Borthwick & Sons (A'Asia) Limited)	Tiki
The Wanganui Mild Bacon Company Limited	Monarch
J. Wattie Canneries Limited	Watties, Oak
Unilever New Zealand Limited	Birdseye, Vesta

Peach Products Limited are the biggest suppliers of continental smallgoods to the Palmerston North market, followed by "Metzlers" Continental Sausages Limited, Bell's Continental Smallgoods and Brooks Smallgoods Limited. Peach Products Limited sell their continental smallgoods under their Vienna brand name. "Metzlers" Continental Sausages Limited and Bell's Continental Smallgoods Limited only sell continental smallgoods in Palmerston North.

J. Wattie Canneries Limited, Unilever New Zealand Limited and Alliance Freezing Company Southland Limited supply the local market with a range of frozen processed meals such as 'Sliced Beef in Gravy', a boil in the bag product, Rissoles, Steakettes and Hamburgers. Peach Products Limited supplies the Palmerston North market with frozen Hamburgers. Unilever New Zealand Limited

also supply the market with their "Vesta" range of ready-to-prepare dried foods. J. Wattie Canneries Limited and Prepared Foods Limited supply the market with a range of canned processed meals such as Beef Stew. J. Wattie Canneries also supply the market with a range of canned comminuted products such as Beans and Sausages and their latest canned sausage product is Frankfurters.

There were indications that a Christchurch based continental smallgoods company, A. Verkverk Limited, would attempt to get into the Palmerston North market with its bacon, ham, smallgoods and continental smallgoods. The prices of their products were up to 20 cents/kilo cheaper than the other manufacturers supplying similar products.

From the limited number of brands which were available in a number of the larger retail outlets it would appear that the supplying companies had contractual agreements with these outlets. The competition by companies for these contracts appeared to be quite fierce, judging by the contract turn-over rate. One can only assume that pricing formed a major part of the contracts, with the contracts going to the lowest bidder. Too much price cutting by the various companies can only lead to loss of profit by individual companies and possibly harm the whole industry in the long term.

The companies supplying the Palmerston North market with processed meat products appeared to have different channel policies. The two local companies who commanded a significant share of the market tended to supply the larger retail outlets, such as supermarkets and grocery chains and a limited number of the grocery and dairy outlets. The other local company tended to sell its products through the smaller retail outlets such as dairies and groceries and one or two of the larger retail outlets. The companies based at a distance from Palmerston North also had varying market channel policies. The two largest smallgoods and bacon factories in New Zealand, like the two larger local firms, tended to concentrate on the larger retail outlets and to a lesser extent on the smaller outlets, while the smaller firms tended to supply the dairies, groceries and a limited number of the larger retail outlets. The smaller firms appeared to be forced to follow a more vigorous sales policy in that they attempted to sell their products in as many outlets as was possible.

A number of retail outlets are selling processed products under their own outlet brand, and one or two specialist food outlets are selling own branded products with accompanying manufacturer's brand name as well. The major supermarkets tend to give more shelf facing to their own brand than manufacturer's products. The trend toward increasing dependence on a few outlets for the sale of a company's products, plus the trend toward more private branding by the retail outlets could lead to problems for any firm attempting to establish a brand image for their products. Companies should retain a flexible channel policy which enables them to take advantage of the evolving retail side of the business.

The international fuel situation may have some serious repercussions on the number of firms supplying Palmerston North with meat and in particular processed meat products. The manufacturers are situated throughout the North Island with Peach Products Limited and "Metzlers" Continental Sausages Limited in Auckland, J. C. Hutton (N.Z.) Limited in Hamilton, Bell's Continental Smallgoods, Brooks Smallgoods Limited and Gould Bros. Limited in Wellington, Meat Packers (N.Z.) Limited and Wanganui Mild Cure Bacon Company in Wanganui, Tiki Bacon Company Limited, the Feilding Bacon Company and the Manawatu Meat Company in Feilding, and finally the Kiwi Bacon Company Limited at Longburn. As fuel prices become increasingly important in the pricing of products, the local producers will inevitably obtain a competitive edge over the companies with processing facilities at a distance from the Palmerston North market, and the same is true for all other cities throughout New Zealand.

2.5. PROCESSED PRODUCTS AVAILABLE IN PALMERSTON NORTH

Owing to the large number of fresh meat products available on the local market it was decided that the emphasis in this section should be only on the processed products available in Palmerston North, and even this number was formidable. They ranged from bulk bacon and ham aimed at the supermarket and butchery trade, to products which were immediately available for purchase by the consumer. The most striking aspect of Table 5 is the large number of processed meat products which are available on the local market.

Table 5: Processed products available in Palmerston North

BULK MEAT

Bacon
Sides
Boneless sides
Flat middles
Boneless middles
Rolled middles
Flat shoulders
Rolled shoulders
Bacon pieces
Boiling bacon

Ham
Cooked flat
Raw rolled boneless
Cooked pressed (skin on)
Cooked pressed halves
Cooked rolled boneless (skin on)
Bostons
Sandwich hams
Picnic hams

SLICED MEAT

Roast pork
Cooked corned silverside
Salami
Liverwurst
Mettwurst
Sliced bacon
- Middle ½ lb pouches
- Shoulder ½ lb pouches
- Middle 5 lb pouches
- Shoulder 5 lb pouches
- Brunch ½ lb pouches
- Brunch 5 lb pouches
- Danish style ½ lb pouches
- Loose Danish, mild cured for sale by supermarkets

Sliced ham
- Cooked pressed ham (bulk)
- C.P. ham 7 oz pouches
- C.P. ham 4 oz pouches
- Picnic 4 oz pouches
- Picnic 7 oz pouches
- Loose ham for sale by supermarkets

Meat loaf of a number of varieties
Pressed tongue
Pressed ox tongue
Brawn

SAUSAGES

Pork linked, loose
Pork 1 lb pouches
Pork linked 5 lb pouches
Pork 'Economic Eights' 1 lb pouches
Bacon linked, loose
Bacon 1 lb pouches
Beef linked, loose
Beef linked 5 lb pouches
Beef 1 lb pouches
Precooked linked loose
Barbeque skinless 1 lb pouches
Barbeque skinless 5 lb pouches
Saveloys linked loose
Saveloys 1 lb pouches
Saveloys 5 lb pouches
Cocktail sausages linked loose
Cocktail sausages 8 oz pouches
Chipolatas linked loose
Chipolatas linked 1 lb pouches

Luncheon type sausages
Luncheon ½, 1 and 6 lb chubs
Ham and chicken ½, 1 and 6 lb chubs
Ham ½, 1 and 6 lb chubs
Vegetable and luncheon ½ and 1 lb chubs

Other sausage type products
Frankfurters ½, 1 and 5 lb pouches
Canned frankfurters 1 lb cans
Black puddings, Large rounds and 1 lb rounds
Brawn chubs ½ lb

Meat pastes
Liver pate
Liver and bacon
Ham and chicken
Venison pate

CONTINENTAL SMALLGOODS

Belgrade salami*
Dutch salami*
Hungerian salami*
Italian salami*
Summer salami*
Verona salami*
Veronese salami*
Vienna salami*
Vienna snydwurst*
Triestes salami*
Cooked salami*
Garlic sausage
Strong garlic sausage
Jagtworst
Kookworst
Liverworst
Paprika speck
Polish garlic sausage
Rookworst
Onion sausage

COMMINUTED FROZEN PRODUCTS

Hamburgers
Rissoles 8, 12, 13½ and 16 oz packs
Steakettes

DICED FROZEN PRODUCTS

Lamb curry
Madras curry
Sweet and sour lamb 8 and 12 oz packs
Steak and kidney

* These are all sold to the retailers in the long sausage form, and the retailer then slices them to customer specification

In the past a number of the bacon products, such as sides, boneless sides, rolled middle, flat middle and flat shoulders were traditionally sold to butcher shops, groceries and dairies. The proprietors of the respective outlets would then slice the products to the customers' specifications. The supermarkets, grocery chains and butcher shops are the main outlets for these products now. The first two mentioned outlets slice and package the products under their own brand name.

A general criticism of many of the processed products available on the Palmerston North meat market is the lack of product differentiation on any consumer-identifiable product attributes such as colour, flavour, texture, aroma, mouth feel, etc. As an example a small taste panel was given samples of 'mild cured', 'sugar cured' and 'Danish style' bacons and asked whether they could detect any differences in flavour between the samples; the results indicated no significant differences in flavour between the samples. A similar criticism would appear to hold for many of the ham and sausage products currently produced by the bacon industry.

A number of the companies supplying the local market introduced new products at regular intervals, but no company appeared to have a policy of taking any of its products off the market. The companies could develop a more active product development scheme where new products were brought on to the market to replace products which had reached a static growth phase. This product policy has been particularly successful in the ice-cream, fashion and even bread industries and there is no reason why it could not be applied to the processed meat industry.

2.6. BRAND PREFERENCE AND BRAND AWARENESS

In the course of the consumer survey, housewives were asked first to list any brands of bacon and ham which could be bought on the Palmerston North market, and secondly which brand they preferred. The only brands which could be recalled were Tiki, Peach, Huttons and Kiwi. Only 8% of the housewives were able to recall any bacon brands and only 5% could recall any of the ham

brands. Brand preference for either bacon or ham was not strong with only 3% of the sample stating any brand preference for any bacon or ham product.

This is not to say that brand preference does not operate at the retail outlet as market share figures for the different companies supplying the Palmerston North market suggest otherwise. Housewives stated that they looked for a product with very little fat and good meat colour and pack appearance, which seems to suggest that the relative market shares of the different companies could be due to product and product presentation differences which were readily identifiable by the housewives. However, no conclusions can be made as to whether it was brand commitment or product quality and appearance which was responsible for the different company market shares, as no research was undertaken to ascertain which of the mechanisms operated in the market place. The respective market shares of the companies appeared in part to be due to the method of selling adopted by the different companies.

2.7. PRICING AND PACKAGING

The prices for the various processed products varied depending on the type of retail outlet and even between similar retail outlets. At the time of the survey, for instance, one supermarket had just been opened and its strategy for attracting customers was to offer cheap meats, and their products were up to 10% lower, for certain processed meats, than some of the other supermarkets in Palmerston North. In general, dairies tended to be the most expensive outlets for processed products, followed by groceries and manufacturers' branded goods in supermarkets, then private branded goods in supermarkets and finally a few of the butcheries who were selling ham and bacon up to 20 cents cheaper than the supermarkets. These butcheries were able to offer these cheaply priced products because they were manufacturing their own products and not purchasing them from the companies. The price of J. Wattie Canneries and Unilever products tended to be more uniform throughout the different retail outlets, whereas some of the other processed meat manufacturers appeared to have differential pricing policies, except when the two companies were specialing.

Processed product prices were noted at the same time as information was being gathered on the throughputs of the different retail outlets. All

the supermarkets and city butcheries were visited in the course of the survey, and approximately half the suburban butcheries and half the dairies and groceries were visited also. Pricing was one way of attracting customers and this was particularly effective for the recently opened supermarket mentioned above. Prices varied so much that it was felt only a resume of the data could be presented without actually naming retail outlets and their prices, a policy which would not be justified.

All the companies pack their bacon and ham which is for direct sale to the customer in evacuated plastic laminated packages. However many housewives are distrustful of such packaging because of their experiences with deceitfully packaged ham and bacon. It would appear that all the companies have inadequate control of their bacon and ham packaging because practically all the housewives contacted in the course of the survey reported buying ham and bacon vacuum packs which had a good slice of meat on the top and either overfat or small pieces underneath. Another reason for the dislike by housewives of vacuum packed bacon or ham was the difficulty they experienced in separating the slices which inevitably crumpled into small pieces. It would appear that there is need for the industry to provide more rigorous standards in their packaging rooms and it would also appear that research is required to either develop a more acceptable package to overcome the problem of sticking or that efforts be made to find some harmless substance which could be used to prevent the slices from sticking to one another.

It would also appear that in the bacon industry there needs to be some rationalisation of the package sizes it offers its products in. Vacuum packed bacon is only offered in ½ lb and 5 lb packs at present, and from some of the comments by the supermarket managers there is a need for a smaller sized pack such as ¼ lb for bacon as many consumers think that they are being too extravagant if they buy ½ lb of bacon, whereas they might be prepared to buy ¼ lb.

In the case of sausage products, particularly pork sausages, it would appear that the industry could benefit by reducing the number of different sized sausages which it produces, and instead vary the weight of the packs. In this way they could cater for the large singles market, the increasing number of two person households and also the bulk purchasing trend with the larger

packs.

Luncheon type sausages are generally regarded by the consumers to be sandwich meats with high appeal to children. Bread for sandwich purposes is sold in square and loaf shapes while luncheon products are sold in 2 and 4 inch casings, i.e. a round product. It would appear that the industry is not tailoring its products for the ultimate use. As the product is liked mainly by children, there could be a market for a novelty product aimed at this young market, i.e. moulded luncheon sausages in the shapes of cartoon characters and the like.

It would appear that there are possibilities of providing readily identifiable shapes for a number of the processed products so that the consumers could identify products with shape as well as name, etc.

2.8. MEAT CONSUMPTION DATA - A COMPARISON BETWEEN SURVEY RESULTS AND OFFICIAL NEW ZEALAND CONSUMPTION STATISTICS

The survey results and the official statistics for meat consumption quite clearly differ. With the exception of smallgoods consumption, all the other per capita per annum meat consumption figures are markedly smaller for the survey than those reported in the 1974 New Zealand official yearbook. The survey results tend to ascribe the average New Zealander with a similar meat intake to his cousin across the Tasman which was 171.8 lb/capita.annum in 1970 (see table 7).

Meat consumption by the catering trade was not included in the survey because of problems associated with gathering the data from the catering institutions in Palmerston North. In the United States (10) the catering trade accounts for 20% of all food sold and a reasonable assumption would be to say that the catering trade accounted for a very similar figure in this country. But even if 20% is added to the market survey results there is still a marked difference between the national statistics and the results of the market survey.

Table 6: Comparison of meat consumption (bone-in weight)

Meat	1970*	April 1974**
	lb/capita/annum	lb/capita/annum
Beef	96.4	81.6
Sheep meat	89.4	49.4
Pork	13.1	10.4
Smallgoods	13.0	15.4
Bacon	10.3	7.8
Ham	5.5	3.1
Total	247.7	167.7

* New Zealand official yearbook 1974

** Palmerston North survey consumption data 1974

At present the New Zealand statistics on meat consumption are determined by taking total production plus any imports and then subtracting all meat exports and the difference is the domestic meat consumption. There appears to be a number of places where error can creep into this method of the domestic meat consumption. The first concerns the problem of accurate data i.e. the statistics department relies on the companies supplying accurate information. The second reason concerns the special problems associated with primary products, where large stocks of meat may have to be stored for considerable lengths of time until the world meat market is in a bouyant condition. It is possible that some of these stocks may be included in the domestic meat consumption. The third source of error is that of meat consumption by pets. In the United States of America it has been shown that if 50% of the meat which is currently consumed by pets were supplied to the third world it would go a long way to alleviate their chronic protein shortage. (20) There are no estimates of meat consumption by pets and so consumption by pets is included in the meat consumption of homo-sapiens.

For the reasons outlined above it would appear that it is time a more satisfactory method for gathering consumption data was used in New Zealand. One

possibility is an adaption of the extensive consumer survey system used in the United Kingdom.

To summarise, the Palmerston North market is a responsive market, and most of the processed meat products which are currently available on the Palmerston North market are also available throughout most of the North Island. One is able to study the marketing policies of the companies supplying the Palmerston North market with meat products and also the retailers within the market.

The market survey produced consumption data which was not in agreement with the official statistics and for this reason a further consumer was required to determine consumption data for the different meats before the exact product area for further research could be determined. The consumer survey was also necessary in order to explain some of the factors which were outstanding in the market survey.

2.9. CONCLUSIONS

1. An analysis of the per capita consumption of the different meats in New Zealand showed that bacon and ham consumption had undergone the greatest decline in the period 1954-1970. A subsequent market survey of Palmerston North showed that the trend had continued over the period 1970-1974.
2. The above analysis and a recourse to the product life concept suggest that additional product research ought to be carried out in the cured pork product field, an area which has largely been the preserve of the bacon industry and to a lesser extent the butchery trade.
3. An analysis of the retail value of bacon and ham indicates that any new products which are developed must be capable of generating at least as much revenue for the industry as bacon and ham have done if the industry is to remain viable.
4. The new products must also generate a comparable product volume as ham and bacon if existing facilities are to be kept operational.
5. An analysis of the market share controlled by the different retail outlets suggests that supermarkets are increasing their share of the market and that the industry ought to concentrate much of its marketing efforts

in this field. However, the butchery trade still controls the major share of this market and must also be serviced adequately.

6. If the present trend toward shopping at one-stop stores continues, and if the mobility of New Zealanders is not curtailed too drastically in the future, then the importance of the dairies and even some of the grocery stores is likely to decrease, unless of course larger dairies are constructed which could offer the consumer some of the benefits associated with the large supermarkets, etc.

7. The success of the super-butchery in commanding three times the turnover of any other butcher shop in Palmerston North suggests that there is a place for this type of improved butchery establishment. The butchery trade would appear to have reached the same stage of development as the grocery stores in the 1920's and must evolve in the same way as the grocery business if it is to remain viable. (54) It would appear that there is a place in Palmerston North for a new super-butchery which is large and spacious and which offers a whole range of select-your-own pre-packaged meat. It is also envisaged that there should be some contact with the customers as in present butcher shops. Four or five of these establishments judiciously placed in Palmerston North could see them take a significant share of the meat trade from the existing butchery trade and also the supermarkets.

8. The bacon industry ought to apply more stringent quality control standards in their packaging rooms to prevent any dishonest packaging. This is particularly true of bacon and ham.

9. It would appear that additional research is required to find either a more acceptable package than the present vacuum package, or some harmless compound which could be used to prevent adhesion between slices of bacon and also ham.

10. It would appear that consumers are searching for real product variants. This is particularly true of bacon and ham if sales figures of mild cured bacon, sugar cured bacon, Danish bacon, picnic ham and Boston ham are any indication. As in the cheese industry, it seems as though the bacon industry ought to make bacon and ham products which have real and identifiable flavour differences.

11. The bacon industry needs a more realistic and rational policy to new products and also existing products. At the present moment, the industry

is producing too many products. They might remove those products from the market which are not successful in terms of sales and profit return and replace them with a smaller number of products which the consumer clearly wants. They should then manage their product development so that as products enter the static stage in their growth cycle they are replaced by new ones which market and product research has shown to be wanted by the consumers.

12. The bacon industry could rationalise the number of package sizes in which it sells its products. This is particularly true of the fresh pork sausage trade. Packaging policy ought to be modified in the light of changes in the structure of the society in which it sells its products and also in the light of emerging purchasing trends. At present there is a tendency toward smaller and smaller families and also the proportion of single people living alone is increasing. (75) There is also a trend in Palmerston North toward bulk purchasing and the industry ought to take advantage of these trends.

13. The industry could investigate the possibility of marketing a number of its products in clearly identifiable shapes as the cheese industry has started to do, the shape being such as to comply with the consumer requirements for that product as in the case of sliced ham and luncheon sausage which are used mainly in sandwiches. At present, ham and luncheon sausage do not comply with the new bread shapes.

CHAPTER 3

CONSUMER SURVEY OF PALMERSTON NORTH MEAT CONSUMPTION

A consumer survey was carried out to determine meat consumption in Palmerston North.

The specific aim of the survey was to provide statistical information on the pattern of expenditure on meat by households in the Palmerston North area, in particular -

(a) the quantity of different meats purchased by households, the type and cuts of meat purchased
(b) expediture on meat
(c) retail outlets and their relative positions in the sale of meat
(d) brand loyalty in regard to bacon and ham

3.1. SURVEY PROCEDURES

The survey, originally designed to cover a sample of households drawn from the Palmerston North area, was subsequently revised to cover only people living in Palmerston North city for two reasons. Goreux (29) has shown that consumption of food products by urban dwellers is different to that by the rural population which often kills its own stock and consequently does not go through the normal meat retail channels.

A "recall" method of interviewing was selected, that is, housewives were asked to give details of their most recent purchase of meat. In the case of some housewives, it was the previous week's purchase; with others, the previous fortnight and still others their last bulk meat purchase. The 'diary' technique could have been used to obtain the necessary information, but as the technique is so expensive in terms of time and money, it was not used in this particular survey. The Australians (44) found no significant difference between the recall and diary methods in their surveys.

The whole survey rests on the validity of the assumption that people are able to accurately recall the previous week's consumption and in the case of the people who bought in bulk their purchases months earlier. The Australians (45), Americans (71) and Yandle (101) all found that respondents did recall data with reasonable accuracy. The Australians measured the ability of respondents to recall data by measuring the spontaneity of their responses. They reported that 55% of respondents appeared to know without doubt the weight of their meat purchases and 29% of the rest with a certain amount of hesitation.

Three interviewing techniques could have been used, namely mail questionnaires, personal interviews, and telephone contacts. (32) Mail questionnaires were not used as time was at a premium and because this technique tends to have a very low respondent response ratio. Personal interviews were not used because of the expense involved. The telephone interviewing technique was used for this survey because it was possible to reach a larger number of respondents per dollar, than the personal interviewing technique, and also because the non-response numbers can be significantly less than the mail questionnaire.

3.2. SELECTION OF HOUSEHOLDS FOR THE SAMPLE

In selecting the private households to be included in the survey, the following procedure was adopted -

(a) The 1973/74 telephone book for Manawatu was used as address source for respondents to the questionnaire.

(b) The telephone number and address of every one hundreth name in the Palmerston North area was recorded for use in the survey. If a business address happened to coincide with the one hundreth address then the next private household address after the business address was included in the list of private dwellings. By selecting every one hundreth it was possible to collect a surplus of addresses which could be used if there had been a large proportion of non-responses.

(c) If those on the respondent list had moved since the compilation of the telephone book and if the house was occupied by somebody else, then they

were asked to co-operate in the survey.

(d) For the purposes of this survey, flats were considered to be private dwellings.

(e) Boarding houses and hotels were considered to be businesses for the purposes of this survey.

(f) A total of 300 names were selected from the telephone book and then 150 names were randomly selected from these for the interview list. If any respondents refused to answer, then another name was randomly selected from the remaining 150 names.

All interviewing was done by myself with the exception of ten respondents who were contacted by an assistant. But because the respondents were hostile to her during the interviews, she was asked to stop and the questionnaires were not used in the subsequent analysis.

Each person on the interview list was telephoned some time between the hours of 6 p.m. and 9.30 p.m. and if they agreed to co-operate in the survey then they were interviewed immediately. If, on the other hand, they refused to co-operate in the survey then the next address on the list was contacted and so on. Whenever a person was not at home, then the address was contacted the following evening and if they were not at home that evening then they were contacted one week later, and if they were not at home on the third telephone call then another name was selected from the address list.

The respondents were asked to give the weight of their previous meat purchases in lbs. The questionnaire form is given in Appendix 5.

In calculating the sample size use was made of the fact that if a sample is selected by random sampling methods, then the reliability of the sample means can be measured in advance. (32) The assumption is that the individual results are distributed about their arithmetic mean in a normal distribution and that the sample means also tend to be distributed in a normal distribution (Central Limit Theorem).

If an estimate of the total error which can be tolerated from in the survey can be found plus some estimate of the standard deviation, then it is possible

to estimate the standard error from the following relationship -

Z_c x the standard error of the means = total error

and the sample size for the survey can be estimated from the following equation -

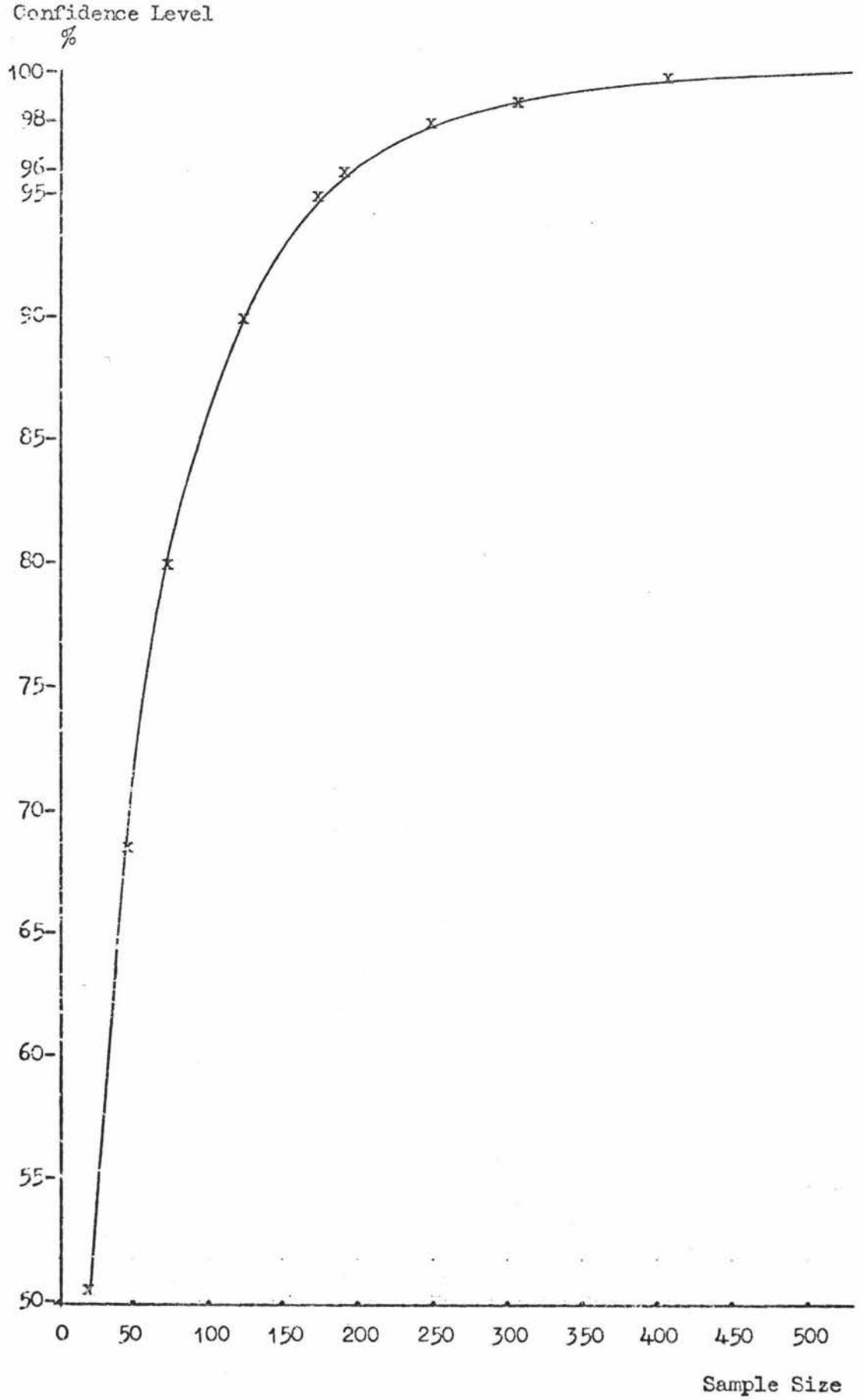
$$n = \frac{(\text{standard deviation})^2}{(\text{standard error})^2}$$

Z_c is related to the confidence level, i.e. for a 95% confidence level $Z_c = 1.96$, and for a 99% confidence level $Z_c = 2.58$. The larger the confidence level, the greater the chance there is of getting the true population between the limits. The effect of the confidence level on the sample size is shown in Fig. 5. The sample size was limited to 150, i.e. a 90% confidence level, as the sample size tended to rise exponentially as the confidence level approached 100%, a cost which was beyond the resources of the present project. In going from a confidence level of 95% to 99% meant almost doubling the sample size.

3.3. DATA RELIABILITY

Respondents were selected for the survey from the Palmerston North telephone book. This could have caused a bias in the data as this technique confines the survey to those respondents who own telephone books, but 14 502 of the 16 427 households in Palmerston North own a telephone (73) i.e. 88% of the households. Only a very small number of households were missed by this method. The sections of the Palmerston North population which would be missed by the survey are the very low income group, and possibly the pensioners; however, as the latter receive special consideration for telephone rentals the proportion of this group without the telephones is thought to be very small. Moreover, the number of unemployed at the time of the survey was exceedingly small, approximately 1 000 out of work throughout New Zealand, and only 60 people out of work in Palmerston North. The other group likely to be missed in the survey was the student group, but it was decided that no special effort would be made to contact this group until the sample had been analysed.

Fig. 5 Effect of the Confidence Level on the Sample Size.



As it was, almost 5% of the survey sample was made up of this group, a figure that was almost 3% higher than the national average. Other sources of error were data distortion, suggestion bias, non-response error and interview error. (98, 45, 34, 32, 71)

It was felt that there was a certain amount of data distortion on two of the following socio-economic questions - age of the housewife, and income of the household head. Suggestion bias was minimal in this survey because the respondents were not given any warning about the survey and were asked to answer immediately. There was a certain amount of interview error in the survey. Firstly because of the interest of the interviewer in the survey results, and secondly because the respondents were quite often hostile for the first few minutes of the survey. It would appear that Palmerston North is over-surveyed, if the comments of the respondents is any guide.

A number of South East Asians were contacted in the course of the survey and as they only ate pork, this has meant that the survey results for pork were higher than they should have been.

3.4. SAMPLE APPRAISAL

One hundred and fifty people were required for the survey, and to contact this number of positive responses some 220 people had to be contacted. Twenty households could not be contacted, representing 29% of the non-response error. The other 81% of the non-responses was due to people who refused to co-operate in the survey (see table 7).

Yandle, using a mail questionnaire obtained a 32.2% response rate (101), while the Australians (44, 45) using personal interview techniques had a 73% response rate. Results from this survey compare more than favourably with Yandle's return rate, but are not quite as good as the Australian results.

Table 7: Derivation of final sample

Description	Number of Households	Percentage
Original list including reserves	300	
Unused reserves	80	
Addressed used including reserves	220	
Not contacted, including refusals	70	32
Completed questionnaires	150	68

3.4.1. Comparison of Survey Sample Characteristics with the 1971 Census.
The easiest way of appraising the sample is to compare it with the 1971 Census, i.e. compare the characteristics of the sample with those of the New Zealand population, with the assumption that the characteristics of the New Zealand population have remained constant in the intervening three years (table 8).

The survey sample characteristics and the 1971 Census data agreed on the following variables - age of housewife, and household occupants. The occupational status of the households differed considerably from the national statistics as evidenced by the 1971 Census because Palmerston North has a high proportion of students, professional and technical people by virtue of the fact that there is a University in the city. The number of children statistics obviously differ because a different basis was used to select the children household characteristics for the survey compared with those in the 1971 Census.

The latest income information was the 1973-74 tax returns. Quite clearly the sample does not conform with the national distribution of incomes. A high proportion of people on higher incomes was contacted in the course of the survey which is probably a reflection of the Palmerston North population

Table 8: Comparison of survey sample with 1971 census data

Characteristics	Survey	1971 Census
	%	%
Persons		
By occupational status:		
Self-employed	5.6	6.0
Professional and technical	14.1	9.0
Clerical and sales	18.3	22.3
Skilled workmen	12.7	19.8
Manual workmen	12.0	29.8
Students	4.9	2.5
Pensioners and people on benefits	12.1	10.6
No reply	11.3	
By number of occupants per household:		
One person	14.1	14.1
Two people	28.2	26.4
Three people	15.5	16.5
Four people	24.6	17.7
Five people	11.3	12.5
Six people and over	6.3	12.7
	Under 13	Under 15 for Census
By number of children under 13:		
None	67.6	49.0
One child	9.2	13.8
Two children	13.4	15.5
Three children	7.0	10.7
Four children and over	2.8	11.0

Table 8, continued

Characteristics	Survey	1971 Census
By age of housewife:		
Under 20 years of age	2.7	2.8
21-30	19.7	23.9
31-50	38.6	40.1
51-60	16.4	14.1
Over 60	22.6	19.0
		1973-74 tax returns
By income of head of household:		
Under $5 000	38.7	61.8
$5 001 - $7 000	26.8	21.3
$7 001 - $9 000	12.0	8.8
Over $9 000	12.7	8.1
No answer	9.9	

itself, as the city has a higher proportion of professional and technical members compared with many other cities because of the University, Teachers Training College, and associated scientific institutions. For the same reason, occupational characteristics of the sample differed from the national average in the 1971 Census.

The number of people per dwelling bears a close relationship to the Census data though the proportion of two and four person households was larger than the Census data, while the number of six and over person dwellings was a good deal smaller. The average size of the student flats was four persons per dwelling and this may in part explain the higher proportion of four person dwellings which were contacted in the survey compared with the national average.

The number of children characteristic differs from the 1971 Census data mainly because the Census breaks this statistic down into those under fifteen and those over fifteen, while in the present survey it was considered that

children under thirteen would not eat as much meat as an adult, but that those over thirteen would. The largest deviation from the national data is the high proportion of households in the survey which did not have any children at all; this is in part due to the high proportion of pensioners who were contacted in the survey. Moreover, the proportion of women in the 31-50 age bracket who were contacted in the course of the survey was slightly less than the national average, and it is this age bracket which has four children and over sized families. If the sample is corrected for the high proportion of pensioners, then it bears a much closer resemblance to the Census data.

The present survey investigated meat consumption in Palmerston North and the effects of various socio-economic factors on meat consumption. Yandle (101) is the only person to have done any work in this field in the last ten years, and his investigations only included a minimal number of socio-economic variables.

3.5. RED MEAT CONSUMPTION

The market survey of Palmerston North clearly showed a discrepancy between meat consumption as reported in the national statistics (75) and the results of the survey. The difference between the results was so great that it was decided that a further survey was needed before any definite product plans could be formulated. The results of this survey plus those of the market survey are shown in table 9; once again the results of this second survey differ from the national figures.

The bone-in figures for the consumer survey were calculated by assuming that bones accounted for 30% of the total carcass weight (58). Bone-in figures for bacon and ham were also calculated because it appears that the bacon industry still reports their production in bone-in weights.

Table 9: Comparison of meat consumption by sample with monthly consumption as reported in the New Zealand Official Yearbook (1974)

Meat	Red Meat Consumption/capita/month (Grams)			
	Survey Sample (bone-out)	Survey Sample (bone-in)	Yearbook (bone-in)	Market Survey (bone-in)
Beef	2 192	2 849	3 897	3 087
Sheep meat	1 221	1 587	3 367	1 869
Pork	595	773	568	394
Bacon and ham	321	417	605	412
Smallgoods	704	704	454	583
Total Meat	5 033	6 330	8 891	6 345
Total Meat lbs/annum	133	167	235	168

It must be stressed at this point that the consumer and market surveys were carried out quite independently of one another, and that there was a four month interval between them. The market survey was carried out in April and the consumer survey in late August of 1974.

An examination of table 10 shows that the market and consumer surveys were in very good agreement with one another. Pork was the only meat that was different between the two surveys, but this was probably due to the fact that 12 households, 6% of the survey sample, purchased substantial quantities of pork which raised the average per capita consumption figure for the whole consumer survey. There was very good agreement on beef and mutton consumption, and least agreement on smallgoods and pork consumption.

The findings of the two surveys were markedly different from the consumption/capita/annum figures which can be found in the 1974 New Zealand Official Yearbook. The estimate of beef consumption in the two surveys was within ± 20% of that by the national statistics, but estimates of the consumption of the other meats was markedly different. The survey estimate for sheep

meat/capita/annum consumption was ½ that of the national statistics, while the estimate for bacon plus ham was ¾ that by the national statistics. Smallgoods, on the other hand, were between 1¼ and 1½ times greater than the national estimate.

According to the consumer survey, the bone-in bacon consumption figures was some 8.6 lb/capita/annum compared with 10.3 in the national consumption figures (1971), a drop of some 17%. Ham consumption was down to 2.5 lb/capita according to the consumer survey - a drop of 55% on 1971 consumption figures. It must be noted that the survey was carried out at a time when ham sales are traditionally low compared with summer consumption figures, and this probably explains the very large percentage drop between the 1971 and survey consumption figures. The market survey carried out in April showed consumption to be 3.1 lb/capita/annum, which was still 45% less than the 1971 figures. Once again April is not noted for very high ham sales, but the sales are considerably higher than they are in August. Both surveys show a decline in consumption of ham over the period 1971-74, but the significance or size of the trend cannot be estimated as there are no consumption figures for the summer of 1974.

Overseas prices for sheep meat at the time of the two surveys were comparable with the ruling beef prices, and this may explain the large difference in sheep meat consumption compared with the national statistics. Normally, for every lb. of beef eaten in New Zealand, 0.75 lbs of sheep meat is eaten. But the two surveys showed a different ratio, 0.61 lb of sheep meat for every pound of beef eaten. It other words, consumers appeared to be eating more beef meat than sheep meat during the period under study because of the relatively cheap beef prices when compared with the price of sheep meats.

There are obvious problems in estimating annual meat consumption from what amounts to point estimations, i.e. a single interview. Consider the ham consumption case above. Ham consumption tends to be seasonal, people eating more of it in summer than at any other time of the year. So if the survey is carried out during the winter months then obviously the annual meat consumption estimate from the survey results will be spurious. The same is probably true of some of the other meats as well. One way of overcoming this problem would

be to have a whole range of surveys at monthly intervals. In this way the seasonality of each meat could be determined and a far more accurate estimate of the per capita consumption of meat could be determined. Another problem is the reliability of people's memories. Only about 50% of those contacted during the course of the survey could state that they had purchased such and such a meat cut and how much of it they had bought in their last meat purchase. A further 25% had some difficulty in remembering their meat purchases. The people who normally purchased their meat in bulk belonged to this last group, which really was not surprising as many had bought a side of beef six months before the interview, and in certain cases the repurchase period for beef was up to a year prior to the interview.

3.6. CONSUMPTION OF THE DIFFERENT MEAT CUTS

The average consumption figure for the different cuts and also the percentage of the sample who actually purchased each cut is presented in table 10. The most significant feature about table 10 is the high proportion of the sample which did not purchase some of the cuts. It appears that sausages reached the largest market segment, and this was only 70% of all the households. Only frying steak, luncheon sausage, pork and beef sausages, lamb chops and bacon were bought by more than 50% of the sample. Pork and sheep meat cuts were bought by a very small number of the respondents, with legs of hogget and lamb, plus hogget chops being the most popular. Poultry was bought by almost 50% of the sample.

Consumers were not asked to list the different types of frying steak to reduce interviewing time and also to prevent any data distortion as there are indications that certain steak cuts have a higher prestige rating than others (comments from a number of butchers).

Table 10: Proportion of the sample who purchased each cut

Meat Cut	% of the Sample
Sausages*	70
Bacon	65
Frying steak	54
Luncheon sausage	50
Lamb chops	50
Chicken	49
Roast beef	47
Mince	47
Leg of lamb+	47
Stewing steak	44
Leg of hogget+	37
Hogget chops	34
Ham	25
Leg of mutton+	21
Pork chops	21
Mutton chops	17
Leg of pork	16

* includes pork and beef sausages

+ includes forequarters of each meat type

In table 11 the average consumption/capita/annum figure for the whole sample and also the average consumption/capita/annum data for those people who actually bought each cut is presented. If the consumption data for the whole survey is examined it can be seen that people ate more stewing steak and frying steak by weight than any other cut. These two cuts were followed by roast beef, pork and beef sausages, leg of pork, mince, chicken, leg of lamb and then the other cuts. Consumption of leg of pork was high because of the number of South East Asians who were contacted in the survey. This group tended to eat only pork, thus exaggerating the consumption of this cut by the whole sample.

Table 11: Comparison of meat consumption by the whole sample with those who actually purchased each cut

Meat cut	Per capita consumption/month	
	Whole sample	By those purchasing each cut
	ozs	ozs
Frying steak	21	39
Stewing steak	23	40
Roast beef	18	42
Mince	15	30
Lamb chops	7	14
Hogget chops	7	21
Mutton chops	2	17
Leg of lamb+	11	22
Leg of hogget+	8	22
Leg of mutton+	8	38
Pork chops	5	24
Leg of pork	16	100
Luncheon	9	19
Sausages*	16	22
Ham	3	10
Bacon	9	13
Chicken	11	23

+ includes forequarters of each cut

* includes beef and pork sausages

A more meaningful marketing estimate is the consumption by those people who actually purchased each cut. As would be expected, the estimate for the people actually purchasing each cut was higher than the sample average. In the case of bacon and sausages, because such a large proportion of the sample bought these cuts, the people actually purchasing the cut only consumer 1½ times more per capita than the sample average, but in the case of stewing steak, frying steak, lamb chops, leg of lamb, chicken, mince and roast beef they ate two times more per capita than the sample average. In the case of

such cuts as ham, pork chops, the mutton cuts and even the pork cuts the people actually purchasing each cut ate three times and even more in some cases than the sample average. The sample average per capita consumption figures suggested that the consumption of most of the sheep meat cuts was much lower than that for the beef cuts, whereas this was not in fact the case. The people actually purchasing the different sheep meat cuts consumed almost as much per capita as those purchasing the beef cuts.

A very large segment of the population who purchased their meat in bulk was isolated during the course of the survey, almost 35% of the whole sample. In the 1971 Census some 45% of the households in Palmerston North reported that they had deep freezers, so at first glance this figure of 35% for the whole sample would not be unexpected, but bulk purchase of meat is a recent phenomenon and really only started in Palmerston North in early 1973. Bulk purchasers appeared to eat less per month than the respondents who bought their meat each week. Lamb, bacon, ham and smallgoods were the exception. For the last three, consumption figures were the same for both the non-bulk and bulk purchasers as the bulk purchasers tended to buy these meat cuts each week. Lamb consumption by the bulk purchase group was slightly greater than twice that of the non-bulk purchasers. Beef, hogget and pork consumption was approximately 2/3 that of the non-bulk purchases. The difference in meat consumption of beef, pork and hogget between the two groups appears to be due to the problem the bulk purchasers had of recalling when they last purchased their meat. Some housewives, for instance, had not bought beef or pork for six months or more and they did not really know whether it was five, six, or more months since their last purchase, and this uncertainty could have had a marked effect on the accuracy of the results when translated to monthly consumption figures (see table 12).

Lamb, on the other hand, tended to be purchased every one to two weeks. It would appear that bulk-purchasers had great difficulty in changing their shopping habits. They tended to buy a large supply of beef and pork, enough to last on the average for 20-21 weeks, but they still bought their lamb, ham, bacon and smallgoods at more frequent intervals.

Table 12: Meat consumption by people who purchased meat in bulk

Average family size = 3.8

Meat	Consumption/capita	
	Grams	Ozs
Beef	1 388	49
Lamb	1 343	47
Hogget	162	6
Mutton	-	-
Pork	52	2
Ham	71	3
Bacon	251	9
Luncheon	266	9
Sausages (pork and beef)	438	16
Chicken	313	11

Poultry consumption/capita for the whole sample was 313 grams/month, which represented some 35.8 lb/annum - 12 to 15 lb more than the national average. Fifteen per cent of the respondents stated that their households were on low fat diets because one member of the household had cardiac problems. These people tended to be in the over 50 years age bracket, though there were a few people even in the under 50's age bracket. Chickens tended to be the main source of protein along with fish for this group and some households were consuming two or more chickens per week. A further 35% of the respondents had a chicken at least once per fortnight and some had a chicken each week.

Smallgoods consumption by the whole sample was some 55% greater than the national average. This trend to greater smallgoods consumption has been in evidence for the period 1971-73 and even much of 1974, but there are signs of a decrease in the consumption of these products through the latter part of 1974 into 1975 and this can be mainly attributed to the comparatively cheap fresh meat prices which were operating in the market over this period. Housewives reported that they bought luncheon for two purposes, sandwiches and snacks. Some 15% of the sample reported that they had recently bought

salami and were reasonably happy with the product, except for its price. The main use for salami was in sandwiches and, to a lesser extent, for snacks.

3.7. FREQUENCY OF CONSUMPTION OF THE DIFFERENT MEATS

An examination of table 13 shows that most meats were consumed on an average of four times a month. The housewives had great difficulty in answering this question because they could not really say whether they had had such a cut x times per month because it really depended on their menu plan for the week, so the answers have been generalised to give monthly frequencies for the different meats.

Table 13: Average consumption frequency for the different cuts

Meat	Frequency of consumption/month
Frying steak	4
Stewing steak	4
Roast beef	2
Mince	2
Lamb chops	4
Hogget chops	4
Mutton chops	4
Leg of lamb	2
Leg of hogget	4
Leg of mutton	2
Pork chops	4
Leg of pork	1
Luncheon	4
Sausages	4
Ham	4
Bacon	4
Chicken	1

One thing that did emerge from the survey was the fact most people appeared to consume their roasts on a weekend and that they tended to have about one per weekend. The group which consumed large quantities of sheep meat tended to eat roasts on a more regular basis than any of the other groups, quite often having them on week nights as well as the weekends.

3.8. FREQUENCY AT WHICH THE CONSUMERS BOUGHT THEIR MEAT

Consumers were asked to state how often they bought their meat as the pre-test to the survey had shown that a significant proportion of the respondents bought their meat in bulk. While it should have been interesting to characterise this variable completely, it was decided for reasons of convenience and time to only include three responses, once per week or more frequently, each fortnight or bulk. Anyone who purchased their meat at greater time intervals than two weeks were characterised as bulk meat purchasers because of the quantities that they would have to buy to feed a family for even three weeks. The results are presented in table 14.

Table 14: Frequency of meat purchase

	Proportion of the sample
	%
Bought meat each week or more frequently	56.3
Bought meat every fortnight	9.2
Bought meat in bulk	34.5

An examination of table 14 clearly shows the distribution in methods of purchasing meat. A little over 55% of the sample bought their meat each week or more often, while a very small proportion of the sample bought their meat at fortnightly intervals - 9% of the sample. The second largest segment was the bulk purchasers and they accounted for almost 35% of the sample.

Most of the bulk meat buyers tended to buy only beef, some 60% of this group so doing, while a further 25% bought beef, pork and lamb and the remaining

15% only bought sheep meat. Mutton was not bought by a single bulk meat purchaser, while hogget was only bought by a few. The most popular sheep meat appeared to be lamb. The average repurchase rate for beef was about 21 weeks. Sheep meat was bought on a more regular basis, three to four weeks for lamb and eight to 10 weeks for hogget. The difference in repurchase rate between lamb and hogget was probably due to the difference in weights between the two animals with lamb being considerably lighter than hogget. Most people tended to buy a side of beef, a whole porker and a lamb whenever they restocked their freezer.

A number of people who bought their beef in bulk had their scraps turned into sausages. Very few bought ham or bacon in bulk.

3.9. EXPENDITURE ON MEAT PER WEEK

The respondents were asked to state how much they spent on meat each week and the results are presented in table 15. It is very difficult to compare meat expenditure on household basis unless the figures are reduced to some common denominator such as expenditure per person. This has been done and the results are presented in column 2 of table 15.

Table 15: Average expenditure per week on meat

	Household expenditure	Expenditure/person
	$	$
Whole sample	6.18	1.99
Bulk purchasers	6.23	1.64
Non-bulk purchasers	6.16	2.13

Table 15 shows quite clearly that those housewives who bought their meat in bulk spent more per week per family but less per person that the non-bulk purchasers.

Housewives who bought their meat in bulk generally had two children at least, while some of the non-bulk purchasers were singles or elderly couples with no children living at home. The bulk purchasers claimed that they saved between 15 to 20% by buying their meat in bulk, whereas table 15 shows that their savings were only marginal compared with the non-bulk purchasers. This is not strictly true, as the bulk purchasers were able to buy the more expensive cuts of beef by virtue of the fact that they bought the whole side of beef, while some of the respondents from the smaller households and particularly the very large households were unable to purchase these very expensive cuts, or at least not as much as they would have like.

3.10. RETAIL OUTLETS FROM WHICH THE CONSUMERS BOUGHT THEIR MEAT

The respondents were asked to give details on where they purchased their fresh meat and also whether they purchased their bacon and ham from the same outlet or whether they purchased their bacon and ham from some other outlet and finally, they were asked to state whether they always bought their meat from the same outlet. The results are presented in tables 16, 17 and 18. A comparison has been made with Yandle's findings - the results of a survey carried out in the Christchurch area in 1965, (101) - because they do provide trends in channel importance, provided the assumption is made that, had Yandle carried out in survey in Palmerston North in 1965, then he would have obtained much the same result as he found in Christchurch.

Yandle (101) found that approximately 70% of his respondents shopped at butcher shops for their meat, in comparison with only 45% in the present survey indicating a decline in the influence of butcher shops in the Palmerston North trade at least. The share of the market has increased for city butcher shops, supermarkets and particularly the works butcher shops compared with Yandle's findings. The rise in importance of the city butcher shops can probably be attributed to the emergence of the working wife who is now buying her meat purchases in town, whereas before she would have obtained her meat at the suburban butcher shops. The increasing importance of the supermarket trade can probably be attributed to the general one-stop shopping that these outlets provide.

Table 16: Trends in retail outlet patronage

Retail outlet	1974 survey	(Yandle's survey (1965)
Suburban butcher	31.7	68.4
Works and farm	20.4	2.6
City butcher	14.8	6.8
Supermarket	14.8	5.7
No regular shop	18.3	16.5

The survey results have been broken down in table 17 to give some idea of the shopping habits of the non-bulk and bulk meat purchasers. One of the most striking things about the two groups is the high proportion of people who had no regular shop from which they bought their meat; this was particularly true of the bulk purchasers, 31% of whom had no specific shop from which they bought their meat. This would tend to suggest that this group shopped around before buying their meat to see which shops were the cheapest.

Table 17: Popularity of the different retail outlets

Retail outlets	Whole sample	Bulk Purchasers	Non-bulk Purchasers
	%	%	%
Suburban butcher	31.7	25.4	35.2
Works and farm	20.4	29.0	15.7
City butcher	14.8	0.0	22.9
Supermarket	14.8	14.6	14.8
No regular shop	18.3	30.9	11.5

Approximately 57% of the non-bulk purchasers bought their meat from either a suburban butcher shop or a city butcher shop whereas only 25% of the bulk

purchasers did so, and then only at suburban butcher shops. Similarly, a much higher proportion of the bulk purchasers bought their meat from the works butcher shops. The bulk purchasing group appeared to be far more mobile a group than the non-bulk purchasers as evidenced by the high 'no regular shop' and 'works and farm' proportions compared with the non-bulk purchasers. The same proportion of non-bulk and bulk buyers bought their meat at supermarkets.

Table 18: Popularity of the different retail outlets in the sale of ham and bacon

Retail outlet	Whole sample
	%
Suburban butcher	21.8
Supermarket	21.1
Grocery	19.7
City butcher	7.0
Dairy	7.0
Works and farm	5.6
Delicatessen	4.2
No regular shop	13.4

The market share of the different retail outlets was quite different for the sale of bacon and ham compared to that of the fresh meat trade (see table 18). Supermarkets and groceries are much more important outlets in the sale of bacon and ham than they were for fresh meat, with 21.1% and 19.7% respectively of the ham and bacon sales in Palmerston North. The butchers' share of the bacon and ham market was only 29% compared with 55% for fresh meat; some of the bacon and ham which they sell is made by themselves, the proportion depends on a number of factors, but the main one is the market price for pigs. In years when pig prices are low and the bacon industry does not drop its

bacon and ham prices, the butchery trade achieves a significant share of the market by under-cutting the bacon industry with much cheaper products (see the section on bacon industry in Chapter 7).

3.11. SUMMARY

The three most significant findings of the consumer survey were -

Firstly, the isolation of a large market segment which bought meat in bulk, some 35% of the sample.

Secondly, the high proportion of the sample which did not buy many of the cuts; only four cuts were bought on a regular basis by more than 50% of the sample. Bacon, pork and beef sausages were purchased by more than 65% of the sample, suggesting that these three products have a very wide market appeal when compared with even the beef cuts which tended to be the next most popular cuts. The results for bacon are quite surprising, in view of the declining sales of this product which have been taking place since about 1960. The actual weight decline in consumption/capita/annum of this product would appear to be a result of changing meal patterns rather than to a shift away from the product. A very small segment of the sample, only 10%, bought ham on a regular basis. This low figure may be due to the fact the survey was carried out in late August/early September, a time of the year when the sales of this product are traditionally low.

The third significant feature of the survey was the difference in importance of the retail outlets in the sale of fresh meat and also the sale of ham and bacon. The groceries, supermarkets and suburban butcher shops were the most important outlets in the sale of ham and bacon, but supermarkets and particularly groceries do not share the same importance in the sale of fresh meat, where the butchery trade still commands the largest share of this market.

The isolation of the bulk purchasing segment and also the fact that only a very small portion of the sample actually bought some of the cuts leads to the surmise that these purchasing patterns were due to certain segments of the sample and that if the data was stratified into certain meaningful socio-economic segments it might be possible to identify the segments responsible for the above phenomena. This information would be particularly useful to the companies supplying the local market with processed meat products. The information from this survey was in fact examined in relation to a number of socio-economic variables and the information is presented in Chapter 4.

One thing which became patently obvious during the course of the survey was the consumers' reaction to the high prices of bacon and ham. Consumers appeared to be overcoming the very high price of ham by purchasing only small quantities at a time. One large supermarket reported increased bacon sales since they had started to sell bacon by the slice, i.e. consumers could ask for as many slices of bacon they wanted. Clearly then the manufacturers were not awake to this purchasing trend as they continued to sell their bacon in ½ lb packs and they ham in ¼ lb packs, packs which the consumers thought to be too expensive, as this supermarket reported that customers were purchasing less than ½ lb of bacon and less than ¼ lb of ham at a time. It appeared that the customers were buying such small quantities to achieve a pseudo price reduction in the price of the products.

The survey highlighted the existence of at least four market segments as far as fresh meat purchase was concerned. The first consisted of about 45% of the sample and these people tended to buy all three red meats, i.e. beef, sheep meat and pork, in reasonable quantities, though beef tended to be the main meat. The second segment - 35% of the sample - consumed mainly beef, a little pork for variety and very little sheep meat. The third segment - 16% of the sample - ate mainly sheep meat with beef and pork for variety. The final segment, 4% of the sample, ate mainly pork and little else.

CHAPTER 4

THE EFFECTS OF SOCIO-ECONOMIC FACTORS ON MEAT BUYING

In the design of any new successful product, the company must be constantly aware of the fact that the consumer determines the success of the product. This means that the company must find out as much as possible about the potential consumers of its new products. Information must be gathered on their likes and dislikes, their attitudes for and against a specific product or class of products, and most important some of the factors which are likely to affect the sales of the product once it is on the market.

There are a number of ways of segmenting a market. It can be done on the basis of socio-economic factors and this is something which is traditionally done by marketers or it can be done on the basis of likes and dislikes to a product and the final method; a technique which is receiving a considerable amount of attention by market researchers is by attitudes toward different products. (99) This chapter is concerned with the traditional market approach, namely an examination of some of the principal social and economic factors which influence meat consumption.

4.1. EFFECTS OF HOUSEHOLD CHARACTERISTICS ON FOOD BUYING

The economic behavioural unit involved in purchasing, preparing and consuming meats and other foodstuffs is the family or, more generally, the household. However, the quantities of particular food consumed by households are obviously dependent upon a wide variety of factors. (82, 89) These may be listed as follows -

(a) Size of households.
(b) Level and distribution of household income.
(c) Composition of households, i.e. the relative number of men, women and children.
(d) The age of the housewife as an indicator of the age of the family.
(e) Occupation of the household income earners.

This part of the report discusses the influence of these variables, both individually and in combination, upon the consumption of food in general and various types of meat in particular. For a more detailed discussion of the influence of these variables, see S.J. Prais and H.S. Houthakker, The analysis of family budgets (82) and R. Stone, The measurement of consumers' expenditure and behaviour in the United Kingdom. (89)

4.1.1. Household Size. In general, it might be expected that as household size increases then meat consumption of the household ought to increase in the same proportion, i.e. that the meat consumption of the household ought to be proportional to the size of the household. It is quite possible to envisage certain economies in the purchase, storage and preparation of foods as households get larger. For example, it might be quite difficult to prepare certain meals on a small scale, owing to the indivisibilities of certain ingredients. If such meats were prepared in small households there may be a large wastage. Any such waste would be reflected in higher consumption and purchase of meat by these smaller households, when compared with larger ones, other things being constant. Larger households may also be able to achieve further economies if they are able to purchase meat in bulk.

4.1.2. Income. Income is an important determinant of food consumption (82). As income increases, the consumption of most foodstuffs increases until a certain stage, and then begins to tail-off above certain consumption levels and certain foodstuffs may be replaced at this point with more expensive ones. So even though consumption may stay the same, expenditure tends to rise with increasing income. Income and its affect on consumption really depends on how the consumers sees the goods, i.e. whether they see it as a luxury, an inferior good or a necessity, and depending on what group the product falls in so the income elasticity of the product varies. Income elasticities of the different meat cuts were not examined in this report, mainly because the sample size used in the survey was thought to be too small for this type of analysis.

4.1.3. Household composition. Here we are concerned with the relative numbers of men, women and children in each household. If, in terms of the number of occupants, two households are of the same size but of different

composition, differences may be expected in the average consumption of meat per person even though all other characteristics are the same, since it is generally accepted that women eat less than men and that children eat less than adults.

Study of the relationship between food consumption and size and composition of households is important for two reasons. Firstly, if meat consumption patterns do differ between households of different size or compositions, advertising or product development programmes designed to influence these consumption patterns can be addressed specifically at the type of household most likely to be influenced. Secondly, if size or composition of households changes over time, for example because of the effect of birth control measures, the implications of such a change for consumption of meats can be predicted more accurately, and industry expectations can be adjusted accordingly.

4.1.4. Other Household Variables. The remaining household characteristics listed at the beginning of this section may have less spectacular but still important influences upon consumption. Occupation may affect meat consumption; manual workers may consume more meat than people in sedentary occupations and further more, they may eat different proportions of meat.

Age of housewife is an indicator of the age of the family, older families with near adult children should eat more meat than families with very small children. It could be important from the view that as the housewife gets older, so her meat purchasing habits may become more fixed, i.e. the older housewife may not change her meat eating habits in the light of emerging trends.

The discussion so far has concentrated on the effect that individual variables might have on meat consumption, but it is clearly possible for a complex relationship to exist between the various variables. These complex inter-relationships have not been explored in the present study.

4.2. SURVEY PROCEDURE AND ANALYSIS

The details of the survey procedure are given in Chapter 3.

The data was examined according to the five socio-economic variables listed in the start of the Chapter. In addition to the normal descriptive type statistical analysis, Chi-square analysis was carried out on the five variables to see whether any of the variables were significantly correlated with the consumption of the different meat cuts.

All the figures reported in this section of the report are means, except for the following variables, age of the housewife, income of household head and occupation of the household head, where the mode has been used instead. When means are computed for coded variables the results are quite often meaningless in the context of the question because the resulting mean inevitably falls between two coded values and to overcome this problem the mode was selected for the above variables.

An analysis of trends within the New Zealand society has been introduced at the start of each section because it is felt that a knowledge of these trends will help in the prediction of future meat demands in Palmerston North at least, if not in the whole of New Zealand. However, the data is not specific to Palmerston North due to the paucity of information on the city, and the assumption is made that the trends which are evident in the whole New Zealand society are also true for Palmerston North.

4.3. HOUSEHOLD SIZE: ITS EFFECT ON MEAT BUYING

This is probably one of the most important variables from the industry's view at least as household size is a very important determinant of the size of packs which industry offers the consumer. It is clearly bad policy for a manufacturer to package a product in six serving sized packages when the market clearly wants two serving sized packages. How then have the New Zealand households evolved in the 1966 to 1971 period? The results to this

question are presented in table 19. The most noticeable feature of the table 19 is the percentage decrease in all households with three or more people over this very short period, and the increase in two and one person households.

Table 19: Size of households (includes families and non-families)

Size of households	Percentage of total with stated characteristic	
	1966 Census	1971 Census
1 person	12.5	14.1
2 people	24.8	26.4
3 people	16.9	16.5
4 people	18.0	17.7
5 people	13.2	12.5
6 people	7.6	6.8
7 or more people	7.0	5.9

An examination of the statistics showed that most of the single person households are occupied by people in the 45-64 and 65 and over age brackets, 34.2% and 47.3% respectively and 57% of all the single person households are occupied by women. This trend toward smaller and smaller households can be expected to continue in the future provided the same attitude toward birth control continues and provided no new diseases arise which endanger the life expectancy of the population.

The characteristics of the households covered in the survey can be seen in table 20. As household size increased, so the number of children under thirteen and also the number of people over thirteen increased. In general, the income of the household head tended to increase with increasing household size. The mode for housewife age for each sized household tended to be in the 31-50 age bracket, except for households with two or less people where the women were in the 51 and over age bracket. The occupation of the household head in the very small sized households - two people or less - tended to be in the pensioner bracket. The representatives of each of the groups were

Table 20: Characteristics of households according to household size

	1 person	2 person	3 person	4 person	5 person	6+ person
Children under 13	0.0	0.0	0.36	1.12	1.62	2.67
People over 13	1.0	2.0	2.68	2.88	3.38	3.78
Number of people working*	0.45	0.80	1.00	1.00	1.50	1.17
Age of housewife*	over 60	51-60	31-50	31-50	31-50	31-50
Occupation*	Pensioner	Pensioner	Clerical	Technical	Managerial	Clerical
Income of head	Under $5 000	Under $5 000	$5 001-$7 000	$5 001-$7 000	$7 001-$9 000	$5 001-$7 000

* Established by considering the mode of each group

based on the mode and that obviously not all heads of households in the two person or less households were pensioners, nor were all the household heads, managers in the five person households.

As in Chapter 3, details are given of the proportion of households which actually purchased each cut and the results are presented in table 21. The meats have been arranged according to the method of cooking required for each cut, i.e. roasts have been grouped and so on. With one or two exceptions, the proportion of the consumers in each household group that bought steak tended to decrease with increasing household size, something which the Australians (44, 45) picked up in their two household surveys. With stewing steak and mince, the proportion of each group that bought each cut tended to increase with increasing household size. The proportion of households purchasing the chops of pork, lamb and hogget tended to decrease with increasing household size. The results for the above meats is not entirely unexpected; stewing steak and mince, for instance, are comparatively cheap compared with frying steak and hence it could be expected that the proportion of households purchasing steak would decrease as household size increased and the reverse for stewing steak and mince. The proportion of households purchasing roasts tended to be greatest in the 3 person households and tended to decrease with both increasing and decreasing size of household. Six person and over households tended to be an anomaly in this broad generalisation as a much larger proportion of this sized household than expected purchased legs of hogget and mutton. This anomaly was probably due to two things; firstly, the very small proportion of the whole sample in this group and secondly, the cuts, because there is a substantial amount of meat on them, were probably the ideal size for such large households, though even this surmise tends to be confounded by the fact that a greater proportion of three person households than any other sized household purchased these roasts. The proportion of households in each size household group that purchased chicken was almost the same, though there was a trend to a smaller proportion of households purchasing chicken with increasing size of households. A similar trend was in evidence for ham. The proportion of each sized household which bought bacon tended to be constant, which was quite surprising in view of the high cost of this product and also the fact that consumption of the product appears to be

Table 21: Percentage of each household size actually purchasing each cut

	Household size (number of persons)					
	1	2	3	4	5	6+
Frying steak	68.4	56.4	63.6	47.1	56.2	33.3
Stewing steak	42.1	64.1	54.5	58.8	62.5	66.7
Mince	36.8	41.0	50.0	52.9	56.2	44.4
Pork chops	21.1	30.8	22.7	20.6	-	11.0
Lamb chops	27.0	23.0	27.0	18.0	6.0	11.0
Hogget chops	27.0	23.0	9.0	24.0	13.0	-
Mutton chops	-	5.0	18.0	-	6.0	-
Roast beef	21.0	56.0	59.0	38.0	44.0	23.0
Leg of lamb	20.0	23.0	27.0	18.0	6.0	11.0
Leg of hogget	-	13.0	9.0	6.0	-	22.0
Leg of mutton	-	10.0	14.0	9.0	6.0	16.0
Leg of pork	-	5.0	9.0	9.0	13.0	-
Chicken	32.0	56.0	50.0	47.0	44.0	44.0
Ham	21.0	31.0	32.0	18.0	19.0	13.0
Bacon	58.0	72.0	59.0	59.0	75.0	67.0
Sausages	32.0	67.0	73.0	82.0	75.0	78.0
Number of respondents in each group	20	40	22	35	16	9

declining. The proportion of households which purchased luncheon, pork and beef sausages tended to increase with increasing household size.

Details for per capita consumption of the different cuts are presented in table 22. More red meat per capita was eaten by two person households than any other sized household; they were followed in order of per capita red meat consumption by one person households, three person households through to six person and over households. This last group ate a little less than half the amount of meat per capita than the two person households.

Beef consumption was highest per capita for one person and smallest for six or more person sized households, i.e. there was a natural decrease in the consumption per capita of beef with increasing household size. This was due to the high consumption of mince and frying steak by the one person households compared with the other sized households, and the consumption of both these meats tended to fall off with increase in household size.

Like beef consumption, sheep meat consumption tended to fall with increase in household size, but the trend was not quite as clear cut as it was for per capita beef consumption. This trend was caused by the associated trends of lamb and hogget consumption and also legs of lamb consumption which all tended to decline with increase in household size. There was no clear cut trend for mutton chop consumption, but this was probably due to the fact that a very small proportion of the sample actually bought this cut. The per capita consumption of legs of hogget and mutton, on the other hand, tended to increase with increasing household size, though the trend for legs of mutton consumption was not quite as clear cut as it was for legs of hogget.

Pork consumption per person was highest for the three person households and decreased with both smaller and larger households. Pork chops, bacon and particularly ham consumption were highest for two person households and tended to decrease with increasing household size.

Per capita consumption of luncheon did not increase or decrease with increasing household size, though per capita consumption was quite high for

Table 22: Meat consumption per person by household size (grams/month)

	Household size (number of persons)					
	1	2	3	4	5	6+
Frying steak	1 529	763	481	331	216	160
Stewing steak	645	704	550	411	386	362
Roast beef	239	687	592	337	278	126
Mince	454	361	323	327	255	185
Total beef	2 867	2 515	1 946	1 406	1 135	833
Lamb chops	693	233	268	124	45	67
Hogget chops	573	274	250	177	68	-
Mutton chops	-	58	151	-	51	-
Leg of lamb*	136	326	413	200	199	57
Leg of hogget*	-	64	121	160	-	353
Leg of mutton*	-	280	275	213	282	471
Total sheep meat	1 402	1 235	1 478	874	645	948
Pork chops	144	204	158	114	-	67
Leg of pork	-	291	669	434	398	-
Ham	96	105	89	50	24	10
Bacon	335	378	234	177	193	168
Total pig meat	575	978	1 150	775	515	335
Luncheon	191	230	200	230	159	185
Sausages	335	483	447	400	363	303
Chicken	287	611	310	192	142	126
TOTAL MEAT	5 657	6 052	5 521	3 877	2 959	2 730
TOTAL MEAT (lbs)						
Number in each group	20	40	22	35	16	9

* Also includes forequarters

the larger households. It would appear that some other variable was responsible for the consumption of this cut, possibly the number of young children. The per capita consumption of pork and beef sausages showed a clear cut trend, with consumption falling with increasing household size, despite the fact that a large proportion of the larger households bought this cut. The per capita consumption of people in the smaller households who bought sausages was significantly greater than that by people in the larger sized households.

The results of this section of the survey suggest that larger sized households were in fact able to gain economies in the consumption of most meat cuts, provided one assumes that people in the larger sized households were in fact getting enough meat in their diet.

1966 and 1971 Censuses indicated a trend toward an increase in the number of one and two person households and a consequent decrease in the number of five or larger person households. (72) If one assumes that the trend towards smaller households will continue into the future and that the results of the survey can be projected to the whole New Zealand population, then the first thing that can be expected is an increase in the total per capita consumption of meat. The consumption of all beef cuts should increase, in particular, the convenience cuts such as frying steak might increase. Per capita consumption of sheep meat will probably remain constant, provided there are no drastic decreases in their price so that beef becomes significantly more expensive than the sheep meats. The consumption of cuts like lamb and hogget chops may increase in the future, while the consumption of all mutton cuts may decline in the future, if the apparent unpopularity of the cuts continues into the future. Legs of lamb, on the other hand, should increase all things being constant.

The per capita consumption of pork chops, bacon and ham was highest in the small sized households and if the overall trend towards smaller sized households continues then there may be a larger market for these products, but the actual per capita consumption will depend on how the different market factors change the supply situation. If pig meat continues to increase in price, relative to other meats, then the change in New Zealand's

society to smaller households is unlikely to have much effect on the consumption of pork meat in this country. The per capita consumption of chicken, and pork and beef sausages, may also increase in the future.

4.4. INCOME OF HOUSEHOLD HEAD: ITS EFFECT ON MEAT CONSUMPTION

How have incomes changed in New Zealand since 1970? The details are presented in table 23. The information has been obtained from the May 1975 Monthly abstract of statistics which gives details of the annual taxation returns in New Zealand. (74)

Table 23: Percentage of total work force in each income bracket

Amount of Total Income	Tax Returns 1970-1971	1972-1973	1973-1974
	%	%	%
Under 0 (losses)	0.3	0.2	0.1
1- 999	20.7	16.8	15.9
1 000-1 999	18.9	11.2	12.8
2 000-2 999	19.8	14.2	12.6
3 000-3 999	24.6	16.0	13.8
4 000-5 199	10.1	17.7	17.6
5 200-5 999	2.2	4.8	9.7
6 000-7 999	2.4	5.2	9.4
8 000-9 999	0.8	2.3	4.4
Over 10 000	1.0	2.2	3.7

An examination of table 23 shows how incomes have risen in the period 1970-1974. In the 1970-71 period approximately 84% of the wage and salary earners were on incomes of $4 000 or less; by 1973-74 only 55% of the total work force were on an income less than or equal to $4 000. (74) The

proportion of the work force which was on an income of $4 000-$8 000 had risen from the 15% figure in 1970-71 to 38% in 1973-74. The proportion of the total labour force on an income greater than $8 000 has increased by some 4.5 times since 1970-71 taxation returns and in the 1973-74 period stood at 8% of the total work force. (74) Clearly the proportion of the work force which is on very low incomes is gradually changing and the country is reaching a stage where a large proportion of its work force is on a reasonable income compared with four years ago. The particular approach by both major political parties in this country to the concept of a fair and just wage suggests that this trend toward centralisation of incomes will continue into the future.

In discussing the effects of increased income on meat sales the following question must be asked, as it has a very important bearing on the conclusions, "How are increasing incomes keeping pace with increasing costs?" Unless increases in incomes are keeping pace with increased costs then there is every likelihood of a decrease in the standard of living in this country with the associated effects of such an occurrence on the sales of meat. An examination of table 24 suggests that the effective weekly wage index which takes rising costs into consideration shows that wages did not, in fact, keep pace with rising costs during the 1956-70 period, but wages have generally outstripped rising costs since 1970. In the 1974-75 period wages outstripped rising costs by some 2.5%. In the last few years at least, consumers have had more money to spend on a whole range of goods, including meat.

The characteristics of the households in the survey according to gross annual income of the household head are presented in table 25.

The number in each household tended to increase with increasing income, going from households in which the household head earned less than $5 000 to households where the household head earned more than $9 000. This was in part due to an increasing number of children under 13; households with gross incomes of less than $5 000 had an average of 0.21 children under 13, while households with gross incomes over $7 000 had an average of 1.18 children under 13. Households where the household head earned between $5 000-$7 000

Table 24: Comparison of nominal and effective wage rates

Year	Consumer Prices (all groups)	Nominal Weekly Wage Rates (males)	Effective Weekly Wage Rates
1956	777	748	963
1957	794	783	986
1958	829	791	954
1959	860	806	937
1960	866	846	977
1961	882	866	975
1962	905	881	973
1963	923	905	980
1964	956	933	976
1965	988	989	1 001
1966	1 016	1 017	1 000
1967	1 077	1 070	994
1968	1 124	1 111	988
1969	1 179	1 176	997
1970	1 256	1 327	1 057
1971	1 386	1 628	1 175
1972	1 482	1 778	1 200
1973	1 604	1 980	1 234

Table 25: Characteristics of the households according to gross annual income of the household head

	Income of the Household Head			
	Under $5 000	$5 001-$7 000	$7 001-$9 000	Over $9 000
Children Under 13	0.21	0.86	1.18	1.18
People over 13	2.14	2.63	2.59	2.61
Total people	2.35	3.49	3.77	3.78
Number working	1.00	2.61	1.9	1.44
Age of housewife	over 60	31-50	31-50	31-50
Occupation of head	Pensioner	Skilled	Professional	Professional

had an unusually high proportion of people working in each household. This was in part due to the fact that a number of the households which were contacted in this group were flats where all the members were working. A high proportion of the housewives in the households where the household head earned $5 000-$7 000 were in fact working. A high proportion of professional people were contacted in the course of the survey, but this is just a reflection of Palmerston North itself.

Table 26: Meat consumption per person by gross income (grams/capita/month)

	Under $5 000	$5 000-$7 000	$7 001-$9 000	Over $9 000
Frying steak	610	364	384	1 068
Stewing steak	490	487	433	334
Roast beef	450	398	192	394
Mince	461	208	291	214
Total Beef	2 011	1 457	1 300	2 010
Lamb chops	230	78	185	160
Hogget chops	264	145	128	40
Mutton chops	45	56	-	-
Leg of lamb	401	268	142	187
Leg of hogget	112	290	213	160
Leg of mutton	112	298	227	54
Total Sheep Meat	1 164	1 135	895	601
Pork chops	171	152	92	80
Leg of pork	297	-	419	400
Ham	63	78	57	93
Bacon	234	268	284	306
Total Pork	765	498	852	873
Sausages	372	498	404	320
Luncheon	294	245	163	133
Chicken	362	260	338	284
TOTAL MEAT	4 968	4 093	3 952	4 221

It is with this financial background that income and its associated effects on meat consumption will be discussed. Details of meat consumption per capita by gross income are presented in table 26.

With the exception of the under $5 000 group, total red meat consumption per capita was approximately the same for all groups, which is a very similar finding to that of the Australians in their two household meat consumption surveys. (45, 45) They found that people in the higher income brackets tended to buy more of the more expensive cuts rather than actually increasing their total red meat consumption. In this survey, the per capita consumption of bacon, ham, frying steak, and leg of pork tended to increase with increasing gross income of the household head. All these cuts were comparatively expensive cuts and there is a suggestion that the results of this present survey are very similar to the two Australian surveys, as far as the more expensive cuts of meat were concerned. The per capita consumption of sheep meats tended to decrease with increasing income; this was true for all sheep meat cuts and is in complete contrast to those of the Australians who found that the consumption of these meats remained constant over the whole income range. The consumption of all sausage type products was also found to decrease with increasing income, whereas the Australians found the complete opposite, but this was probably due to the attitude that people have in New Zealand towards smallgoods.

Yandle (101) in a survey carried out in the Christchurch area found that per capita expenditure on poultry, non-carcass meat, lamb and beef went up with increased income, whereas this survey showed that the per capita consumption of a number of meats either decreased or remained static with increasing income. Yandle also found that the consumption of bacon, ham and pork only increased marginally with increased income, while the results of this survey suggest that the consumption of these cuts should increase as much as any other cut with increased income. He reasoned that this very small increase in expenditure on bacon and pork with increasing income was in part due to the way the two meats were used. Bacon, because it was used in conjunction with many other meats, and pork because it was used to provide variety.

If the present trends toward centralisation of incomes and also to larger

incomes with respect to costs continues in the next few years then we may see a further decline in the consumption of sheep meats, but this will depend on the comparative prices of sheep meats and beef cuts, and we may also see an increase in the consumption of frying steak, pork - in particular pork roasts - ham and bacon. There way well be a decline in the consumption of all sausage products.

4.5. AGE OF HOUSEWIFE: ITS EFFECT ON MEAT CONSUMPTION

This particular variable was chosen because Market Research (N.Z.) Limited in a study of New Zealanders' food consumption habits had found in their 1960 study that the age of the housewife had some bearing on the types of meat which were consumed in a household. (66) For instance, they found that bacon consumption was highest in the 16-24 age group and lowest in the over 60's. Kotler argues that each life-cycle ought to have certain distinguishable needs and interests with respect to certain goods. (54) Ideally, the housewife age groups should have been arranged to follow the Family Life Cycle Concept developed by the Survey Research Center of the University of Michigan, in which it is argued that the items purchased by a family are closely tied to its stage in the family life cycle. They distinguished seven stages -

(a) The bachelor stage: Young, single people
(b) Newly married couple: Young, no children
(c) The full nest I : Young married couples with youngest under six
(d) The full nest II: Young married couples with youngest child six or over
(e) The full nest III: Older married couples with dependent children
(f) The empty nest: Older married couples with no children at home
(g) The solitary survivors: Older single people (87, 88)

But because of sample problems, such a scheme would have needed a very large sample. It was decided to limit the survey to four housewife age groups - under 30's, 31-50, 51-60, and the over 60's. The under 30's would, or should, consist of the young singles plus the newly married young couples

with and without young children, i.e. stages (a), (b) and (c) in the above family life scheme. The 31-50 year group would consist of the full nest stages II and III and the 51-60 group would be made up of older married couples with no children at home and also some older singles, while the over 60's would mainly consist of older singles and a smaller proportion of older married couples than the 51-60 year age bracket. The over 60's group was selected because people in this group are mainly pensioners, people who are on a fixed but low income - and a group which is going to become increasingly important with each passing year because of the decreasing birth rate in this country.

The household characteristics of the survey sample when subdivided into the four housewife age groups are presented in table 27.

Table 27: Characteristics of households according to age of housewife

	Age of Housewife			
	Under 30	31-50	51-60	Over 60
Children under 13	0.92	1.07	0.00	0.00
People over 13	2.32	2.97	2.00	1.74
Total number of people	3.24	4.03	2.00	1.74
Number working	1.25	1.53	0.97	0.87
Occupation of head	Professional	Clerical and Sales	Clerical and Sales	Pensioner
Income of head $(000)	5-7	5-7	5-7	under 5

In table 27 the women in the 31-50 age bracket had the most children, as expected, and also the largest families. The average size of the family in the 31-50 age group was four people; two adults, one child under the age of 13 and one over 13. A high proportion, a little over 50%, of the housewives in this group were working; while only 25% of the wives in the under 30 age

bracket were working. The largest proportion of household heads in the under 30's age group were professional people, whereas in the 31-50 and 51-60 age groups the largest proportion of household heads were in sales or clerical positions. With the exception of the over 60's group, most household heads had gross incomes in the $5 000-$7 000 range.

The details of per capita meat consumption by the age of the housewife are set out in table 28. With the exception of pork, the per capita consumption of beef and sheep meats tended to follow a general pattern, high for the under 30's group, a decline in the 31-50 age group and an increase in the 51-60 age group before finally decreasing in the over 60's age group. The per capita consumption of most pork products on the other hand tended to increase with the age of the housewife before finally dropping off for the over 60's age group. The per capita consumption of chicken tended to increase with age of housewife, being highest for the over 60's age group. This is not unexpected as chicken tends to be prescribed for people with cardiac problems and the over 60's group tend to suffer from this complaint more than other age groups.

Women in the under 30 years of age group tended to use less frying steak than older women and they also used more roasts of beef, legs of hogget and mutton than older women. Mothers under 50 tended to use less of the more expensive meats such as pork, chicken, bacon and frying steak and rather more of meats such as sausages, luncheon and mince. The 51-60 age group generally ate more meat than any other age group and, in particular, they consumed more frying steak, stewing steak, pork, ham and bacon per capita than any other group. This group appeared to have a more varied meat diet than any other, eating most meats on a fairly regular basis. Mutton chops, bacon and ham showed a definite trend, consumption increasing with housewife age. Pork and pork products accounted for about 16-20% of the total red meat intake of each group and this figure agrees with the national statistics (75).

An examination of the New Zealand demographic statistics show that women are tending to get married younger than they did even in 1966, and also that women are living longer. This means, provided women continue to marry

Table 28: Per capita consumption of meat by age of housewife

	Housewife Age			
	Under 30	31-50	51-60	Over 60
	Grams	Grams	Grams	Grams
Frying steak	306	373	971	616
Stewing steak	538	377	820	648
Roast beef	479	347	240	214
Mince	460	229	302	378
Total Beef	1 783	1 326	2 333	1 856
Lamb chops	262	107	126	270
Hogget chops	221	66	302	108
Mutton chops	19	41	76	281
Leg of lamb*	399	186	100	50
Leg of hogget*	353	82	151	25
Leg of mutton*	295	124	303	70
Total Sheep Meat	1 549	606	1 058	804
Pork chops	103	109	189	151
Leg of pork	216	155	356	30
Ham	30	72	151	54
Bacon	184	239	391	227
Total Pork	533	575	1 087	462
Luncheon	262	231	290	119
Sausages+	371	392	391	256
Chicken	231	228	536	568
TOTAL MEAT g.	4 729	3 358	5 695	4 065
TOTAL MEAT lb.	10.4	7.4	12.5	9.0
Number of respondents in each group	38	57	20	27

* Includes forequarters of the different sheep meats

\+ Includes beef and pork sausages

early and have their children early in their marriage, that the nest stages are going to be shifted forward a few years with the empty nest stage possibly occurring in the early to middle forties, rather than in the early fifties. This in turn will mean that the present 51-60 age group will be expanded to 45-60, and this may possibly mean that the total red meat consumption in this country will increase. Even people in their sixties appeared to eat more meat per capita than households where the women were in the 31-50 age bracket, so the increased life expectancy, particularly of women, should not markedly affect meat consumption in this country. On top of this trend, there is the decreasing birth rate and associated reduction in household size and this may mean that meat consumption by even households where the housewife is in the 31-50 age bracket might increase. Total red meat consumption in this country may increase because of the complex changes which are affecting the New Zealand population.

What happens to the consumption of individual meat cuts as a result of the changes in the New Zealand society is another matter and really depends on whether a housewife carries her meat preferences with her throughout her life, or whether she adopts the meat preferences of people within her age group, as she goes from the under 30's group into the 31-50's group so her meat purchases change, albeit gradually. If the latter operates, and it is the least likely, then the consumption of frying steak, stewing steak and mince consumption may increase in the future while the consumption of roast beef ought to decline. Similarly, the consumption of lamb and hogget chops may increase, but the consumption of mutton chops will probably decrease as will the consumption of all sheep meat legs and forequarters.

The per capita consumption of pork, bacon and ham may also increase in future years. Luncheon and sausage consumption was almost the same for all age groups and for this reason consumption of this product should remain constant.

If per capita consumption of the individual meats is examined from the premise that the housewife is likely to take her meat purchasing patterns through each stage of the given family life cycles then the conclusions

that can be drawn from the data are quite different. As the different age groups move into the one above so the pattern of meat consumption in this country may change. The per capita consumption of the following meats may increase in future years: stewing steak, roast beef, mince, all lamb and hogget cuts, and to a lesser extent the consumption of roasts of pork, and also luncheon. The per capita consumption of frying steak, cuts of mutton, ham, bacon, sausages and even chicken could decrease in future years given the above premise. What actually happens will probably be the result of the two situations outlined above, i.e. the housewife will probably take some of her attitudes through each successive stage in the life cycle and will probably also adopt some of the meat purchasing patterns of the older group into which she ultimately enters. This is a particularly difficult thing to forecast as the consumption of anything through time is dependent on a number of factors, ranging from those of circumstance such as financial position of the family, to pressure from a number of sources to change her meat purchasing habits, such as advertisements, comments of friends and other equally effective social pressures. The actual evolvement of future meat purchasing habits, particularly in relation to the purchase of meat, really depends on which factors are the most important determinants affecting what the housewife purchases, and until these are determined it is extremely difficult to forecast future meat consumption habits.

4.6. OTHER SOCIO-ECONOMIC VARIABLES AND THEIR EFFECTS ON MEAT CONSUMPTION

Occupation of the household head and composition of the households were listed at the start of the chapter as being important determinants in the per capita consumption of food, but the analysis of the effects of these two factors on the consumption of meat has not been included in the present chapter for two reasons. In the case of occupation of the household head, no trends were isolated in the consumption of the different groups based on this characteristic and this was in complete contrast to the findings of the Australians (44, 45) in their two household surveys, probably due to the very small sample size of this survey. The analysis of the effect of

composition of the household was not included because the sample size used in the survey was far too small for a statistically significant analysis to be carried out on the data.

4.7. SUMMARY

In conclusion, the analysis of the survey data according to the following socio-economic variables:

(a) Size of households
(b) Level and distribution of household income
(c) Age of housewife

appeared to indicate trends within the different socio-economic variables of total meat consumption, consumption of different meat types and also in the consumption of individual meat cuts. The per capita consumption of beef tended to increase with decreasing household size and increasing age of housewife. Sheep meat consumption tended to decrease with increasing income of the household head, age of the housewife and also with increasing household size. The consumption of pork and pork products appeared to decrease with increasing household size, and increased proportionately with income of the household head and also age of the housewife.

The following comments will be concerned with the per capita consumption of ham, bacon and smallgoods as these products are of immediate interest to the present project. The consumption of ham and also bacon appeared to increase as household size decreased, as income increased, and also as the age of the housewife increased. In the case of the smallgoods products included in the survey, the per capita consumption appeared to decrease with increasing income, increasing age of the housewife and also with increasing household size.

What is likely to happen to these products in the future? An analysis of the population trends in this country, in the period 1966-71, would appear to indicate the following:

(a) The proportion of households within the five person and over size

decreased, while the proportion of one and two person households increased. There appears to be a trend to smaller households.

(b) Incomes appear to be centralising at least for the lower income brackets and this trend will probably continue in the future. In addition to this trend incomes have outstripped increasing costs at least in the last four years and as a result of the two trends a much larger proportion of the population has had more to spend on consumer items.

(c) The life expectancy of the New Zealand population and in particular that of the women, has increased since 1966 and will probably continue in the future.

Provided the products are not priced off the market, there seems to be a possibility that the demand for bacon and ham will increase on the local market in the future and if the results of this survey bear any relationship to what is happening in the rest of New Zealand then there could be an increased demand for these products throughout the country in the next five years at least. This conclusion is based on the fact that the per capita consumption of these two meats appeared to increase with increasing household income, and to increase with decreasing household size, two things which appear to have happened to the New Zealand society since 1966. Household size should continue to get smaller, i.e. the proportion of households with five people or more should decrease in the future as a result of the social and economic pressures for limiting family size. These pressures have already started to make a significant impact on the number of new born babies in this country. In the year July 1974-1975, the total number of new-born babies was down on the previous year, and while the trend may not be continuing, there is every likelihood that the percentage increase from new-born babies at least will be minimal compared with the 1960's. What will happen to incomes is not quite as easy to predict. In the period 1970-1974, incomes outstripped rising costs, but this is unlikely to happen in the next two years because of the present world-wide economic conditions. Similarly, the influence of the age of the housewife on the consumption of ham and bacon is not very easy to predict. It really depends on whether housewives retain their existing meat purchasing patterns throughout much of their lives, or whether they change their

purchasing habits as a result of pressures from a whole range of sources.

The future outlook for smallgoods does not appear to be as promising as that of bacon and ham as the consumption of smallgoods was found to decrease with increasing income and to also decrease with decreasing household sizes. Now, if incomes continue to outstrip cost increases and household sizes continue to decrease, then the demand for these products might decrease in the future; but as the demand for these products appears to be related to the price of fresh meat, i.e. the consumption of these meats appears to increase whenever the prices of beef and sheep meat become excessive, what actually happens will depend on what happens to the prices of beef and sheep meat in the next 3-5 years.

CHAPTER 5

CONSUMER BEHAVIOUR IN THE BUYING AND EATING OF MEAT

Consumer behaviour in most fields of marketing is concerned with the questions: Who buys? How do they buy? What do they buy? When do they buy? And why do they buy? The first four questions relate to overt aspects of buyer behaviour and can be learned about through direct observation and interviewing. But uncovering the reasons for peoples' purchases is an extremely difficult task.

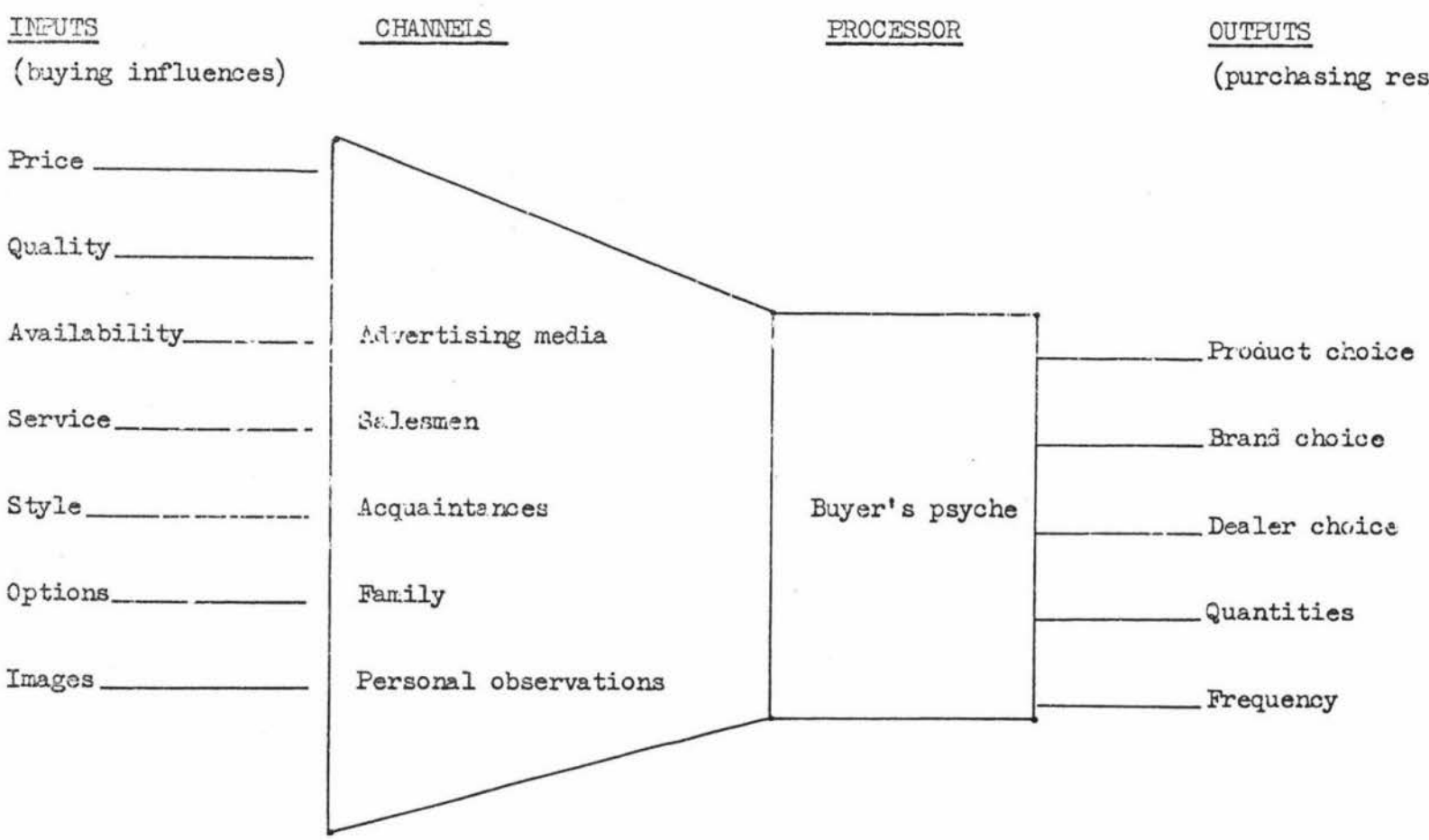
According to Kotler (54) "the buyer is subject to many influences which trace a complex course through his psyche and lead eventually to overt purchasing responses". His conception of the buying process is illustrated in Fig. 6.

The critical area in consumer behavioural research is "What happens in the person's psyche?" (54) A number of models have been developed, but no one model explains the human mind sufficiently to enable adequate predictive statements concerning consumer behaviour to be made.

The present project is more concerned with the inputs and outputs listed in Fig. 6. In particular, the price, quality, style and images on the input side of Kotler's model and on the ouput side the product preference, quantities and frequency of purchase. It is realised that attitudes and values are basic to the whole issue of product choice and an attempt was made to determine the attitudes of consumers to a subset of meats which were available on the Palmerston North meat market, with the idea of obtaining design criteria for new meat products.

The study of consumer behaviour in relation to the purchase of meat has undergone a number of changes over the last 25 years, from a very narrow outlook on the problem to the present comprehensive approach (McFadyen et al., 63). Most of the early work on consumer preferences of meat were concerned with the sensory characteristics of palatability (including flavour, juiciness and tenderness), of fat content (including marbling and

Fig. 6 The Buying Process Conceived as a System of Inputs and Outputs.



Adapted from "Behavioural models for analysing buyers", P. Kotler, Journal of Marketing, vol. 29, no. 4, 1965, p. 37-45.

external fat) and the colour of fat and lean. These characteristics were generally referred to as meat quality. The following sections will show how consumer behavioural studies on meat have evolved from a position where researchers were concerned with the visual and eating qualities of meat and their interrelationships to the present position where the tangible factors such as visual and eating qualities of meat plus the more intangible attributes associated with meat such as prestige, seasonality and nutrition are being investigated (12). Certain aspects involving the tangible attributes of meat are still being studied and are probably likely to be studied for many years in the future. Tenderness, colour and flavour are areas receiving a considerable amount of research at present.

Before discussing the various tangible attributes associated with meat and their affect on people's meat preferences, it would be best to highlight some of the problems associated with studying people's meat preferences. Probably the most significant problem to contend with in this field is the fact that consumers show a tremendous variability in buying behaviour when purchasing their meat. For instance, Juillerat et al. (94) showed that a number of consumers preferred the lower grades of beef, while others had a preference for the quality grades. Field et al. (26) showed that consumers did not discriminate against dark, soft, bull beef. A second problem deals with the question of regional differences; Brayshaw (9) found regional differences between consumers in London and consumers in Glasgow. The final problem deals with the actual reliability of the consumers. For instance, Brayshaw et al. (9) found that consumers failed to differentiate between steaks with differences in visible fat content up to 16%. Rhodes et al. (83) found that consumers could not relate visual and eating characteristics reliably. Meat preference and consumption has been shown to be dependent on the visual, eating quality and intangible characteristics associated with meat.

5.1. VISUAL PREFERENCES

The most important visual attribute is the colour of the lean and fat of

meat. The colour of meat is largely due to the myoglobin and less to the residual blood haemoglobin. Acceptable colours in meat and meat products reflect the traditions and customs of the consumers (Deatherage, 18): the paleness of milk-fed veal, the brown of sun-dried beef, or the bright red, sought in prepackaged fresh meat at the supermarkets. Lasley et al. (56) found that shoppers placed great emphasis on the colour of lean when buying prepackaged meat, thinking that colour was an indicator of freshness and tenderness. Mize and Strange, 1959 (68); Hedrick et al., 1959 (38); and Woods and Jenkins, 1963 (100) reported similar findings. However, Hedrick et al., 1959 (38) were unable to find a significant difference in the tenderness and flavour of dark-cutting and bright beef obtained from beef animals of the same age, degree of fat finish and carcass grade.

Barton, 1969 (4) reports that consumers in Italy prefer pale-coloured beef, including bull beef. While Lasley et al., 1955 (56) reported in their study that 43.5% of their respondents preferred a medium red coloured lean, 32.6% for a bright red coloured lean and 16.3% for a light red coloured lean. The remaining 7% expressed a preference for the other colours. Doty and Pierce, 1961 (23) reported that unaged, raw beef with a bright red colour was usually more tender than dark coloured meat.

Cured and pasteurised products packaged in transparent films such as ham, bacon and sausages tend to have an unstable pink colour that is readily affected by light and oxidation (Watts, 1954). (92) According to Deatherage (18) such colour changes are considered by the layman to be evidence of excessive bacterial contamination when, in fact, they may result from exposure to light and oxygen; when this is so, these changes may not detract from wholesomeness or other qualities.

According to Lawrie, 1966 (58) the colour of meat is dependent on the type and quantities of pigments present in the muscle. Some species tend to have more myoglobin than others, pigs versus cattle for instance. The colour is also dependent on some of the other components of the muscle, the physical conditions such as storage temperature, the oxygen permeability of the wrap, length of time after cutting and a number of other factors. When meat is freshly cut and exposed to air, oxymyoglobin - the bright red colour -

is formed from the myoglobin which tends to be purplish red. Cured meats tend to be pink. Cooked meats tend to undergo a number of changes with heating. As the fresh meat is heated, the internal colour (in beef) will change purplish to red, brownish-pink and brown depending on the ultimate temperature and pH. All of these colours are generally desirable in accordance with the preferences of the consumer. But if any of the colour changes associated with one particular meat are found in another meat, then the consumers tend to suspect the meat. Deatherage reports that consumers do not like supposedly uncured meat to have the pink colour of cured meat. Some stews and loaves (meat) can take on the pink colour of cured meats as a result of naturally occurring nitrates in such vegetables as onions and celery which can be converted to nitrate under the correct environmental conditions.

The colour of fat is another variable which can affect consumers' meat preferences. There tends to be two main fat colours: creamy white and yellow with a whole range of intermediate colours. Yellow fat can arise as a result of two factors: feed and animal type. According to Lawrie (58) if animals are fed with feedstuffs containing carotene the fat colour of the animal tends to be yellow. The carotene appears in the animal's fat as beta-carotene. Hershberger et al., 1951 (41) reported that Herefords which were on a ration containing a high level of alfalfa meal did not produce a yellow fat while those on a pasture diet did. The second factor that affects fat colour is thought to be animal type, though there is some controversy. Morgan and Everitt, 1968 (69) suggest that fat colour may be strongly inherited, but Yeates, 1965 (102) maintains that there is a tendency for older beasts, especially those subjected to periodical weight loss, to have more highly coloured fat.

Deatherage claims that consumers have been taught that fresh fatty tissue of meat should be slight pinkish cream colour ("white") and that yellow fat should be avoided as indicating inferior meat (grass fed). Malphrus, 1957 (65) seems to adopt the same philosophy as he suggested that yellow coloured carcasses ought to be sold at a discount below white coloured carcasses. There does, however, seem to be conflicting evidence as to consumer preference to fat colour. Ashby et al., 1954 (3) found that

about 35% of consumers interviewed preferred yellow fat to white fat. Similarly, Van Syckle and Brough, 1958 (91) found that in Washington there appeared to be no clear fat preference since as many of their respondents bought meat with yellow fat as bought meat with white fat. Stevens et al, (88) using coloured photographs of different beef cuts found in one study that 66% of their respondents preferred meat with white fat, but in other studies they reported that they had not found any discrimination against light, yellow coloured fat.

Lasley et al., 1955 (56) found that among their respondents, 31.5% preferred creamy white fat; 27.2% white fat; 18.5% creamy-coloured fat; 13.0% slightly yellow fat and the remainder had preferences for yellow, very yellow or some other coloured fat. One thing that they did find was that the consumers who expressed a preference for a certain fat colour tended to emphasise freshness, appearance and taste, and in general it was the people with the creamy white fat preferences who expressed these opinions. Malphrus, 1957 (65) found that urban dwellers tended to discriminate against yellow fat more than the rural dwellers.

Van Syckle and Brough, 1958 (91) found that the shape, size (including the thickness) of a cut and also the appearance of the lean had a tremendous effect on what the consumer purchased in the way of meat cuts. There also seems to be an interrelationship between visual properties of meat and its likely eating qualities. Lasley et al., 1955 (56) found that consumers placed great emphasis on the colour of lean, especially when buying pre-packaged meat, as they assumed this to indicate freshness and tenderness. From these studies it would appear that consumers have certain attitudes towards meat that have been built up over a number of years and that they associate certain eating qualities of meat with its visual properties. Myers and Reynolds, 1967 (70) found that past experience as well as anticipated sensory qualities were important in determining attitudes toward meat.

5.2. EATING PREFERENCES

What do consumers look for when they are eating their meat and which factors are likely to affect their meat preferences? Kiehl, 1958 (52) found that freshness, tenderness, flavour and juiciness were important variables associated with the consumers' eating preferences. When asked to rank the variables in order of importance the consumers placed them in the order shown above. In a previous study (52) which had not included freshness, the consumers had ranked the different variables in the following order: tenderness, flavour, juiciness and amount of fat. The three variables associated with eating preference are tenderness, flavour and juiciness. Brayshaw (9) found that butchers thought consumers considered tenderness, leanness and flavour to be the most important considerations when buying meat and that leanness and tenderness were of equal importance.

5.2.1. Tenderness and Texture. These qualities of meat have been studied more than any other and they are interrelated. If meat is so tough that it is difficult to eat, then it is unsatisfactory to the consumer. But even if it can be eaten, certain textural requirements are required (Deatherage, 18). Deatherage maintains that from earliest times it was realised that tenderness and texture were related to the age and nutrition of the animal and also that postmortem age improved the tenderness. Early concepts held that connective tissue was responsible for the toughness of meat. Bate-Smith and co-workers instituted studies which continued for some years (Bate-Smith, 1948), (6) on the chemistry and physiology of rigor mortis and related phenomena and showed that meat toughened on entering rigor mortis. Cover, 1936 (15) and co-workers began a long series of studies on methods of measuring tenderness and texture and relating these to meat cookery and the chemistry of muscle. Later Deatherage and co-workers, 1946, 1947 (17, 19) and others suggested that the contractile tissue as well as the connective tissue was responsible for tenderness and texture. Still later, Hamm and co-workers, 1960 (35) examined the effects of processing on meat tenderness as did Locker, 1960 (62) and others.

Levie, (59) showed that consumers liked their meat to be very tender, but

that in their actual purchasing behaviour showed a preference for the comparatively tough cuts of steak such as rump in preference to the more tender cuts such as tenderloin.

McFadyen et al., 1973 (63) found that consumers related tenderness and toughness to their cooking ability.

5.2.2. Juiciness. The degree of shrinkage on cooking is directly correlated with loss of juiciness to the palate (Siemers and Hanning, 1953), (84). Juiciness in cooked meat has two organoleptic components. The first is the impression of wetness during the first few chews and is produced by the rapid release of meat fluid; the second is one of sustained juiciness, largely due to the stimulatory effect on salivation (Weir, 1960), (94). According to Gaddis et al., 1950 (28) this function explains why, for example, the meat of young animals gives an initial impression of juiciness but, due to the relative absence of fat, ultimately a dry sensation. Good quality meat is more juicy than that of poor quality, the difference being partly attributable to the higher content of intramuscular fat in the former (Gaddis et al., 1950, (28); Howard and Lawrie, 1957 (47).) An association between juiciness and intramuscular fat has been noted in comparing rib roasts from several groups of steers and bulls which had the same sire (Bryce-Jones et al., 1963), (11); juiciness varied significantly between the groups.

Law and Vere-Jones, 1952 (57) and Bouton et al., 1954 (7) reported finding no effect on juiciness by the actual process of freezing, but Howard and Lawrie, 1957 (47) found that storage did have an effect. Hamm and Deatherage, 1960 (35) reported that freeze drying when operated even under optimum conditions causes some loss in juiciness.

Levie (59) showed that people preferred the more juicy cuts of meat.

5.2.3. Flavour and Odour. According to Lawrie (58) flavour is a complex sensation involving odour, taste, texture, temperature and pH. Of these, odour is the most important. Without it one or other of the four primary taste sensations predominates, i.e. bitter, sweet, sour or saline.

There are considerable differences between species in intramuscular fat (Lawrie, 1966) (58); and according to Hornstein and Crowe, 1960, 1963 (42, 43) these are reflected in differences in volatiles produced from the heated fats and account for the differences in flavour of meat from different species. Jacobsen et al., 1962 (49) reported that they found flavour differences between breeds in sheep and cattle, while Bryce-Jones et al. 1963 (11) found differences in meat flavour between groups of animals with the same sire. It would appear that not only can flavour differences be detected between species but also between breeds within the same species.

Lawrie, 1966 (58) claims that there are flavour differences between older and younger animals with the former having a much stronger flavour. He also claims that there are differences between muscles within the same animal. Thus beef l.dorsi muscle has an apparently better flavour than semitendinus (Doty and Pierce, 1961 (23); Howard and Lawrie, 1957 (47).)

The biochemical condition of a given muscle would also appear to be a factor determining the flavour. Bacon of a relatively high ultimate pH according to Ingram, 1949 (48) appears to be less salty than that of a low pH, even when the salt content is the same.

Weir, 1960 (94) found that the method of cooking and the degree of doneness could have a marked effect on the flavour of a meat. He found, for instance, that leg roasts of lamb cooked to an interior temperature of 65°C had an odour and taste more characteristic of lamb than if cooked to an internal temperature of 75°C.

Weir (94) also found that prolonged cooking at high temperatures caused a marked breakdown of the meat proteins and the production of undesirable H_2S odours. Howard, 1956 (46), Howard and Lawrie, 1957 (47), and Bouton et al., 1957, 1958 (7, 8) found that the odour and taste of beef roasts cooked to an internal temperature of 82°C over two hours in an oven at 177°C generally received a lower taste panel rating than grills from the same animal cooked to the same internal temperature over 0.5 hours in an oven at 288°C.

Rhodes et al., 1958 (83) correlated organoleptic scores for beef loins made by the laboratory panel, with those of a consumer panel and found that the simple correlations between mean ratings of the two panels were: tenderness, 0.69; flavour, 0.56; and juiciness, 0.13. They also found simple correlations between individual ratings: tenderness and juiciness (r=0.48); tenderness and flavour (r=0.37); juiciness and flavour (r=0.34). Morgan, 1967 (69) published a correlation of 0.52 between flavour and juiciness scores of a panel. These results tend to indicate that there is some interrelationship between the different variables and that consumers tend to store the different variables associated with eating in a rather complex fashion.

5.2.4. Meat Preferences. According to consumer research reported by Carpenter, 1972 (13), lamb is generally considered by United Kingdom consumers to be unappetizing and wasteful and is low on their meat preference list, with beef, poultry and pork surpassing it in preference.

Lamb is even less popular in the United States. The American Sheep Producers Council, 1964 (1) and Weidenhamer et al., 1969 (93) showed that there is widespread ignorance on the part of the consumer about lamb and the American consumer was not really interested in learning about it, either.

Gregory et al., 19 (33) in a survey carried out in Columbia, Missouri found that chicken was the most preferred meat in that part of the United States, followed by sirloin steak, hamburgers, beef roasts, etc., as in table 29.

Gregory et al., (33) also examined the affect of socio-economic position on the meat preferences. They found in comparison with women from other socio-economic groups that professional class homemakers were more favourably disposed toward sirloin steak, beef roast, pork roast, lamb roast, lamb chops, beef tongue, pork heart, and pork tongue. Meats which were regarded more favourably by Negro respondents than other homemakers included ham, pork chops, spare ribs, pork sausages, hens, and boiling beef. Middle class homemakers were more favourable in their attitudes toward bacon,

veal steak and beef heart. In comparison to homemakers in other socio-economic groups, lower-class white women reflected a less favourable attitude toward pork brains and beef brains.

Table 29: Meat preferences in Columbia, Missouri

Rank	Meat	Rank	Meat
1.	Fried chicken	13	Boiling beef
2.5	Sirloin steak	14.5	Hens
2.5	Hamburger	14.5	Veal steak
4	Beef roast	16	Lamb roast
5	Ham	17	Salt pork
6	Bacon	18	Lamb chops
7	Pork chops	19.5	Pork liver
8	Turkey	19.5	Beef tongue
9.5	Spare ribs	21	Beef heart
9.5	Pork sausage	22	Pork brains
11	Pork roast	23	Beef brains
12	Beef liver	24	Pork heart
		25	Pork tongue

5.2.5. Meat Prices and Budgets. The meat consumption surveys in Sydney, 1967 (45) and Melbourne, 1970 (44) showed two things: first that meat consumption tended to increase with increasing income and secondly, that above a certain income consumers stopped buying more meat and instead bought the more expensive meat cuts.

McShane, 1973 (64) found that housewives tended to have some minimum level below which they would not allow the quantity of meat purchased to decline. He also found that a majority of housewives allocated a portion of their budget, either deliberately or subjectively to a meat budget. On the basis of this budget the housewife then determined the quantity and quality of her meat purchases. He found, above a certain income level, that

the budget did not influence the quantity of meat purchased, but had more influence on the type of cut bought by the housewife.

5.2.6. Consumers' Meat Buying Behaviour. Many of the factors which have been discussed act at the point of purchase, i.e. at the retail outlets, whether it be butcher shop or supermarket, in that they affect the consumers' choice at the time of purchase. Colour of the meat and fat, the amount of lean, the amount of fat and the size of the cut are all factors that have been shown to have an effect on consumer purchase behaviour, influencing the consumer to select one piece of a particular cut in preference to another piece of the same cut.

5.2.7. Intangible Meat Preferences. Myers and Reynolds, 1967 (70) and Dichter, 1964 (22) have shown that there are more abstract motivations that influence the acceptance of meat. Dichter, 1964 (22) found that there were symbolic factors associated with the acceptance of beef. For instance, if a person likes a rare steak, the reason could very well be that it is the strength of the bull that the person is trying to incorporate. He also found that American consumers had a hostile attitude towards the meat of lamb because of the connotations with the beautiful, meek and lovable animal. He argues that Americans will not eat it because they subconsciously feel that some of its cowardliness and "sheeplike" qualities might mysteriously become part of themselves. Gregory et al. demonstrated little direct connotation between the homemaker's image of a meat producing animal and her attitudes toward its derived meat products, i.e. knowing a housewife's image of a producing animal was of little value in predicting her attitude towards meat cuts derived from the animal. They did not examine the interrelationship between lambs and the cuts derived from lamb. (33)

5.3. OVERALL MEAT PREFERENCES

More recent investigators have concentrated on a range of diverse factors affecting a consumer's attitudes toward different meats. The first of these was Gregory et al. (33) The basic aim of their experiment was to

determine the extent to which homemakers conceptualised meats into categories or meat groupings.

They found that meats generally had a favourable image among housewives; also that the housewives tended to think in terms of three meat categories: beef and liver cuts, organ cuts, and pork cuts. Beef and liver cuts were found to have the most consumer positive attributes, followed by pork cuts, and organ-cuts which were viewed in decidedly negative terms.

According to them, whenever a housewife was considering the selection of a meat she first thought of the meat's acceptability and then, in terms of its more specific qualities. Pork cuts were found to have a lower acceptability rating than either beef or poultry. This lower rating was attributed to the higher fat content in pork cuts or at least the perception of a higher fat content by the consumer.

McFadyen et al., 1973 (63) and also Carpenter and Hughes, 1974 (12) have attempted to obtain the factors which are important
(a) for all meats, and
(b) for specific meat cuts
from a whole range of variables which are known to affect the consumer's purchase of meat. McFadyen et al. generated a whole series of variables which consumers thought were important in the selection of their meat with the aid of the Repertory Grid Technique (Frost and Braine, 1967 (27)). Three hundred and four variables were obtained using this technique, but these were subsequently categorised into fifteen ideas; subsequent survey pre-tests reduced the number even further to twelve factors and these were then used by them in a semantic differential survey which was carried out in Edmonton, Calgary and Vancouver. The most important factors related to the consumer acceptance of meat were: 'nutrition', 'tenderness', 'suitability for serving to special guests', 'fattiness', 'waste', and 'packaging'. Other factors were found to be of importance for specific cuts. For instance, the additional important factors for beef cuts were: 'fat', 'waste', 'packaging' and 'lunch';
poultry cuts were: 'expense', 'packaging', 'preparation' and 'season';
lamb cuts: 'expense', 'packaging', 'preparation' and 'season';

pork cuts: 'fat', 'waste', 'packaging', 'lunch' and 'preparation';
processed products: 'versatility' and 'season'.

They found that lamb cuts were accorded relatively low scores on each of the twelve factors indicating that most consumers would not purchase them.

They also found that opinions about 'fat content' were based on preconceived ideas and were not closely associated with wastage. 'Nutrition' evoked concern for healthfulness in terms of fat content and degree of processing.

Carpenter and Hughes, 1974 (12) in a study carried out in Newcastle (United Kingdom) used a completely different technique to obtain their initial set of factors to that used by McFadyen, namely the personal interviewing technique using small housewife panels. They were able to identify fifteen major factors or criteria which were important for all types of meat cuts, namely: 'tastiness', 'tenderness', 'nourishment', 'value for money', 'whether liked by children', 'number of ways of serving', 'ease of preparation', 'flavour', 'speed of cooking', 'juiciness', 'amount of bone', and 'usefulness for a main meal'.

Factor analysis was carried out on the results from a sample of 300 housewives and the analysis identified four factors which were salient in housewives' assessment of meat cuts. These were: "eating quality", "wastefulness", "economy" and "usefulness".

"Eating quality" was found to be a composite of the scales - 'tender', 'good flavour', 'tasty', 'nourishing' and 'juicy'.

"Wastefulness" of the scales - 'amount of bone', 'leanness' and amount of 'waste'.

"Economy" of - 'cheapness' and 'value for money'.

"Usefulness" for midweek cuts of meat of - 'number of ways of serving' and 'whether liked by children' and for Sunday roasts it was - 'ease of carving', 'use as a cold meat' and amount of 'cutting'.

Carpenter and Hughes then scored fifteen meat cuts on the four factors, and found that very few cuts performed well on all four factors, suggesting that many fresh cuts of meat did not satisfy all the basic consumer food needs.

This review traces the development of the researchers' conception of consumer behaviour. In the first place it was dominated by examination and research into the sensory characteristics of meat and the subsequent behaviour of consumers. Subsequent work by Dichter, 1964 (22) and Myers and Reynolds, 1967 (70) indicated that these sensory characteristics were not the only factors of importance in determining the behaviour of consumers and their research led on to the more fruitful research of McFadyen et al., 1973 (63), and Carpenter and Hughes, 1974 (12). Carpenter and Hughes' work shows how the early consumer behaviourists, in the meat field at least, were wrong to simply consider meat quality, i.e. the sensory characteristics, in their assessment of consumer attitudes toward meat. It would appear to be one of four factors important in the decision process of any consumer. Neither research group sought an answer to the question of whether it is the most important factor in the consumer decision process.

The work of McFadyen et al. and that of Carpenter and Hughes provides the meat industry with a method to more clearly define the meat requirements of consumers.

Details of the work of Carpenter and Hughes were not available at the time of the questionnaire design for this project and for this reason the present project was based on the work of McFadyen et al. The aim of the present project was to determine the attitudes of consumers in Palmerston North to a number of meats and, in particular, to ham, bacon and processed meat products; products which are produced by the bacon industry. Once these attitudes had been obtained it was intended that the products which are currently produced by the bacon industry should be compared with the more consumer acceptable fresh meat cuts with the idea of building any attributes which were considered to be responsible for the high acceptance of the fresh meat cuts into some of the products produced by the bacon industry. A secondary objective of the present project was to determine

the relative importance of the different variables - tangible and intangible - with the idea of specifying which consumer important variables ought to be examined first in any research programme.

5.4. METHODS USED IN THE SURVEY AND POPULATION STUDIED

For the purposes of this survey the major dimensions in which housewives conceptualise meat as a food product were selected from the Canadian studies of McFadyen et al. (1973) (63). These were: 'would buy', 'expense', 'tenderness', 'fat', 'waste', 'packaging', 'nutrition', 'guests', 'lunch', 'quickness', 'versatility' and 'season'. 'Packaging' was omitted from the present study because in New Zealand it is not generally an important factor in buying of meat. Studies by Gregory et al. (33) had shown that flavour was also an important variable in meat consumption and for this reason flavour was also included. The McFadyen et al. study (63) included only length of preparation, i.e. 'Quick' as a factor, obviously incorporating length of cooking in this dimension. However, it was felt that while the terms could be synonomous for certain meats, i.e. one meat may take a long time to prepare and a short time to cook, and vice versa; for this reason their factor of 'quick' was subdivided into two factors: 'length of preparation' and 'length of cooking'.

According to Heise (40) attitudes have three dimensions: evaluation, potency and activity. These dimensions can be described by adjectival pairs. Evaluation is measured by adjectives referring to the "good-bad" qualities, potency by "strong-weak" qualities, and activity by "active-passive" qualities. If a complete measure of attitude is to be measured, then the above three dimensions must be included. In the present study the factors to be considered to measure evaluation were: 'would buy', 'expense', 'tenderness', 'fat', 'waste' and 'flavour', while potency was measured by 'nutrition', 'guests' and 'lunch' factors, and activity was measured by the 'versatile', 'season', 'length of cooking' and 'length of preparation' factors.

The importance of the factors used to differentiate meats was determined using a semantic differential survey technique (Heise, (40)). A seven point rating scale was used for the respondents to evaluate 24 carefully selected meat cuts. The objective was to produce profiles for the 24 meat cuts by the 13 factors so that the meats could be compared and contrasted and reasons could be found for the high preference of certain cuts compared with others, and also why certain meats are eaten in greater quantities than other meats.

The 24 meat cuts were carefully selected to provide some indication as to how some of the principal meat products produced by the bacon industry stood in relation to a number of selected fresh meat cuts. The objective was to find out why some of the fresh meat cuts such as chicken, rump steak and leg of hogget were preferred by the consumer to such processed products as bacon, ham and sausages, and to see if a product could be designed which would incorporate some of the properties of these more preferred meats.

Chicken was included in the survey because there are indications that the per capita consumption of chicken in New Zealand is increasing each year (75), and secondly because Gregory et al. (33) had found in their studies that fried chicken was the most preferred meat. It was felt that chicken was encroaching upon the sales of meat in this country, and the reasons for chickens' apparent increasing popularity were sought. Rump steak was included in the survey as a representative of the more prestigious beef cuts, which also include porterhouse and fillet steaks, and because general comments in the first consumer survey indicated that most consumers bought rump steak because it was slightly cheaper than the other two steaks. Lamb loin chops were included because of their similarity to pork chops, and reasons for the higher consumption of loin chops in the consumer survey were sought. Lamb neck chops, stewing steak and pork pieces were included because they are essentially stewing meats. Rolled beef, leg of pork and leg of hogget were included because they are regarded as roasting meats and some reason was sought for the decline in consumption of these meats as shown by the consumer survey. Corned beef was included as being representative of processed beef products and could therefore be contrasted with other cured processed products such as bacon and ham. Lambs fry was included

because it was thought that organ meats have a very low acceptance in this country as evidenced by the rather low consumption per capita figures of approximately 2.6 kg/annum (75) and that this product would determine the lower acceptance bound of the 24 meats. Such products as beef sausages, shoulder bacon, ham-on-the bone, etc. were included as they are the major product lines of the bacon industry, and ham and bacon were of particular importance as the industry study, the market study and the consumer survey had shown a marked drop in their consumption, reasons for which were being sought in this study.

5.4.1. Questionnaire. The questionnaire used in this survey was of the semantic differential type. This scaling procedure was developed by Osgood and his associates (80). The 13 different variables were arranged to give 13 sets of pairs of bipolar adjectives, by which the consumers were to assess 24 selected meats. All the variables were presented on one sheet of paper, and directly opposite was another with the 24 meats and a grid for the rating of each variable. The housewives were asked to fill in their assessments of each meat according to all the factors before proceeding to the next meat. While it was realised that each variable ought to be presented on a separate page so that the meats and meat cuts were rated for one variable at a time, pre-tests had shown that the housewives tended to get bored toward the end with this type of questionnaire, and objected to filling in seemingly endless pages of questionnaire. For this reason a single grid was selected to overcome their objections to the original questionnaire. The final questionnaire form is presented in Appendix 6.

The 24 meats were not arranged in a different order for the 30 survey forms because of the costs and difficulties associated with doing so for such a small sample.

The housewives were asked to assess several pork, beef, sheep meat and poultry cuts and also several processed meat products which were then available on the Palmerston North market. The survey pre-tests showed that some housewives had not tasted three products. These products, frankfurters, boiling bacon and salami were, however, still included as it was hoped that in the case of those housewives unfamiliar with the products, assessment

would be on the basis of their pre-purchase attitudes, which in turn could help in determining the likely success of these three products.

The questionnaire also included two ranking questions. In the first, the housewives were asked to rank the 24 cuts of meat in order of preference, putting the meat they liked most first, and the least liked last. The respondents were not allowed to give meats equal ranks. In the second question, they were asked to rank the 13 variables in order of importance when buying meat for their family; once again they had to put the most important factor first and the least important factor last.

The survey was pretested on a number of respondents representing the different age groups.

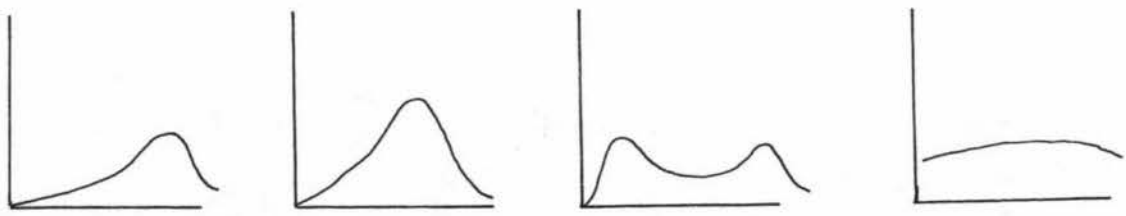
5.4.2. The Sample. Thirty housewives were selected from the respondents contacted during the original survey of Palmerston North. It was hypothesised that the attitudes of housewives toward different meat cuts would change according to the stage at which they and their families were in the family life cycle (96, 97), therefore the sample was initially stratified into the following four age groups: the under 30's, the 31-50's, the 51-60's and the over 60's. A sample of 30 housewives was drawn from these sub-groups to exactly mirror the New Zealand population. However, pretesting of the questionnaire showed that the over 60's as a group were unable to answer the complex questionnaire with any degree of reliability and for this reason were dropped and the numbers in each of the other age groups were increased to give a total sample size of thirty.

The thirty people were contacted and the data was analysed using Kendall's coefficient of concordance (51) and Cronbach's (2) reliability estimate (16, 67). Because the results were significant sampling was stopped. There was no intention of segmenting the results on the basis of age to see whether there was any significant difference between age groups, but only to provide a sample which represented the spectrum of attitudes of the Palmerston North citizens toward the 24 meat cuts.

5.4.3. Interviewing. The interviews were conducted in the respondents' homes by two female interviewers with considerable experience in interviewing. The two interviewers had the same number of respondents to contact and the numbers of people in each age group were identical for both interviewers. The sample was split into two equal halves to help determine any interview bias. The interviewers called at the housewives' homes and asked them to answer the two ranking questions immediately. Once these were answered, they carefully explained the semantic differential questionnaire by way of unrelated examples and left the housewives with the forms to be filled in within two days, after which time the interviewers returned and picked up the completed forms. Only completed forms were to be used in the analysis. As it happened, all forms were completed by the respondents.

5.4.4. Analyses. The responses from the completed surveys were key-punched on IBM data cards. The FASTABS programme (Nie, Bent and Hull, 1970) was used to obtain chi-square tests for independence. The data was tested for both interviewer and respondent effects. The respondent effects were determined with the aid of two techniques; coefficient of concordance and rater reliability. (51, 16)

An examination of the frequency distributions of the scores on each factor meat showed that four types of frequency distributions were obtained - skewed, normal, bimodal and spread.



Skewed Normal Bimodal Spread

Normal distributions were generally common to the following factors: 'season',

'wastage', 'type of meal', and for some meats, 'expense', 'tenderness', 'would buy' and 'frequency of serving'.

'Nutrition', 'prestige', 'flavour' and 'would buy' tended to come through as skewed distributions for most meats, indicating strong attitudes by the respondents to these factors.

Bi-modal distributions for the different meats and factors can be seen in table 30. Quite clearly there were two groups of respondents who thought quite differently on the factors displayed in table 30.

Table 30: Bi-modal distribution for the different factors

Meat	Factor
Rump steak	Prestige
Stewing steak	Season, Wastage
Rolled beef	Would buy
Loin chops	Type of meal
Neck chops	Season, Cooking, Frequency
Pork pieces	Would buy
Side bacon	Type of meal
Boiling bacon	Would buy, Frequency, Prestige
Ham-on-tye-bone	Type of meal
Hawaiian ham	Cooking
Lambs fry	Expense
Beef sausage	Would buy, Versatility
Pork sausage	Frequency
Luncheon	Would buy, Tenderness
Salami	Would buy, Type of meal
Frankfurters	Tenderness

The meats and factors on which a 'spread' frequency distribution was obtained are shown in table 31. Respondents appear to have had great difficulty

with the versatility question because a spread distribution on this factor was obtained for practically every meat, suggesting that people really did not know what versatility meant in the context of the question, something which was not picked up in the questionnaire pre-test. The spread distributions for salami and boiling bacon were expected, as only 50% or less of the respondents had ever tasted or bought them. The large number of spread distributions for lambs fry would appear to indicate that the consumers could not rate this product either because they had not tasted it or because they could not conceptualise it as being a meat. The low per capita consumption of offal meat in New Zealand would tend to suggest the former reason was correct.

Table 31: Spread frequency distributions on the various factors

Meat	Factor
Rump steak	Versatility
Stewing steak	Preparation
Rolled beef	Tenderness, Frequency of serving
Loin chops	Versatility
Neck chops	Preparation
Leg of hogget	Frequency, Prestige, Versatility
Pork chops	Frequency, Versatility
Pork pieces	Preparation, Type of meal, Versatility
Leg of pork	Versatility
Shoulder bacon	Versatility
Side bacon	Versatility
Boiling bacon	Tenderness, Flavour, Versatility
Ham-on-the-bone	Wastage, Versatility
Sliced ham	Prestige, Versatility
Lambs fry	Would buy, Tenderness, Frequency, Type of meal, Versatility
Beef sausage	Frequency, Flavour
Pork sausage	Would buy, Versatility
Luncheon	Cooking, Flavour
Salami	Expense, Tenderness, Prestige, Versatility
Frankfurters	Flavour

The respondents appear to have had some problem in deciding how much 'preparation' was required for the three stewing meats, i.e. stewing steak, neck chops and pork pieces.

Quite clearly the data on at least one factor for each meat suffered from some distribution defect, either because the distribution was bi-modal or because it was spread, and for this reason the sample should have been expanded to try and overcome some of these defects in the data, but problems of time and expense prevented this.

The median rather than the average for each factor was used because a number of the meat-by-factor distributions were skewed. According to Snedecor and Cochran (87) the median is used in cases of skewed distributions because in such cases the median seems to represent people's concept of an average better than the mean. It must be stressed that most of the meat-by-factor distributions were normal and the median was equal to the mean.

Reliability of the semantic differential survey: of the thirty households approached all thirty forms were completed. Tests for independence of the data from interviewer effect were determined by t-test for each factor and no significant difference was found. Tests for reliability of the respondents were determined by two mathematical tests, Coefficient of concordance and Rater reliability, and both these thests showed that there was significant agreement between the respondents, p 0.05. For details see Appendices 7, 8 and 9.

5.5. MEAT PREFERENCES

The following section of the report deals with the consumers' meat preferences and also the product profiles of the 24 meats. The respondents were asked to rank the 24 meats in order of preference, putting those they liked most first, and those they liked least last. No ties were allowed. The results were analysed for significance by the Coefficient of concordance test, and agreement between respondents was greater than 99.9% significance, i.e.

$p \leqslant 0.001$. The results are given in table 32. The rankings of the 24 meats by individual respondents can be found in Appendix 10.

Table 32: Meat preferences

Meat	Rank
Chicken	1
Rump steak	2
Leg of hogget	3
Leg of pork	4
Ham-on-the-bone	5
Corned beef	6
Pork chops	7
Rolled beef	8
Hawaiian steak	9
Sliced ham	10
Stewing steak	11
Loin chops	12
Side bacon	13
Shoulder bacon	14
Pork pieces	15
Lambs fry	16
Pork sausage	17
Boiling bacon	18
Neck chops	19
Beef sausages	20
Salami	21
Saveloys	22
Luncheon	23
Frankfurters	24

Gregory et al. in a study carried out in Columbia, Missouri (33) found that fried chicken was the most popular meat, followed closely by sirloin

steak, a very similar finding to that of the present study. However, he also found that a number of processed meat products had quite high acceptability. Hamburgers for instance were as popular as sirloin steak, and ham and bacon were more acceptable than pork chops. This is in complete contrast to the findings of the present survey which showed that processed products, with the exception of ham, have an extremely poor acceptability rating in Palmerston North. Many of the products, such as beef sausages, salami, saveloys, luncheon and frankfurters were even less acceptable than lambs fry which was originally envisaged as the least popular meat and therefore the lower limit to the acceptability scale.

Corned beef received an unexpectedly high acceptability rating, just below ham-on-the-bone.

There were relatively high standard deviations for rump steak, leg of hogget, chicken, luncheon and frankfurters, which showed that there was a certain amount of disagreement among respondents as to the meats' relative acceptabilities. It was not entirely unexpected for frankfurters as some 40% of the sample had never eaten them. Luncheon was rated quite highly by five respondents, and all the others gave the product a poor rating, hence the consequent high standard deviation. The high standard deviations for rump steak, leg of hogget and chicken were not unexpected. The consumer survey (Chapter 3) had indicated a number of segments characterised by either high beef consumption and very little else, high sheep meat consumption and little else, high chicken consumption and little else, and the last a segment which ate something of everything. One would therefore expect these attitudes of meat purchasing to be reflected in the respective segments scoring for the different meats, and in particular for the most prestigious cuts of the respective meats, namely rump steak for the beef eaters, leg of hogget for the sheep meat eaters, and chicken for the poultry consumers.

In table 33 the rankings of the different meats on the preference questions plus the rankings on the eight preference dependent variables (i.e. variables significantly correlated with the preference question) can be found. The rankings on all the 13 variables can be found in Appendix 16.

Table 33: Ranking of the 24 meats on each of the eight variables

Meat	Preference	Would Buy	Frequency	Expense	Flavour	Nutrition	Prestige	Type of Meat
The 8 most acceptable meats								
Chicken	1	2	3	13	4	3	1	10
Rump steak	2	1	2	10.5	2	2	6	1
Leg of hogget	3	5.5	1	14	9	4	5	4.5
Leg of pork	4	3.5	21.5	4.5	4	9	2	2.5
Ham-on-the-bone	5	3.5	24	4.5	1	5	3	14
Corned beef	6	5.5	4	9	10.5	15	8.5	7
Pork chops	7	9	11	4.5	7	11	7	2.5
Rolled beef	8	9	7	10.5	14	6.5	10	4.5
The 8 medium acceptable meats								
Hawaiian ham	9	9	17	4.5	7	9	4	11.5
Sliced ham	10	9	12.5	4.5	4	9	8.5	18
Stewing steak	11	13	5	17	7	6.5	11	6
Loin chops	12	14	9	15	13	12	15.5	9
Side bacon	13	11	7	4.5	10.5	16.5	15.5	19
Shoulder bacon	14	12	12.5	4.5	12	13.5	17	20
Pork pieces	15	15	16	12	15.5	18	12	3
Lambs fry	16	20	20.5	18	17.5	1	19	13
The 8 least acceptable meats								
Pork sausage	17	18	7	21	11.5	20.5	21	16.5
Boiling bacon	18	16	20.5	4.5	15.5	16.5	13.5	15
Neck chops	19	24	15	23	17.5	13.5	18	8
Beef sausage	20	21.5	14	19	22	20.5	21	16.5
Salami	21	17	20.5	16	15.5	19	13.5	23
Saveloys	22	21.5	17.5	22	24	24	24	22
Luncheon	23	23	10.5	24	23	22	23	24
Frankfurters	24	19	18.5	20	21	23	21	21

An examination of table 33 shows that the most preferred meats were generally ranked best on the following factors: 'would buy', 'flavour', 'nutrition', 'prestige', 'versatility', 'expense', and 'type of meal' and all these factors were highly correlated with preference. In other words, it would appear that the respondents would buy the ten most preferred meats if all prices were the same. They thought these meats were reasonably expensive to very expensive, highly nutritious (corned beef was an exception), had an acceptable flavour (rolled beef was an exception), and were prestigious and reasonably versatile. The least favoured meats generally scored badly on all these factors.

An analysis was carried out on the 13 variables to see whether there was any correlation between the consumers' meat preferences and their responses to the 13 attitude variables and also to see whether there was any correlation between 'frequency of usage' and the other attitude variables. The 24 meats were ranked by the median score for each attitude variable. The correlation results are displayed in table 34.

Table 34: Variables significantly correlated with preference and frequency of usage

Preference				
Would buy	Type of meal	Prestige	Nutrition	Flavour
$R=0.94^{+}$	0.76^{+}	0.91^{+}	0.80^{+}	0.90^{+}
Versatility	Expense			
$R=0.59^{-}$	0.61^{-}			
Frequency of usage				
Preference	Type of meal			
$R=0.46^{-}$	0.42^{-}			

\+ Significant at p 0.1

\- Significant at p 0.5

The high correlation of 'would buy' with preference suggests that if all meat prices were the same, people would buy the meats they preferred. In

other words, this question appeared to reflect the meat preferences of the consumer, something which was hypothesised at the start of the survey (see table 34).

'Expense' and 'preference' were also correlated (p 0.5%) and the most expensive meats were the meats highest on the preference list. Chicken and rump steak were exceptions as these were seen to be only moderately expensive and yet were on the top of the preference list. The three bacon cuts, which were placed midway and toward the least preference scale of the meats were also exceptions to the above correlation in that consumers considered the cuts very expensive.

'Wastage', 'tenderness', 'cooking', 'preparation' and 'seasonality' do not appear to have affected the preference or acceptability rating of each meat as 'wastage', 'cooking' and 'preparation' were all negatively correlated with preference. The most preferred meats with certain exceptions such as rump steak, were considered by the respondents to require quite a bit of cooking and preparation and were generally seen as quite wasteful meats, while the least acceptable meats were generally given high ratings on these factors. There was absolutely no trend for 'tenderness' or 'seasonality'.

'Type of meal', i.e. snack or main meal type meats, was correlated with 'nutrition' and 'preference' and suggests that the consumers thought that main meals were highly nutritious. The sausage type products and bacon products, considered by the consumers to be 'snack' meats, were given poor 'nutritional' ratings.

In the case of the sheep meat cuts there was a significant correlation (p 0.1) between 'nutrition' and 'wastage', suggesting that lamb and neck chops were given a poor 'nutritional' rating because of their high fat-plus-bone to protein or meat ratio.

The 'versatility' question produced a rather odd result in that the least preferred meats were all given poor ratings on this question, as were some of the most acceptable meats, but the eight mediumly acceptable meats with the exception of lambs fry were all rated quite highly on 'versatility'

and 'versatility' was correlated with meat preferences, suggesting that consumers ranked these eight meats ahead of the eight least preferred meats because of the differences in versatility between the two groups in addition to the other four factors.

The 'frequency' question was included in the survey to try to get some measure of the respondents' existing meat purchase habits. They were asked to state whether they served each meat often or infrequently on a 7-point scale. The responses to this question were correlated with actual per capita consumption of a few of the cuts which had been gathered in the consumer survey and found to be highly significant. In other words, the respondents' ratings appeared to bear some relationship to their existing meat purchase behaviour. If this is so, then the question must be asked "Which other meat quality and societal factors determine the meats which respondents buy?" The only factors which 'frequency of serving' was found to be correlated with were 'preference' and 'type of meal'. In other words, housewives generally served the meat they liked most, but frequency depended on the type of meal. Main meal meats were generally served more often than snack type meats, and within the context of each meal type, certain meats tended to be served more often than others.

The snack type meats, which appear mainly in the eight least favourable group, generally had a very poor consumer image with respect to 'flavour', 'prestige', 'versatility', 'nutrition', etc. and the only things in their favour were their convenience and low wastage. It would appear that housewives expect these latter three characteristics to be built into their snack-type foods, but certainly do not expect them in their main meal meats.

The pork cuts were all served, although at varying frequencies, despite the fact that they were all considered to be expensive. The order of frequency of serving of the different pork cuts is given in table 35.

Table 35: Frequency of serving of the pork cuts

Meat	Frequency of Serving	Preference	Type of Meal *
Side bacon	7	13	19
Pork chops	11	7	2.5
Shoulder bacon	12.5	14	20
Sliced ham	12.5	10	18
Hawaiian ham	17	9	11.5
Boiling bacon	20.5	18	15
Leg of pork	21.5	4	2.5
Ham-on-the-bone	24	5	14

* The meats have been ranked on a scale from 1 to 24, where 1 represents a main meal and 24 represents a snack meal.

It is quite noticeable in table 35 that all the pork cuts which the consumer could purchase in small quantities tended to be served more often. In the market place, ham was the most expensive meat per unit weight, followed by bacon, with pork the cheapest, and this actual cost difference may have been responsible for the difference in frequency of use of the smaller cuts. Leg of pork, ham-on-the-bone and even boiling bacon, cuts which do require a large expenditure per purchase, do not appear to have been served with any frequency by the respondents. There would appear to be a need for the bacon industry to offer all the pork cuts in small unit packages which do not require a large expenditure by the consumer at any one time.

In conclusion, the respondents' meat preference pattern appears to depend on the following factors: 'flavour', 'nutrition', 'prestige', 'versatility', and 'expense', while the 'frequency of use' of the different meats would appear to depend on 'preference' and 'type of meal'.

Of the products produced by the bacon industry, ham was the most preferred,

followed by bacon, pork and beef sausages and then the comminuted sausage products of which salami was the most popular. Ham-on-the-bone was the most popular ham cut, while there was very little difference between Hawaiian and sliced hams. Side bacon was the most popular of the bacon cuts, though there was very little difference between it and shoulder bacon. The popularity of boiling bacon was quite low compared with the other bacon cuts. Of the comminuted products, pork sausages were the most acceptable followed by beef sausages, salami, saveloys, luncheon and frankfurters.

The frequency of consumption of the different cured products appears to be associated with the size of cut that the consumer has to purchase. For this reason the consumption frequency of ham-on-the-bone was less frequent than the less popular sliced ham, similarly with the bacon cuts. Boiling bacon was not used with the same frequency as side or shoulder bacon, and preference as well as cut size is thought to have some bearing on the relative frequency of consumption of boiling bacon.

5.6. PRODUCT PROFILES - A COMPARISON OF MEATS

As a result of the way the answers to the semantic differential questionnaire were set out, i.e. in a grid, it could be argued that the consumers were constantly and consciously able to deliberate on the merits of each meat compared with all the rest. Because they were able to do this it should be possible to compare and contrast the meats on the 13 factors to determine why certain meats were preferred more than others. In other words, if product profiles were to be drawn for each meat according to the median scores on each question, then because of the inherent properties of the test it should be possible to compare and contrast individual meats according to the median responses on each question, and thus find out why consumers preferred some meats to others, and why they bought more of certain meats.

5.6.1. Beef Cuts. The profiles for the four meats, rump steak, stewing steak, rolled beef and corned beef are displayed in Fig. 7. In the previous section, preference or would buy was seen to be dependent on the following factors: flavour, nutrition, prestige, type of meal, versatility and expense. If Fig. 7 is examined it can be seen that all four beef cuts were considered to be main meal meats, and consequently can be discussed within the same terms of reference.

Rump steak scored better on all the preference dependent factors than the other three meats. 'Versatility' was an exception and here stewing steak was scored best. Because 'frequency of consumption' was dependent on preference, and hence on the six preference dependent factors it is not surprising to see that rump steak was consumed more often than the other three meats. Rump steak was seen to be significantly more nutritious than the other three meats.

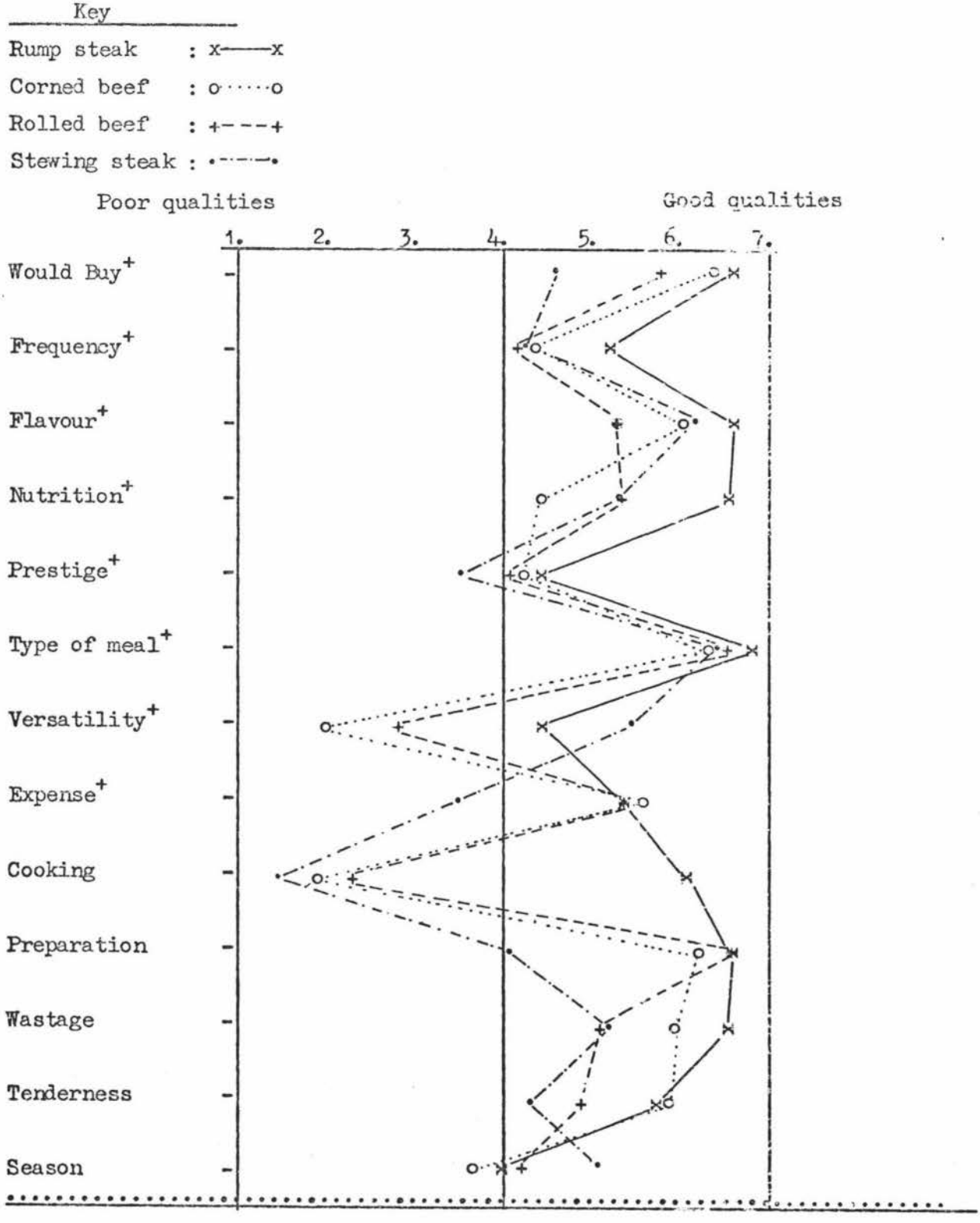
Corned beef had a better preference or 'would buy' score than rolled beef and this would appear to be a result of its better flavour rating, as it scored worse than rolled beef on 'nutrition' and 'versatility'. Also because of its better 'would buy' score than rolled beef it was 'served more often' by the respondents.

Stewing steak was given a very low 'would buy' rating and hence low preference rating compared with the other three beef cuts, and yet it was served as often as corned beef, a meat with a significantly higher preference rating. The difference in use between rolled beef and stewing steak would appear to be due to the latter's 'cheapness', 'flavour' and 'versatility' compared with rolled beef.

The 'frequency' question would appear to confirm the findings of the consumer survey which suggested that roast beef consumption was on the decline.

There would appear to be a place on the market for a more prestigious beef cut. Of the four beef cuts, rump steak scored highest on this variable, but its score was only average and the suggestion is for a more 'prestigious'

Fig.7 Product Profiles of the Four Beef Cuts.



+ Preference dependent variables.

beef cut. It would have been interesting to see how either fillet or porterhouse steak would have scored on these two factors as butchers appear to think that these two cuts are quite 'prestigious', if the relative prices of the meats is any gauge of 'prestige'.

The consumer survey results suggested that per capita consumption of rolled beef would decline and the low 'frequency of serving' rating given this product would tend to confirm the consumer survey results.

5.6.2. Sheep Meat Cuts. The product profiles of the three sheep meat cuts is presented in Fig. 8.

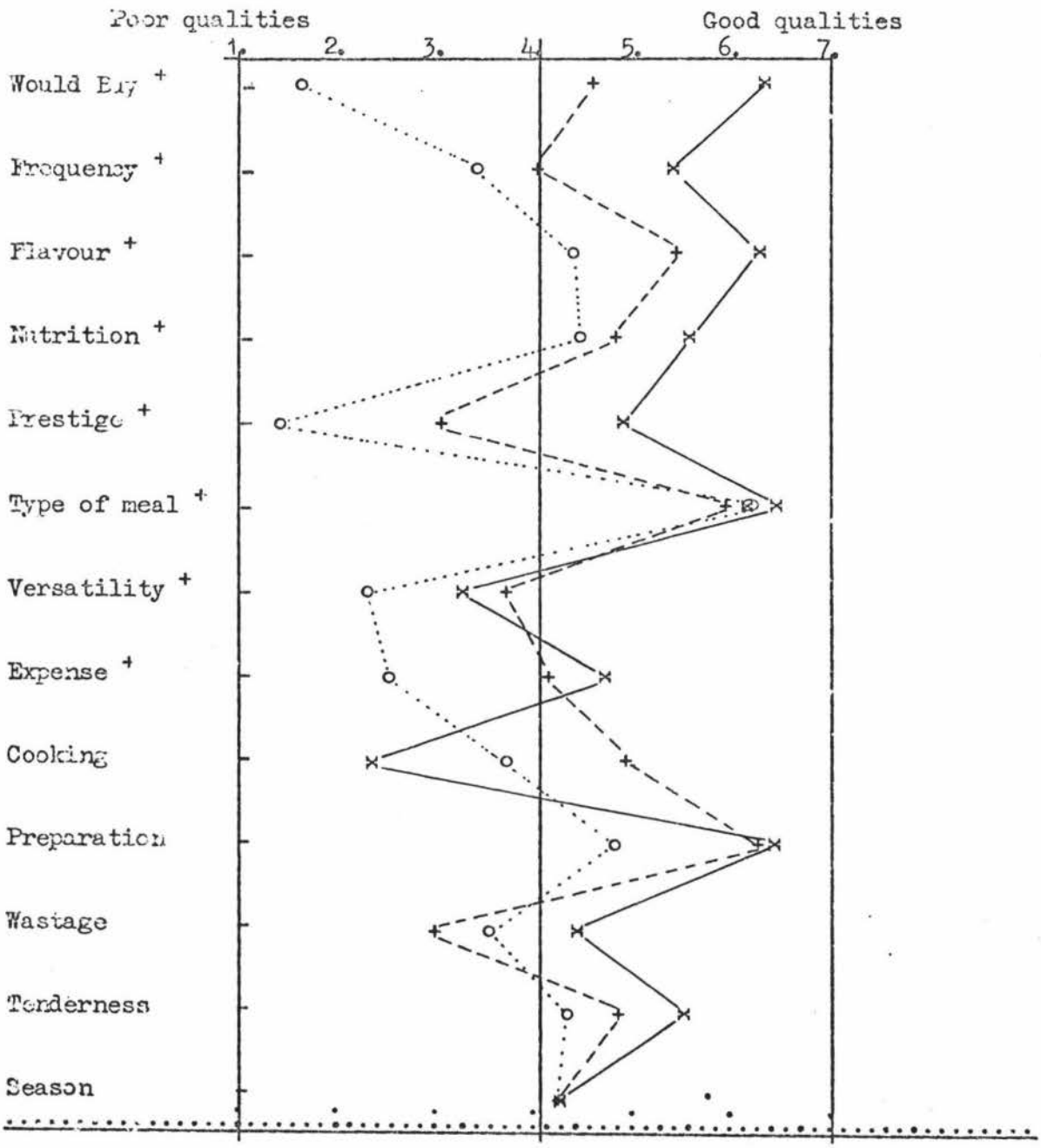
An examination of Fig. 8 shows that, unlike the product profiles of the beef cuts, the sheep meat cuts did not all score well on all the 13 variables. The only variable for which all three meats were given very similar scores was the 'type of meal' question, where all three meats were thought of as main meal meats. Leg of hogget, the most preferred sheep meat cut. was given a higher score on all the preference dependent variables except 'versatility' and was also eaten more frequently than the other cuts. This was true of respondents included in the attitude survey. Consumption data was available for the 30 respondents included in the attitude survey as they all participated in the first survey in Chapter 3. This group on the average consumed more leg of hogget than the average for the whole 150 people used for the consumer survey sample.

Loin chops scored better than neck chops on all the preference dependent variables and for this reason was eaten more frequently than the latter.

5.6.3. Pork Cuts. The product profiles for leg of pork, pork chops and pork pieces are shown in Fig. 9.

Leg of pork was quite clearly given a better rating than the other two pork cuts on all the preference dependent factors. In complete contrast to either the sheep meat cuts or the beef cuts, the pork cut which was scored highest on all the preference dependent factors was not served the most. Instead, leg of pork was served less frequently than either pork

Fig.8 Product Profiles of the Three Sheep Meat Cuts.



+ Preference dependent variables.

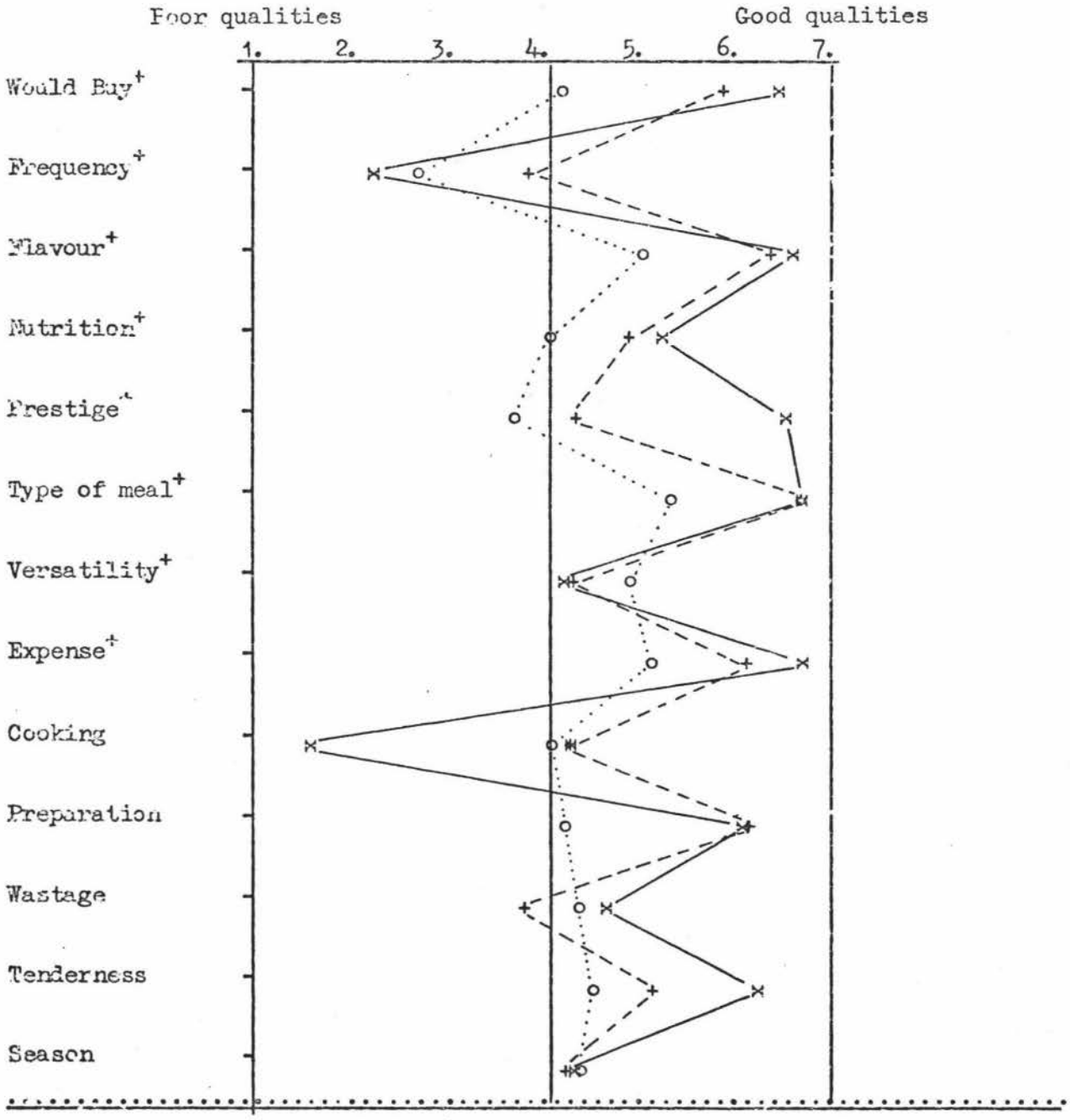
Fig.9 Product Profiles of the Three Pork Cuts.

Key

Leg of pork : x——x

Pork chops : +---+

Pork pieces : o·····o



+ Preference dependent variables.

chops or pork pieces. Pork chops were given a higher score than pork pieces on all the preference dependent questions and for this reason were sold more often. It would appear that expense per cut rather than 'expense' per unit weight was responsible for the 'low frequency' score given to leg of pork, as both pork chops and leg of pork cost approximately the same per unit weight. McShane (64) reported that housewives budgeted a fixed amount of money for meat each week and as a leg of pork would require a large portion of this, it is natural to expect them to buy a pork cut which will consume a smaller fraction of their budget.

Pork pieces, as with stewing steak, were considered the most versatile cut largely because a number of dishes could be made from the meat.

Pork chops as with loin and neck chops were thought to be very wasteful cuts, once again due to the high bone-and-fat to meat ratio. Pork pieces and also stewing steak were also thought of as quite wasteful.

There would appear to be a place in the New Zealand pork trade for a larger porker to try and overcome the present problem of excessively small chops which inevitably lead to a very high fat-plus-bone to meat ratio. The larger porker will provide chops with a much larger eye of lean compared with the present animals.

There is also a potential market for pork steaks to take advantage of the high demand for pork which already exists in the community. It could be expected that these steaks would take on some of the characteristics of rump steak and hence expand the present pork market.

The present high price of pork, combined with the fact that housewives tend to set an upper limit to their meat budget, means that the pig meat trade will have to reduce a number of their large pork cuts, cuts which at present consume a large part of the housewives' meat budget, to smaller cuts. Pork schnitzels and similar products offer the consumer sufficient meat for a meal at a comparatively cheaper outlay than a pork roast. By reducing the size of their products, the industry should be able to achieve a pseudo price drop, enabling them to reach more customers with the limited

pork stocks which are available in this country.

5.6.4. Ham Cuts. The product profiles of ham-on-the-bone, hawaiian ham and sliced ham are presented in Fig. 10.

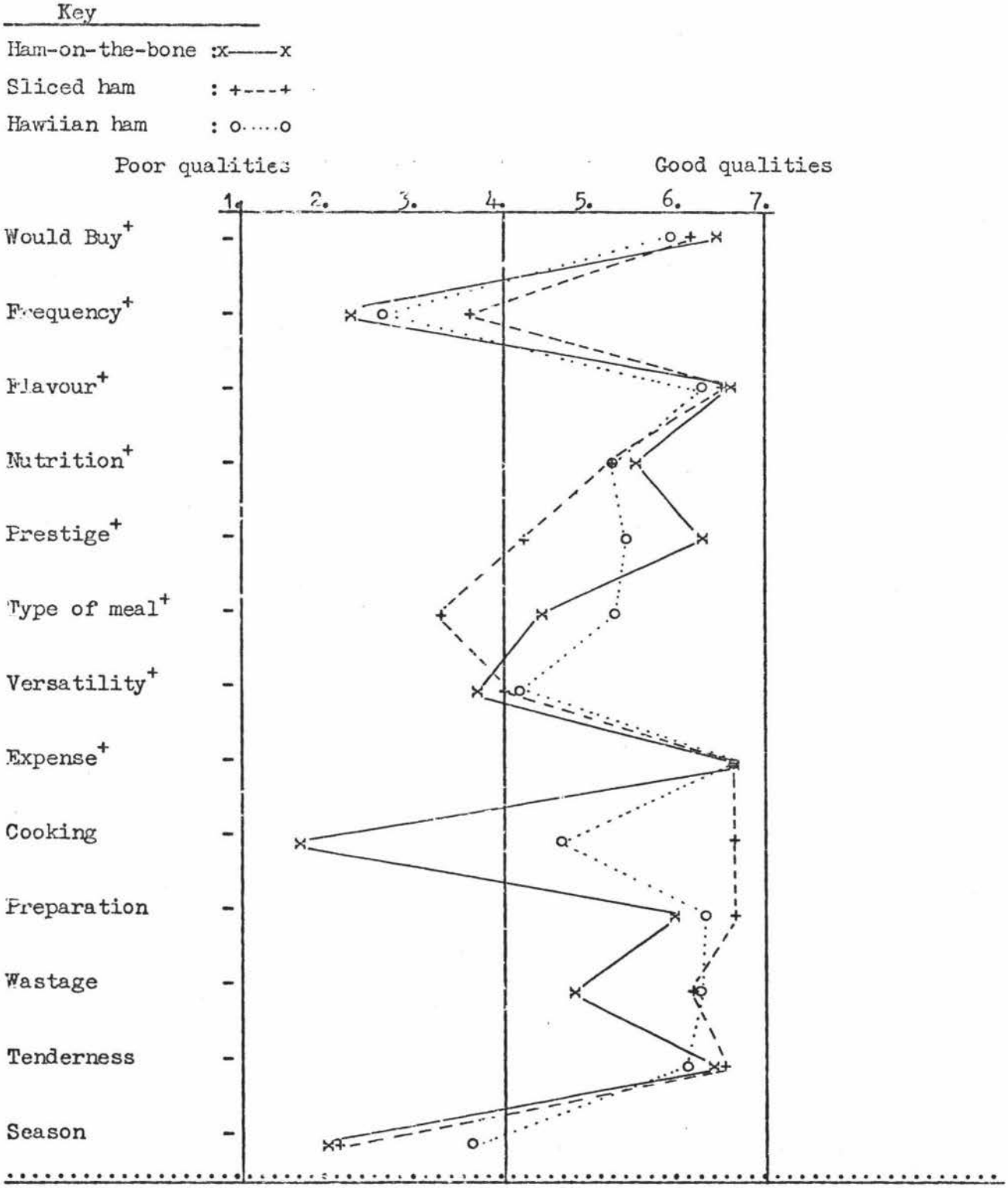
Unlike the other meat types already discussed, the ham cuts were not all seen to be of one meal type, instead they covered the whole spectrum, from main meal to snack. Hawaiian ham was seen to be a main meal meat, ham-on-the-bone was seen to be a meat which could be used for either a main meal or snack, while sliced ham was seen to be a snack type meat.

It was quite noticeable in the survey that the cuts with the highest 'prestige' rating were all cuts which required some carving: namely chicken, leg of hogget, leg of pork and ham-on-the-bone. Steak type cuts and reformulated products were ascribed successively lower 'prestige' ratings with comminuted products last.

Ham-on-the-bone generally scored better on all the preference dependent factors than the other two cuts, and like leg of pork was eaten most infrequently and probably for the same reason. Similarly, hawaiian ham generally had a better rating on the preference dependent factors than sliced ham but was served less often than sliced ham. All three cuts were seen to be significantly more 'expensive' than any other products considered in the survey. The frequency of serving was very low, with the exception of sliced ham, but even here the total quantity of sliced ham consumed was shown to be only marginally increasing. The only reason for the high serving frequency of sliced ham appeared to be due to the fact that consumers were able to buy a large number of slices per dollar and hence obtain a pseudo price drop in the cost of ham.

Sliced ham and ham-on-the-bone were considered summer meats, while hawaiian ham was seen to be a meat which could be eaten all year round. The industry has been able to provide a meat which can be eaten all year round by providing the customers with a steak-like product which they can actually cook. The Christmas ham trade in this country requires the industry to start stockpiling hams in September for the short Christmas period. As

Fig. 10 Product Profiles of the Three Ham Cuts.



+ Preference dependent variables.

this market appears to be declining the industry ought to look to ham products which can be sold all year round. They might consider the possibility of providing genuine hawaiian ham steaks rather than the present reformulated ones. By cutting hams into steaks with the bone in, the industry could take advantage of the high 'prestige' which already exists for ham-on-the-bone.

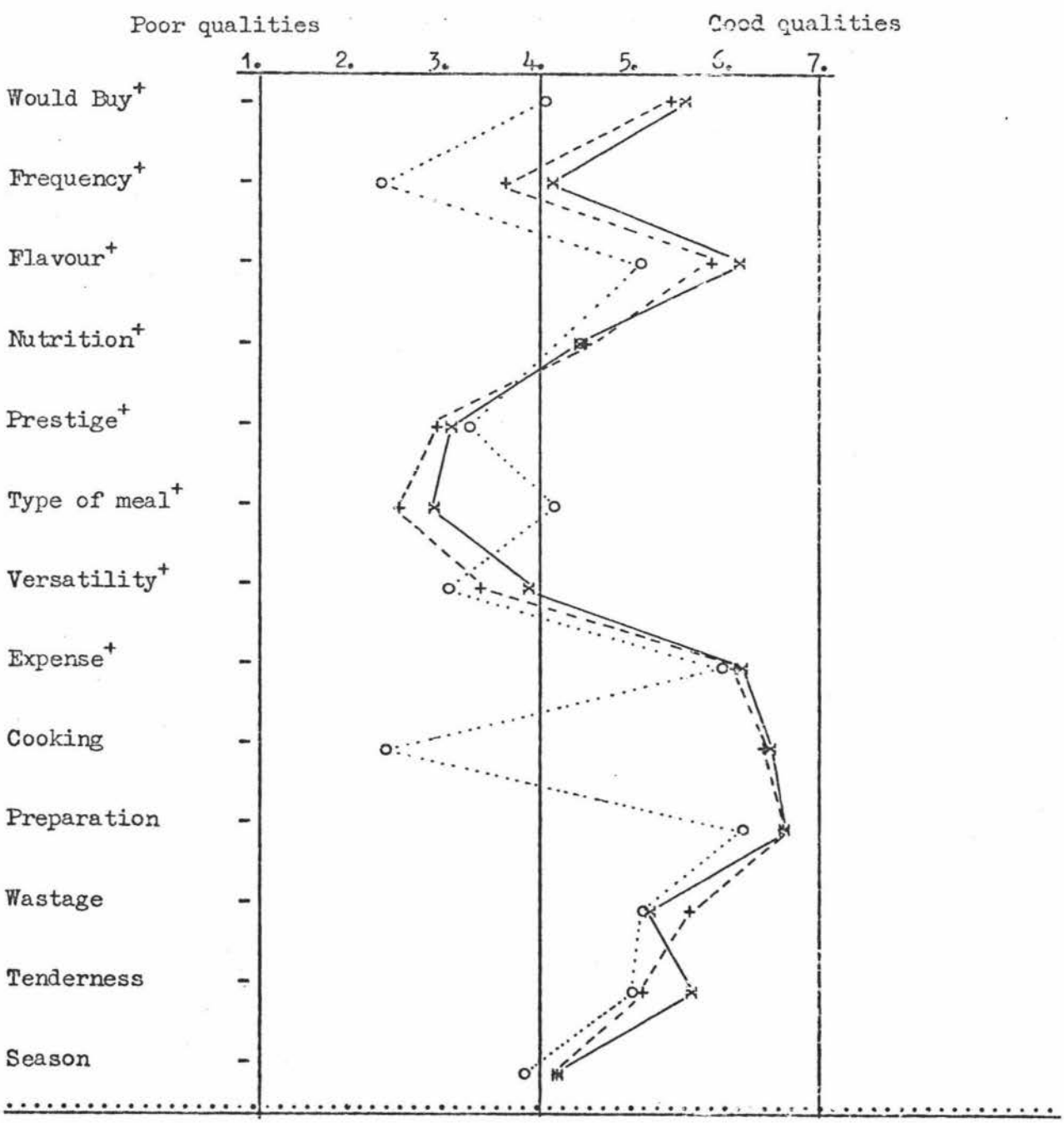
5.6.5. Bacon products. The product profiles of the three bacon cuts, side bacon, shoulder bacon and boiling bacon are presented in Fig. 11.

The consumer saw very little difference between side bacon and shoulder bacon in terms of the preference dependent properties of the two cuts and for this reason there was very little difference in their usage rates. Side bacon was marginally preferred to shoulder bacon apparently due to its better 'flavour' and 'versatility'. The Pork Industry Council in its survey, Survey of the bacon consumer market in New Zealand (77) found that people used side bacon both as a snack meal and as a flavour additive for main meals, while they only used shoulder bacon as a flavour additive. They also reported that younger people were using more shoulder bacon than side bacon, but with older people the sales were reversed apparently due to the fact that older people considered side bacon more 'flavourful'.

Any discussion concerning the properties of boiling bacon must be qualified by the fact that only a very small fraction, 20% of the respondents, were familiar with the product. This lack of knowledge came through in the response to the product's 'flavour', 'would buy', 'versatility', 'nutrition', 'type of meal' and 'tenderness' as the frequency distribution of the scores to these questions were either bi-modal or quite spread. As only 20% of the respondents were actually familiar with the product the responses must be taken to represent the pre-purchase attitudes of the consumers, and quite clearly the product was not considered in a favourable light. With the exception of 'prestige' and 'type of meal', boiling bacon scored worse than either side bacon or shoulder bacon on all the other preference dependent factors.

Boiling bacon was seen to be more a main meal meat than either shoulder

Fig.11 Product Profiles of the Three Bacon Cuts.



+ Preference dependent variables.

or side bacon but it was not thought of as a main meal meat in the same way as fresh meats. It appears that the actual product name, that is, 'boiling bacon' may be responsible for the low preference and rather unfavourable image of this product, highlighting the need for careful naming of any future products. It would appear that 'boiling' evokes an image of a rather insipid 'flavoured' product, reflected in the poor 'flavour' rating for this product compared with the other two bacon products.

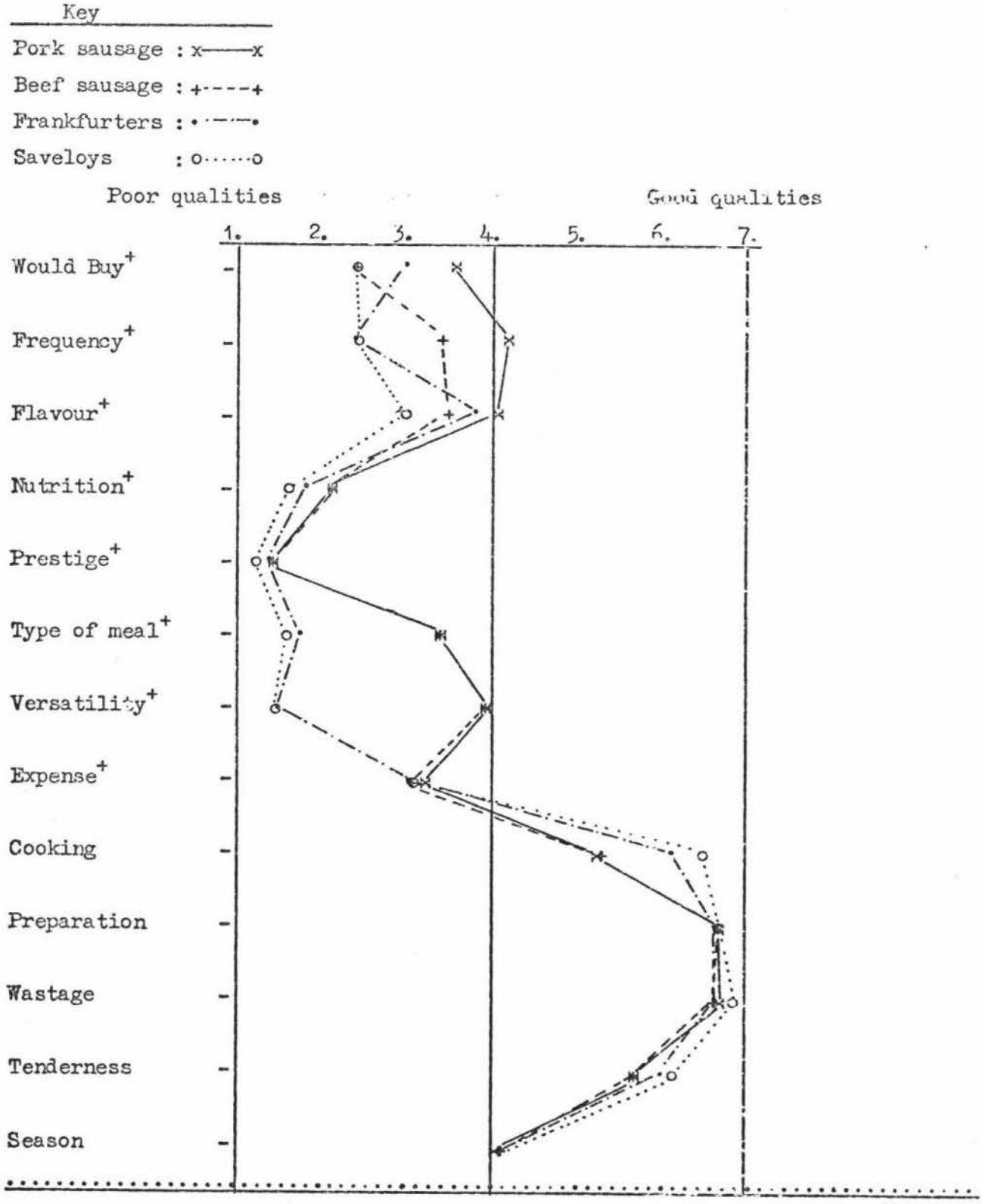
5.6.6. Four sausage products. The profiles of fresh beef and pork sausages, saveloys and frankfurters are presented in Fig. 12.

The most striking feature of Fig. 12 is the very poor scores of all the sausage products on the 'preference dependent variables'. The consumers clearly had a very poor view of these products compared with the fresh meats dealt with earlier.

The product profiles of beef and pork sausages were almost identical, except for 'flavour' and 'nutrition'. It would appear that the difference in 'flavour' was responsible for the higher preference and higher usage of pork sausages compared with beef sausages. The product profiles of saveloys and frankfurters were identical except for 'flavour', with frankfurters being considered the more 'flavoursome'. The industry could perhaps benefit by taking saveloys off the market and just producing frankfurters.

The higher usage of pork and beef sausages compared with saveloys and frankfurters appears to be a result of the 'type of meal', 'versatility' and 'cooking' factors. Pork and beef sausages were seen to require more 'cooking' and to be more 'versatile' and therefore meats which could be used both as snack meats and also main meal meats. Saveloys and frankfurters are both pre-cooked products with a seemingly low 'versatility' and one way of increasing their 'versatility' would be to produce raw cured products, products which could be cooked in a number of ways. Bacon sausages which are currently available on the Palmerston North market do appear to fill this role, but the company which manufactures them has not really promoted the product.

Fig.12 Product Profiles of the Four Sausage Products.



+ Preference dependent variables.

There would appear to be a need for a more 'flavoursome' beef sausage if the sales of this product are to match those of pork sausages.

Consumers appear to prize the 'convenience' and low 'wastage' associated with snack type meats.

5.6.7. Cooked sausage products. The profiles of salami and luncheon are displayed in Fig. 13.

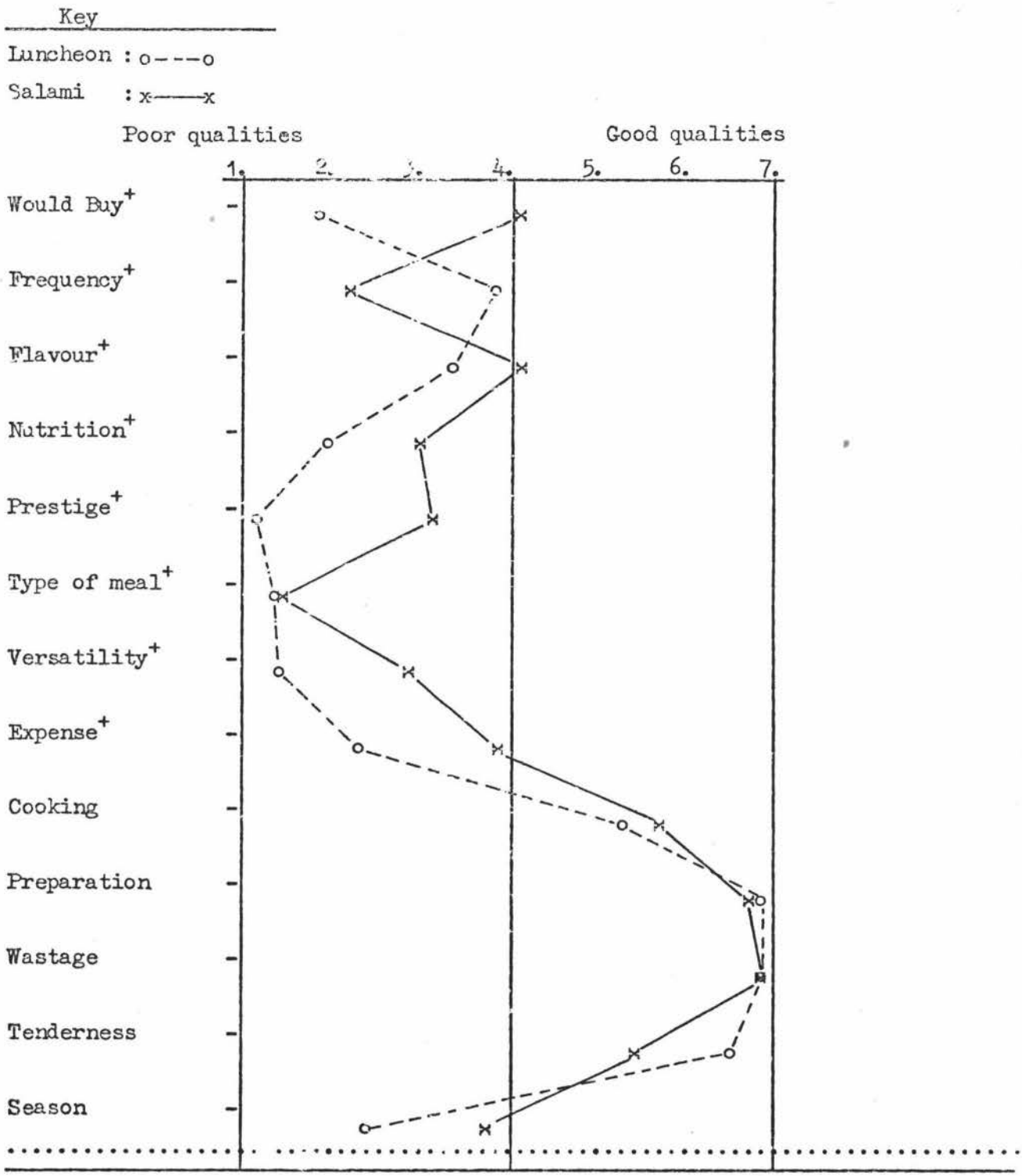
Salami quite clearly scored better than luncheon on all the preference dependent factors with the exception of 'expense'. Despite this high preference for salami compared with luncheon, the latter was served more frequently. The only factor preventing a high usage for salami would appear to be 'expense' being thought too expensive for a snack type meat compared with luncheon.

Luncheon and salami would appear to have different 'seasonalities'. Luncheon was seen to be a meat only eaten during summer, whereas salami was seen to be a meat which could be eaten all year round, although more so in summer than in winter.

5.7. COMPARISON OF THE PRODUCT PROFILES OF RUMP STEAK, HAWAIIAN HAM AND BOILING BACON

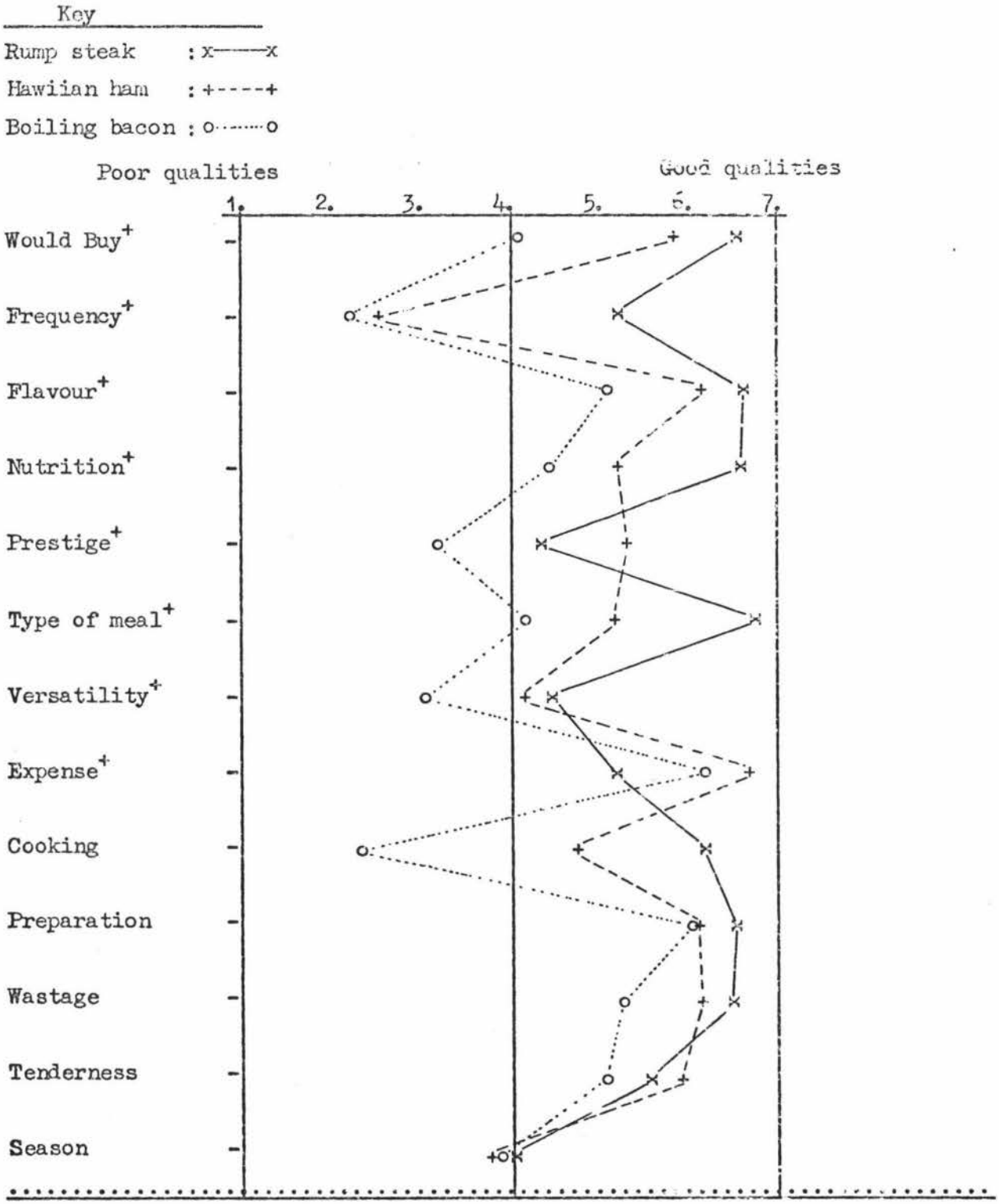
Preference, and 'frequency' because of its correlation with preference, were shown to be dependent on 'flavour', 'nutrition', 'prestige', 'type of meal', 'versatility' and 'expense'. As shown in Fig. 14, rump steak was clearly scored better than either boiling bacon or hawaiian ham on all preference dependent factors except 'prestige' and 'expense'. From their respective positions on the preference scale boiling bacon and hawaiian ham were clearly too 'expensive' for most consumers. There would appear to be a need for a substantial price drop of these products before frequency of usage would increase, in addition to an improvement in 'flavour' and 'nutritional' value for both products. Main meal meats were

Fig.13 Product Profiles of Two Sausage Products.



+ Preference dependent variables.

Fig.14 Product Profiles of Rump Steak, Hawiian Ham and Boiling Bacon.



+ Preference dependent variables.

seen by the sample to be highly nutritious, and while fresh pork cuts were seen to be 'nutritious', the same cannot be said of either the ham or the bacon cuts, though the ham cuts were seen to be 'nutritionally' superior to the bacon cuts.

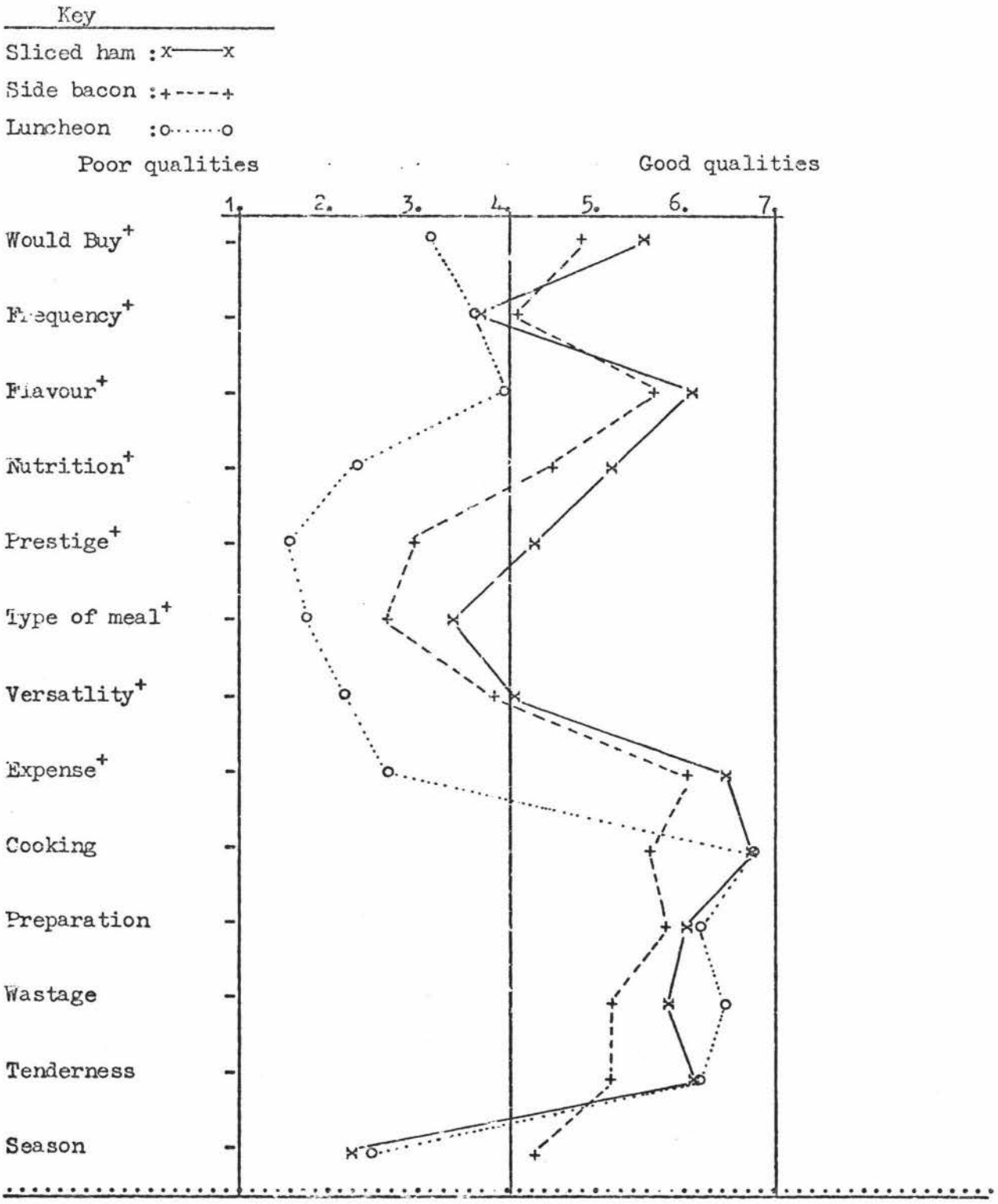
The low 'versatility' rating of boiling bacon can probably be associated with the prefix 'boiling'. Hawaiian ham and boiling bacon would appear to need too much cooking, despite the fact that both products are currently marketed as pre-cooked products which only require heating up. There is clearly a need for more educational labelling on the packs of these two products and also, through advertising media, to tell the consumers just how little 'cooking' these two products require.

The bacon industry at present is faced with the problem of declining sales for its existing bacon products. The industry used to cater for the breakfast meal market and also for the flavour additive market, but with the change in meal patterns it is now facing a decline in these two traditional markets with a resultant decrease in sales. It could do two things, produce a main meal meat or produce a truly snack meal type meat. Boiling bacon, while going some way to being a main meal meat is still thought of as a meat which is neither quite main meal meat or snack. An hawaiian type steak type bacon product could appear to be one product which might go some way toward being a main meal meat. However, there appears to be a limit to how far either bacon or ham can be taken towards a truly main meal meat, mainly because of the comparatively low 'nutritional' rating of the two products.

5.8. COMPARISON OF THE PRODUCT PROFILES OF SLICED HAM, SIDE BACON AND LUNCHEON

The product profiles of the three products, shown in Fig. 15 follow a very similar shape, with sliced ham receiving the highest scores on all the preference dependent factors, followed by side bacon and then luncheon. Sliced ham and side bacon were seen to be more main meal meats than

Fig.15 Product Profiles of Sliced Ham, Side Bacon and Luncheon.



+ Preference dependent variables,

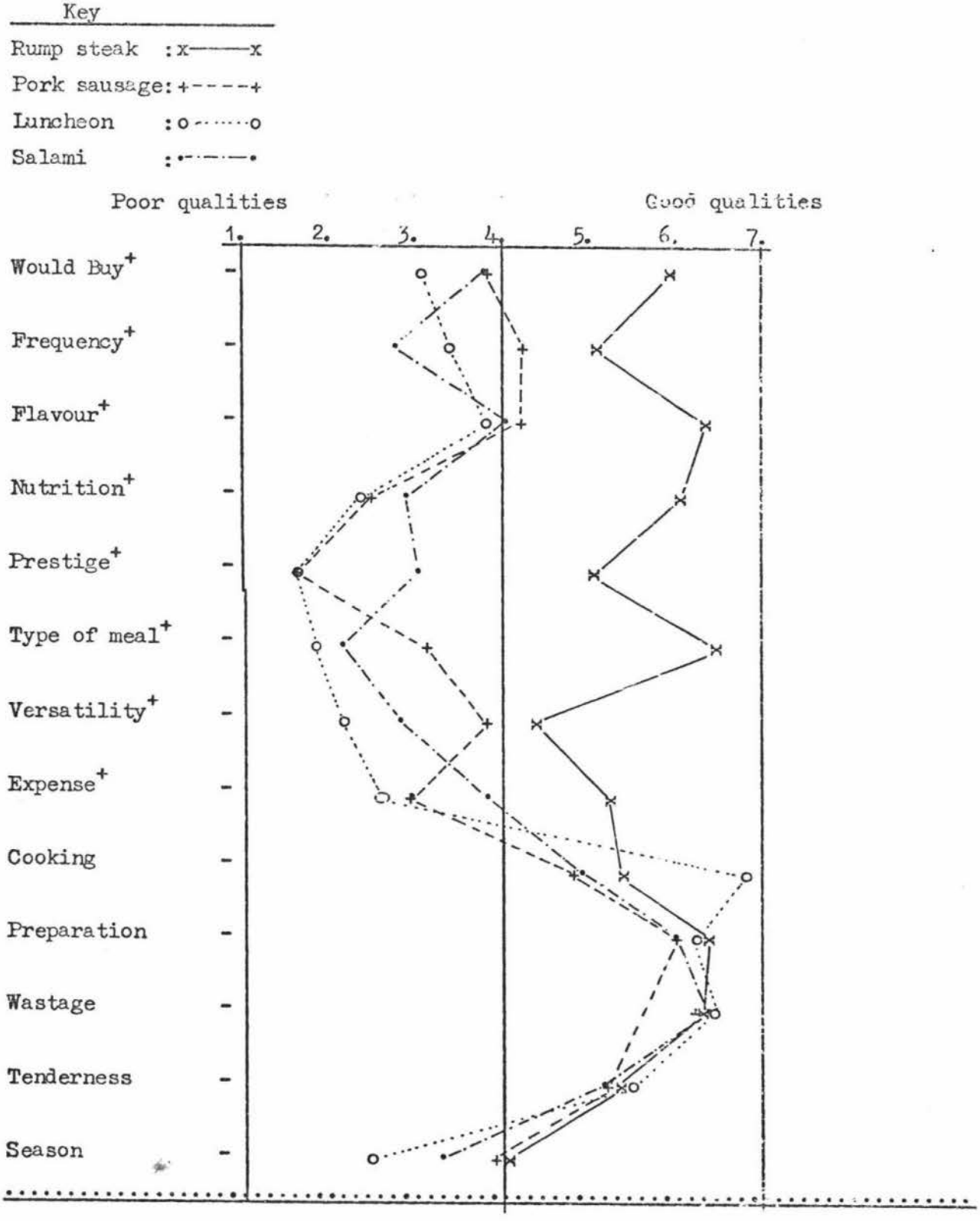
luncheon but despite the difference were still seen to be snack type meats. The low 'frequency' of usage of side bacon would appear to be due to the price of the two products, both excessively priced for a snack type meat. If the industry decides to produce a really snack type bacon and ham product then the first thing they will have to do is decrease the price. One way of achieving this is to produce a product which contains a small fraction of either bacon or ham and a large fraction of some cheaper raw material such as veal or mutton. Alternatively, they could make a snack type product from either veal or mutton which had the same properties as either ham or bacon. Whichever alternative they choose, it is imperative that they retain the high flavour and nutritional rating which sliced ham and side bacon have compared with luncheon.

5.9. COMPARISON OF THE PRODUCT PROFILES OF RUMP STEAK, PORK SAUSAGES, LUNCHEON AND SALAMI

The profiles, shown in Fig. 16, include one raw sausage and two pre-cooked sausages which are ready for immediate eating. The most noticeable feature about the three products from a technological point of view is the meat particle size, which is greatest for salami and least for luncheon. Except for the expense factor there is every indication that salami would take a large part of the luncheon market. This particle size difference between salami and luncheon has moved salami from a low 'nutritional', 'prestige', 'versatility' and 'preference' rating to one considerably higher. Salami had an even higher 'nutritional' and 'prestige' rating than pork sausages. However, the higher 'versatility' rating of pork sausages compared with salami would appear to be due to the fact that they are raw and can therefore be cooked in a number of different ways. Pork sausages are also seen to be more a main meal meat than the very definite snack meat which salami is seen to be.

All three products are clearly inferior to rump steak, but there does appear to be a sausage product opportunity which takes advantage of the good points of both salami and pork sausages. A coarse cut pork sausage

Fig.16 Product Profiles of Rump Steak, Pork Sausage, Luncheon and Salami.



+ Preference dependent variables.

in which the particle size approaches that of salami would appear to be one such opportunity.

5.10. COMPARISON OF THE PRODUCT PROFILES OF CORNED BEEF AND SIDE BACON

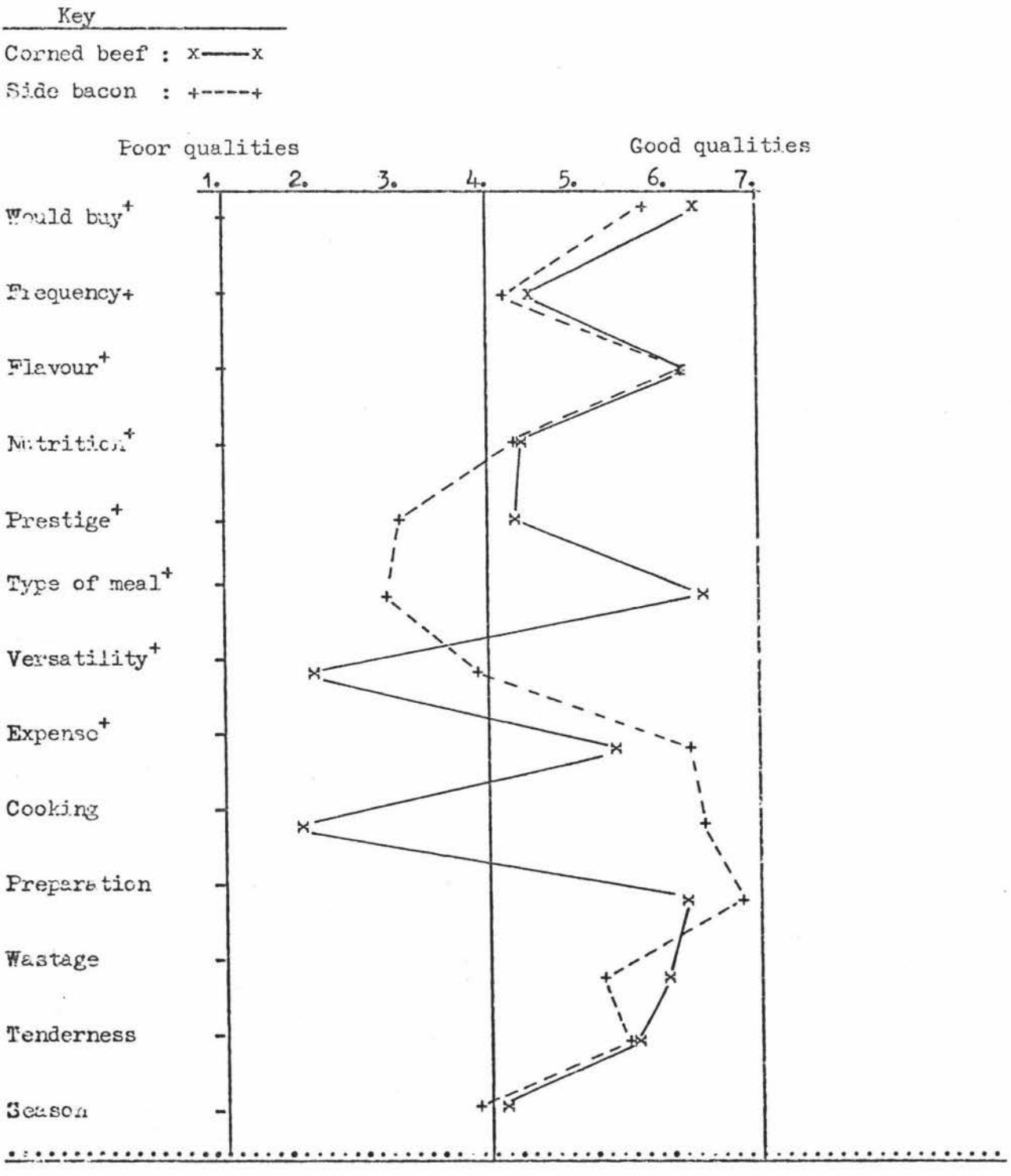
Corned beef is made by curing beef while side bacon is made by curing pork and an examination of Fig. 17 shows that consumers saw differences in the two meats as expected. Corned beef was given a better rating on the following preference dependent variables: 'would buy', 'frequency', 'prestige', 'type of meal', and 'expense'. Consumers appeared to prefer corned beef to side bacon and as a result served it more often. The consumers thought that corned beef had a much higher 'prestige' rating than side bacon and most importantly it was seen to be a main meal meat, something that even ham did not achieve. If a new 'bacon' product could be created with the same 'prestige' and 'main meal' characteristics as corned beef then the new product would seemingly compete quite well in the main meal market. Maybe the industry ought to promote the consumption of corned beef as it appears to have a very good consumer image. Corned beef did not score as well as side bacon on the 'versatility' variable. The industry might be able to improve the consumers' impression of corned beef on this variable by producing a recipe booklet providing a whole series of recipes with corned beef as the basic ingredient, by educational advertising on T. V. and by cooking demonstrations in supermarkets.

The high acceptance by consumers of corned beef and to a lesser degree of bacon suggest that there should not be too much resistance to the introduction of new cured products, provided these new products have consumer desirable properties.

5.11. DISCUSSION OF SURVEY METHOD

The semantic differential technique provided a reasonable method for

Fig. 17 Product Profiles of Corned Beef and Side Bacon.



+ Preference dependent variables.

obtaining consumer attitudes towards a number of meat products. The attitude profile for each product was quite distinct, though certain variables tended to be common to a number of the meats, i.e. the intensity of the consumers' feelings toward some of the meat products tended to be the same.

The technique had certain limitations: the first was a result of the variables chosen for obtaining people's attitudes. Because variables common to the 24 meats were chosen, this meant that a comparison of the meats could only be made on the basis of these thirteen variables chosen for the survey. It must be realised that there are more specific product attributes that could have been chosen for the survey. Take bacon, for instance, more specific questions on salt content, fat colour, degree of smoking and other variables could have been selected, but these attributes are not common to all the 24 meats and for this reason could not be included in the survey, if the relative merits of the 24 meats were to be obtained and compared.

The second limitation of the survey concerned the number of meats and types of meats used in the survey. It is felt that the more meats which the consumers are asked to evaluate then the smaller the detectable differences between products with very similar properties. Now the scores given each meat are scores that are arrived at when all the 24 meats have been compared and contrasted with one another. This process of comparison is made easier when a smaller subset of meats is used in the survey. The technique is analagous to the microscope and the power problem. The higher the magnification the bigger the differences which can be detected between samples. Similarly, the smaller the number of meats used in the survey then the larger the differences in attitude score on each of the attributes between products. For example, if only the ham cuts and bacon cuts had been included in the survey, it is thought that greater differences between products would have been obtained than were obtained in the present survey. There was very little difference between side and shoulder bacon on a number of variables in this survey, differences which might have emerged if less meats had been used in the survey.

5.12. CONCLUSIONS

1. Preference and 'would buy' were found to be highly correlated suggesting that the variable 'would buy' measured people's meat preferences in the semantic differential survey. Preference was also found to be highly correlated with the following variables: 'flavour', 'nutrition', 'prestige', 'type of meal', 'versatility' and 'expense' suggesting that these variables were responsible for the respondents' meat preferences.
2. Frequency of use of a meat was found to be significantly correlated with 'preference' and 'type of meal' suggesting that the meats which people ate depended on their preference but also on the type of meal, i.e. main meal or snack.
3. People generally bought the meats they preferred. But choice was affected by type of meal and also expense. The very expensive cuts such as leg of pork, though high on the preference list were bought infrequently.
4. The most preferred meats were generally non-processed meats. Ham was an exception. Processing had a definite affect on meat preference, the more processed a product the lower it was on the consumer's preference list.
5. Curing appeared to lower the nutritional status of a meat.
6. Similarly, size reduction lowered the nutritional status of a meat. The comminuted products had the lowest nutritional rating of all the meats included in the survey.
7. The unprocessed meats were given the highest nutritional rating and were also used as main meal meats, while the processed meats tended to be used for snack meals.
8. The survey suggested that the single most important variable limiting the sales of pork, ham and bacon was the price and that the consumption of these meats can be expected to decline in the future, unless the industry takes measures to reduce the costs of these products.
9. Not one meat which was included in this survey scored well on all the variables, suggesting that research could be carried out to make each of the products more acceptable to the consumers.

10. The sausage type products scored badly on every variable except 'expense' suggesting that the consumers were mainly concerned with the cheapness of these products and any efforts to increase the price would see a drastic reduction in demand.
11. The consumers thought the bacon industry was operating in the snack food market.

5.13. RECOMMENDATIONS

These recommendations will be restricted to the bacon industry as the industry and market surveys showed that this industry needed new products.

1. There appears to be a very small market for the sale of legs of pork, while a much larger market for pork chops exists. Now pork chops are considered wasteful because of their high fat and bone content relative to their lean meat content and for this reason if a large proportion of the legs of pork and also forequarters were cut into steaks, a much larger market could be found for these products. Firstly, because it would overcome the high price barrier to the purchase of pork legs and secondly, because these cuts would contain a much higher lean to fat ratio than chops. Consequently, the trade could charge a premium for these products.
2. The sale of a pork product, such as pork wiener schnitzel, where the consumer gets a large number of slices per unit weight of product, would be another way of increasing the sale of pork.
3. There does appear to be a contracting market for the sale of ham-on-the-bone, mainly because a whole leg cost so much. The trade could take advantage of the high 'prestige' value associated with ham-on-the-bone, mainly because a whole leg cost so much. The trade could take advantage of the high 'prestige' value associated with ham-on-the-bone by selling ham steaks with the bone in. This contracting market for the sale of ham-on-the-bone also means that the whole trade should push more of their production into the sliced ham market which appears to be expanding. This should take a considerable

load off the companies on and before the Christmas period.

4. The trade should investigate ways of packaging their ham and bacon in smaller quantities to achieve pseudo-price decreases in the minds of the consumers. In this way, the companies should be able to take advantage of the expanding sliced ham market and possibly even increase the sales of bacon - a product that is going through a very rapid decline phase.

5. Boiling bacon does appear to be a poor product in the opinion of the consumers and for this reason more work should be carried out on the product. The name appears to be one of the major stumbling blocks and for this reason it ought to be removed from the market and renamed, repackaged and relaunched.

6. There does appear to be a place for a more 'prestigious' bacon product which will become more a main meal product than existing ones and work should be carried out to produce such a product.

7. Significant 'flavour' improvements could be made to produce a more acceptable bacon. The attitude survey suggested that the respondents preferred a ham-pork flavour and that the new bacon flavour should approach this more acceptable consumer flavour.

8. It appears that consumers are concerned with the fat content of side bacon and that more stringent quality control standards are necessary to control the fat content to more acceptable consumer levels.

9. Significant improvements could be made to the comminuted products at present on the market. Provided these improvements did not involve price increases then there is a possibility that the sale of these products might increase.

10. The best way of achieving this would be for the industry to undertake a massive product development scheme, replacing many of the existing products with new ones. The reformulation of existing products will not achieve any marked change in people's attitudes toward these products, though their sales might be increased.

11. The consumers thought that salami was too expensive for a comminuted product. But compared with the other comminuted products there were certain facets of salami that people liked and that these, if built into new comminuted products, might lead to a highly successful line

of products for the industry, provided the prices for these new products were similar to existing comminuted products.

12. The industry can expect the sales of pork and beef sausages to sell as well as they have been doing for a few years to come. Though once again improvements could be made to ensure growth of this product line, rather than let the products decline.

13. The consumers appeared to find the 'flavour' of the sausage products too spicy, and they could possibly be improved by changing the flavour of these products to a more acceptable meat flavour.

CHAPTER 6

IMPORTANT VARIABLES IN MEAT CONSUMPTION

The acceptability of a product depends on the society at which it is aimed - certain products may succeed in one country and fail completely in another. This is particularly true of food products and the main reasons for the product failures are first, that it may contravene some taboo and second, be unfamiliar to the country. As an example of this second effect, consumers in the United States find the flavour of sheep meat objectionable because it is not commonly eaten there, while New Zealanders and Australians who are quite familiar with the meats find it quite acceptable. (4)

In the context of the present project, 13 variables were selected from the works of Gregory et al. (33) and McFadyen et al. (63) as being important in the consumption and selection of meat. Though the same variables could well be important to consumers here in Palmerston North, the order of importance need not be the same as that in Canada or America and one of the objectives of the present project was to determine the order of importance of the different variables in the consumption of meat in general. If the relative importance of the variables can be determined, then the job of the product designer is simplified as he is then able to concentrate on the different factors in the order of their relative importance to the consumer. But to just look at meat in general may be too great a simplification of how consumers see meats - it is feasible that consumers may group meats on the basis of certain properties and if this is the case, then the factors important to specific meat groupings ought to be examined as well. If one extends this argument to its logical conclusion, then consumers may see individual products as embodying certain characteristics which are important in the consumption of a specific meat, and if this is the case, then these variables ought to be determined if the designer is to understand why consumers eat this particular meat as opposed to some other.

In this section of the project, meats have been examined in general to

determine which variables are common to all meats, then specific meat groupings have been examined, and finally individual products have been examined to see which variables consumers see as being important in determining their consumption of individual meats. Meats have been examined in general with the express idea of finding some direction for further research. If it can be shown that more highly preferred meats have certain characteristics which are common to all meats, but on which they are scored better than the least preferred meats, then one can say that amongst other things these characteristics were responsible for the consumers' preference. If one accepts that premise, then the idea can be extended and one can say that if the products which are very low on the consumers' preference list were redesigned so that they embodied some of the characteristics of the more highly preferred meats then the redesigned products ought to be more acceptable to the consumers. Consider the variable 'flavour'. If it were found to be common for all meats then one could arrange the meats in order of flavour acceptability. If the most acceptably 'flavoured' meats had a bland meat flavour and the least acceptable 'flavoured' meats had a spicy 'flavour', then if the flavour of the least acceptable meats was changed to the more acceptable bland meat flavour the products ought to be more acceptable to the consumers.

It is quite possible, though, that variables common to meat in general and also to specific meat groupings may not completely describe a product in consumer terms, i.e. it may be the additional variables which are responsible for a product's uniqueness, as far as the consumers are concerned. This could be quite important in cases where a company would like to enter an established product field, and their products would have to be significantly better than existing ones. If consumers do see products in terms of a unique subset of variables then this could cause problems in cases where a product had to be produced from new raw materials. Suppose for instance that rump steak were made from bacon, then there could clearly be conflict in the minds of the consumer with this new product appearing to have contradictory claims. This appears to have been the central problem in the market penetration of TVP simulated meats. The TVP manufacturers attempted to make a whole range of meats which did not

have some of the essential characteristics of meat such as texture and flavour retention. The products had a great future in processed meat products where these variables were unimportant, but instead of concentrating on this product field they attempted to get into the fresh meat market and did not meet with the success that they might have, had they first overcome all the problems.

There were at least two quantitative techniques which could be used to isolate variables common to all meats and also to groupings of meat, and they were: factor analysis, and multi-dimensional scaling. The relative importance of the different variables in meat consumption could be determined in a number of ways. The most obvious way would be to ask the consumers to state which variables were most important to them. A second method would be to use multiple regression (step-wise).

6.1. QUANTITATIVE TECHNIQUES AND USE IN VARIABLE ANALYSIS

Factor analysis seeks to summarise data into a more compact form while retaining its essential properties. Thus an object or phenomena described by dozens of variables may be described by just a few synthetic variables, called "factors", which contain the essence of the original variables (32).

Generally, no attempt is made to partition the data into dependent and independent sets. The models are primarily based on linear relationships. According to Green (32) an assumption is also made about the data, namely that it is interval scaled.

The major substantive purpose of factor analysis according to Green (32) is the search and tests of constructs or "dimensions" assumed to underlie manifest variables.

There are a number of Factoring methods available, namely Principal component analysis, minimum residual analysis, alpha and maximum likelihood analysis. According to Gorsuch (30) all the different methods tend to produce identical results as the communalities of the variables approach 1.0 but in cases where the communalities are low, the results from the different

factoring methods tend to differ. Gorsuch (30) recommends Principal component analysis when the communalities are generally low or where there is a wide variation expected among the variables as to their communalities because the method provides a more distinctive solution. Harman (36) recommends the use of a common factor model, such as Principal component analysis, in cases where there are less than 30 variables included in the survey. Gorsuch (30) argues that when a common factor model is used with only a few variables then the method of extracting the factors is probably less critical than the method of estimating the communalities. Gorsuch (30) also claims that it is best to use a common factor model, whenever undertaking exploratory work. It is possible to control the number of factors that are extracted by specifying the eigenvalue at which factoring should cease - as the eigenvalue increases so the number of extracted factors decreases.

In multiple regression one variable is singled out as the dependent variable. In the usual application the dependent variable is assumed to be interval scaled (or stronger) according to Green (32), while the predictors can be interval scaled or nominal scaled, either as dichotomies or multichotomies.

Multiple regression is then used to find a linear combination of the predictor variables that 'best' account for the variation in the dependent variable, when that variation is measured around the dependent variable's mean.

Multidimensional Scaling is a technique for measuring objects in a multidimensional space. The space itself is defined in terms of unidimensional axes called 'attributes' which describe the objects. The relative distances between objects in this 'attribute' space are unidimensional measurements of the psychological difference between objects. (98)

Multidimensional scaling takes a single piece of information and generates multiple measurements. The single piece of information is the ranking or matching of objects based solely on the judgements and personal criteria of the respondents. From this preference or 'similarity' data, a multidimensional algorithm is used to position the objects in the multidimensional space. The axes of the attribute space are labelled by judgement, after

the positioning of the objects. The fact that there is no rigorous criteria for labelling the dimensions is one of the shortcomings of the method.

6.2. ANALYSIS OF ATTITUDE VARIABLES

Factor analysis as opposed to multidimensional scaling was used in the survey mainly because the use of multidimensional scaling is still in its infancy in relation to marketing problems, while factoring methods were used by McFadyen et al. and also by Carpenter et al. (12) in their analysis of a very similar problem to that of the present project.

Principal component factoring was used in the present survey. Firstly because Harman (36) suggests that this technique be used whenever 30 or less variables are being factored - only 12 variables were used in this analysis. The variable 'Versatility' was not used as respondents appeared to have serious problems in conceptualising the meaning of this variable. The second reason for using Principal component analysis was that low communalities were expected from the variables because of the very small sample size used in this survey - 30 respondents. Gorsuch (30) advises the use of this technique whenever low communalities are expected.

Bass (5) suggested that if centralised data were used for the analysis it might be possible to extract more factors than if the raw data from a semantic differential survey were input to the factoring programme. For this reason the raw data from the semantic differential survey and also the centralised data were input to the Principal component programme to see whether Bass's suggestion was true for the present survey. The data were centralised by squaring the raw scores of the semantic differential survey - squaring the data effectively normalises the distribution by spreading the results of skewed distributions so that they approach that of a normal distribution.

An eigenvalue of 1.0 was selected as the point at which factoring should cease. As has already been pointed out, the number of extracted factors is dependent on the eigenvalue, less factors are extracted as the eigenvalue is

increased. In Principal component analysis the factor which contributes the most to the variance of the original data is extracted first and then the programme examines the remainder of the data and extracts another factor which explains the residual information best and so on, it is quite possible that the final factors which are extracted contribute very little to variance of the original information and for this reason factoring has to be stopped at some point. An eigenvalue of 1.0 was selected for two reasons: Firstly, because a very small sample size was used in the survey and secondly, because the objectives of the study were not to prove some underlying construct but only to isolate those variables which the consumers considered to be important first in the consumption of meat in general, and second, the variables important in the consumption of specific meat groups and finally the variables important in the consumption of individual meats. For the same reasons the variables thought to underly each extracted factor were selected on the basis of having a δ value greater than 0.5 where $0 \leq \delta \leq 1$ Its conceivable that an extracted factor could be explained by a single variable, but this is not usually true and generally a whole range of variables contribute to each factor and their δ values range from 0 to 1.0. Now because all the original variables appear in each isolated factor some criterion has to be found for alloting the variables to each extracted factor. If a value of δ is selected which ensures that a variable will only appear in one of the extracted factors, then we have some method of identifying the most important variables. It was for this reason that a value of 0.5 or greater was selected for δ as it ensured that a variable would only appear in one of the extracted factors.

Multiple regression can be used to find a linear combination of independent variables which best account for some dependent variable and if step-wise multiple regression is used it is possible to also obtain the relative importance of the different independent variables in predicting the dependent variable by way of the independent variables' B values. In the context of the present project then, multiple regression could have been used to find the relative importance of the 13 attitude variables in predicting the consumption of meat in general and also the consumption of specific meat groups, provided consumption data had been available for all 24 meats. But

with the present survey per capita consumption figures were only available for a few of the 24 meats and for this reason multiple regression could not be used to determine the relative importance of the different factors in the consumption of meats in general. Preference data was available for all 24 meats, but multiple regression could not be used to determine the relative importance of the different variables in describing meat preference as the Preference data was neither interval or nominal. The dependent variable must be either interval or nominal before multiple regression can be carried out. (32) Consumption data was available for the consumption of side and shoulder bacon and also for sliced ham, and so step-wise linear multiple regression was used on this data to determine firstly, how well the 13 attitude variables predicted the consumption of the three cured products and secondly, to determine the relative importance of the variables. Per capita consumption data was also available for 7 of the other meats included in the survey, but multiple regression was only used on the three cured products because the market and consumer surveys had shown there to be a need for research in the cured product area and secondly, because the relative importance of the variables was required to systematise subsequent product development research.

The relative importance of the different variables for meat in general were obtained by asking the respondents to rank the 13 variables in order of importance. In a pre-test to this survey question, consumers had found great difficulty in ranking 'frequency of purchase' and also the variable 'would buy' because these two variables referred to individual meats and so they were dropped from this survey question and replaced by 'appearance' and 'fat'. 'Appearance' was included because it had been shown to be important in the choice of meat by Lasley et al. (56), Mize and Stringer (68), Hedrick et al. (38) and also Woods and Jenkins (100). Fat was included because of its inverse relationship with the amount lean, and was shown by Doty and Pierce (23) to be an important factor in determining consumers' choice of meat. In the pre-test to this question the consumers appeared to associate the adjective 'appearance' with the meat's colour, its freshness, its juiciness, and even the colour of its fat.

The significance of the results of this ranking question were determined by

the use of Kendall's Coefficient of Concordance (51) test and the agreement between the respondents was greater than 99.9%. The results are presented in detail in Appendices 12 and 13.

6.3. ISOLATION OF VARIABLES COMMON TO ALL MEATS

6.3.1. Variable Isolation by Factor Analysis. Principal component factor analysis was carried out on all the meats taken together and the results are summarised in table 36. The only variables which were significantly correlated with one another were 'would buy' and 'flavour' and for this reason the two variables were extracted in the same factor. The correlation between these two factors would tend to suggest that flavour was largely responsible for the respondents' meat preferences.

Table 36: Isolated factors and their associated variables

Factor	Variables Associated with each Factor	% of the Variance Explained by each Factor
1	Nutrition	19.3
2	Would buy, Flavour	10.8
3	Cooking	8.4
4	Prestige	8.1

If one assumes that the most important variables are those which explain the greatest proportion of the variance, then 'nutrition' would appear to be the most important variable determining the types of meat that consumers in Palmerston North ate. 'Would buy' and 'flavour' would be the next most important variables, followed by 'cooking' and 'prestige'. The survey suggests that consumers in Palmerston North may have always been sensitive to the nutritional aspects of the foods which they eat and this appears to be

more important than even preference or flavour in determining the types of meat that they purchase.

McFadyen et al. (63) in a very similar study to the present one in terms of variables used, found that 'nutrition', 'tenderness', 'prestige', 'fattiness', 'waste' and 'packaging' were common to all the meats. The difference between the two studies revolved around the variables which were included in the two surveys. In this survey 'fattiness' and 'packaging' were left out of the survey for reasons listed in the early part of Chapter 5. McFadyen et al. did not include 'would buy' in their factor matrix as was done in the present survey.

It would appear that Palmerston North and Canadian housewives agree about two things concerning meat. Firstly, that most fresh meats are highly nutritious, and that their nutritional content appears to decline with processing. The Canadians also found that Canadian housewives connected nutritional content of a meat with its leanness, i.e. the more fat then the lower its nutritional rating. The second point of agreement between Canadian and Palmerston North housewives is that meats have varying degrees of 'prestige' which determine whether a meat will be served to special guests, to friends of the family, or just to members of the family.

While the Palmerston North housewife was concerned with the 'flavour' and 'cooking', the Canadian housewife was more concerned with the 'tenderness', 'wastage', 'fat' and 'packaging' associated with meat. The differences are probably due to the developmental stages of the respective cultures, with the Canadian culture considerably modified and affected by the rapid technological advances which have been made in that country: Effects which have not really influenced the New Zealand way of life. The most striking difference is the ready acceptance by Canadians of 'convenience' foods which are now only appearing in the New Zealand supermarkets. This is reflected by the Palmerston North housewives' interest in 'cooking' something which is no longer of interest to the Canadian housewives because of the ready availability of 'convenience' foods in that country.

The Canadians appeared to like very tender meat, if the acceptance of

tenderised steak is any indication. New Zealanders do not appear to be so concerned with 'tenderness'. This may be due to the fact that people in New Zealand generally get first grade beef, as most of the manufacturing beef in this country is exported to North America and the market survey suggested that very few consumers in Palmerston North ate mutton, preferring the more tender cuts of hogget and lamb. It could also be due to the fact that New Zealanders do not mind chewing their meat.

Palmerston North housewives did not appear to be quite so concerned with 'fat' and 'wastage' as the Canadians, only scoring loin chops and pork chops low on the 'wastage' factor. This can be attributed to two factors. Firstly, to the way people in Palmerston North buy their meat, generally in fairly large quantities with a definite trend toward bulk purchasing and secondly, to the comparative cheapness of meat in New Zealand compared with many other countries which means that they really do not have to concern themselves to the same extent as the Canadians with fat and wastage content of the meat they buy.

6.3.2. Importance of Variables Common to All Meats. The respondents were asked to rank the different variables in order of importance, putting that variable they thought most important first, and that they thought least important last. It must be stressed at this point that respondents were not asked to relate to any specific meat cut, but rather to state in general terms which variables they thought were important in the purchase and consumption of meat. The results are displayed in table 37.

The first thing to notice about table 37 is that the sensory variables such as 'tenderness', 'flavour' and 'appearance' were thought to be very important, more important than any of the intangible variables. This study tends to substantiate work by others who found that consumers selected meat on the basis of 'colour', 'tenderness' and 'flavour' in that order. (52), (9)

The ranking of 'nutrition' as most important in the purchase and consumption of meat was quite unexpected, but it does illustrate the growing awareness by consumers of the importance of eating food which is good for you. A trend that is developing in other parts of the world, particularly in North

America and the Continent.

Table 37: Importance of the different purchase variables

Rank	Variable
1	Nutrition
2	Tenderness
3	Flavour
4	Appearance
5	Expense
6	Wastage
7	Versatility
8	Type of meal (snack or main)
9	Special occasions (prestige)
10.5	Length of cooking
10.5	Length of preparation
12	Fat
13	Season

The respective rankings of 'wastage' and 'fat' seem to indicate that the respondents had different conceptions concerning the two variables. Consumers appeared to associate 'wastage' more with the bone content of a cut than its 'fat' content. Brayshaw et al. (9) found that consumers could not differentiate between steaks with differences in fat content up to 16% and for this reason they might have given 'wastage' a higher rating than 'fat' simply because they could more easily differentiate bone content than fat content. Or it could be due to the fact that certain cuts, by their very nature, have a high 'wastage', e.g. pork and sheep meat chops. Because the consumers cannot do much about the high 'wastage' of these cuts once they have decided to buy them, they might consider 'wastage' as being more important than 'fat'. 'Fat' is something they have some control over as they are able to select the less 'fat' cuts from all the other cuts on

display at the retail outlet. 'Wastage' probably operates at the time of the compilation of the meat shopping list, while 'fat' content operates at the retail outlet.

The position of 'length of cooking' and 'length of preparation' was quite unexpected because the consumer survey had shown that the consumption of roasts in general were declining and that housewives were only cooking them on the weekends, a period when they had sufficient time to cook them and yet the rankings would suggest that these two variables were relatively unimportant in determining the types of meat that consumers purchases.

The most important non-sensory factor in the list was versatility, a variable which the attitude survey seemed to suggest that consumers really did not know what this variable meant. The respondents did not appear to think that the intangible variables were important in determining their meat purchases as all these factors were given lower ratings than the sensory variables associated with meat. Respondents may not consciously think of the societal variables when selecting their meat, while the more definable sensory characteristics may be the ones they think of as affecting their meat purchases.

6.3.3. Conclusions. The factor analytic approach and the rating approach appeared to indicate that 'nutrition' was a very important determinant affecting the types of meat purchased by Palmerston North housewives. Sensory attributes such as 'flavour' were next in importance, but after this there was a slight difference between the two methods with the factor approach suggesting that 'convenience' variables such as 'cooking' were slightly more important than the intangible attributes such as 'prestige' while the rating approach suggested the opposite. Since there was very little difference in the results it is probably best to say that the 'convenience' and intangible variables were of equal importance as determinants affecting the type of meat purchased by Palmerston North housewives.

6.4. ISOLATION OF VARIABLES COMMON TO GROUPS OF MEAT

6.4.1. Variable Isolation by Factor Analysis. There were 13 ways of grouping the 24 meats, i.e. they could have been grouped on the basis of each of the 13 variables which were included in the survey. However, it was felt that the most meaningful grouping of the meats, meaningful from a marketing approach at least, could be made on the basis of meal type. The meats were divided into two groups: main meal meats, and snack meal meats, and the results are presented in table 38.

Table 38: Common variables for main and snack meal meats

Factor	Variables associated with each factor	% of Variance explained by each factor
Main Meal Meats		
1	Would buy, Flavour	21.6
2	Preparation	10.5
3	Prestige	8.9
4	Nutrition	8.2
5	Expense	7.8
Snack Meal Meats		
1	Preparation, Cooking	18.7
2	Would buy	12.9
3	Flavour, Nutrition	11.0
4	Prestige	8.6
5	Type of meal	7.8

If a comparison is made between the two tables 36 and 38, then the following variables were found to be common for all meats and also the different meat groupings: 'would buy' or 'preference', 'flavour', 'nutrition' and 'prestige'. In the case of main meal meats 'preparation' and 'expense' were also isolated and for snack meal meats 'preparation', 'cooking', and

'type of meal' were isolated.

The significant correlation between 'would buy' and 'flavour' for main meal meats and not for snack meats would appear to indicate differing reasons for the preference of the two types of meat. Flavour would appear to be largely responsible for the preference of main meal meats, but not so for snack meats. All main meal meats were seen to be nutritionally superior, more prestigious, and better flavoured than snack meats (see Chapter 5). They were also generally more preferred than the latter. The variable 'type of meal' was only isolated for snack meats which suggests that the consumers appeared to have a conscious conceptualisation of snack meats while main meal meats were seemingly taken for granted.

The grouping of 'cooking' and 'preparation' in the snack meats suggests that consumers thought that these meats ought to need very little in the way of 'cooking' and 'preparation', i.e. they ought to be 'convenience' type meats. In the case of main meal meats 'preparation' was isolated as being important which suggests that consumers were more concerned with the 'preparation' aspects of main meal meats rather than 'cooking'. If the median scores for 'preparation' and 'cooking' are examined for all the meats it can be seen that 'preparation' was not really as important in main meal meats as factor analysis would suggest. The only meats to be given significantly different 'preparation' scores to the other meats were stewing steak, pork pieces, chicken and lambs fry, while a greater standard deviation was observed for 'cooking' than 'preparation' suggesting far more variation between meats in cooking time. However, 'preparation' may have had some affect on the 'frequency of consumption' of meats like lambs fry and pork pieces. In the case of stewing steak and chicken, the two meats had characteristics which seemingly overcame the poor 'preparation' image of these two meats, something lambs fry and pork pieces did not have. Coming back to the problem of why 'preparation' and not 'cooking' was isolated for main meal meats, the per capita consumption of the roasts of beef, sheep meat and pork have apparently declined over the last 12 years (The National Food Survey 5) and the results of the consumer survey (see chapters 3 and 4) and an examination of the median scores of 'preparation' and 'cooking' would suggest that 'cooking' time and not preparation' was

a contributing factor to the declining trend in consumption of these meats.

McFadyen et al. (63) found that consumers generally connected 'nutrition' with a concern for healthfullness in terms of fat content and degree of processing. The fact that 'nutrition' was isolated for both snack and main meal meats and that main meal meats generally scored better than snack meats on 'nutrition' suggests that the nutrition question evoked the same response in the Palmerston North housewives as that found by McFadyen et al. in Canada.

One very important point concerning 'nutrition' which was found in the present survey is the fact that Palmerston North housewives thought that the curing process produced a lowering of the 'nutritional' content of a meat. Whether this was a function of the adverse publicity of nitrosamines and their relationship with cured products and cancer or whether it was due to some other factors was not determined in the present survey. But the result has some serious implications for the bacon industry, because any sustained adverse publicity in connection with the nutritional safety of cured products could see a drastic decline in the demand for these products.

6.4.2. Variable Isolation by Multiple Regression. Consumption data for three cured products: sliced ham, shoulder bacon and side bacon, were obtained from the 30 respondents in the earlier consumer survey (see Chapter 3) and their attitudes to the three products were obtained in the later Consumer Attitude survey (see Chapter 5). It was argued, that if the consumer attitudes did in fact affect the housewives' meat purchases and particularly the purchase of the abovementioned cured products, then it ought to be possible to relate or predict the consumer's purchase of these products as some relationship of their attitudes toward the three products. The most simple relationship is that consumption is some function of a linear combination of the 13 variables, i.e. in mathematical terms,

$$Y = \sum_{i=1}^{n} A_{i,j}$$

where $A_{i,j}$ = a person's attitude to cured product j.
Y = consumption of cured product j.
and n = the number of respondents.

A general linear regression model has the following form -

$$\hat{Y} = \hat{a} + \hat{B}_1 X_1 + \hat{B}_2 x_2 = \ldots\ldots\ldots + \hat{B}_n X_n$$

where $\hat{Y}$ = the estimated value of the dependent variable
$\hat{a}$ = the estimated value of the intercept
$\hat{B}$ = the estimated value of the coefficients specifying the relationship between Y and X
X = an independent variable
1,2,.....n are subscripts identifying the different variables.

In step wise multiple regression the variables are ordered in such a way that the variable with the largest B value is placed first, i.e. the variable which contributed the most in explaining Y, and the variable with the smallest B value is placed last. If step wise multiple regression were used to find the variables which best described the consumption of the three cured meat products, then the technique would not only determine the relevant variables but would also arrange them in the order of their contribution to the prediction of the consumption of the three cured meat products. The variables with the greatest B values would be the most important variables explaining the consumption of these three meat cuts, provided of course the variables were significant. The significance of the variables is estimated with the aid of the F-test, which determines if a significant relationship exists between Y and the X's, taken as a whole. Essentially it asks if the explained variance in Y is truly induced by the X's or whether it is a result of random variation in the sample data. The F-ratio is used, which is a ratio of variances. The F-test compares the computed F-statistic, F_c, with the table F-statistic, F_t, to test the hypothesis that no significant relationship exists between Y and the X's. If F_c is greater than F_t then we assume that Y and the X's are truly related. (98)

Now if the assumption is made that the ordering found by step wise multiple regression expressed either the subjective or objective ordering of the

variables by the consumer, then the designer not only has a tool to isolate the variables that the consumer considers when actually purchasing the products, but also the order of importance to her. This in turn enables the designer to set some priority in the order in which the different variables ought to be investigated.

A simple linear model of the form shown above was used in the analysis of the three cured meat products' data and the results are presented in table 39.

Table 39: Variables associated with cured meat products

Variable	B_1	F Value
Tenderness	-0.23	22.95
Versatility	0.08	6.38
Prestige	-0.07	3.41
Cooking	0.06	3.23
Nutrition	0.10	5.26
Wastage	-0.09	2.97
Preparation	-0.05	2.03
Expense	0.07	1.66
Season	0.05	1.43
Type of meal	-0.03	0.82
Flavour	-0.04	0.71
Frequency	0.04	1.05
Would buy	-0.01	0.20
(Constant)	1.68	

Multiple R = 0.72
R Square = 0.52
Standard Error = 0.54

Analysis of Variance	Sum of Squares	Mean Square	F	D.F.
Regression	22.54	1.73	5.97	13
Residual	21.20	0.29		73

The results can be expressed in the following linear form:

$$Y = 1.68 - 0.23 X_1 + 0.08 X_2 - 0.07 X_3 + 0.06 X_4 \ldots\ldots\ldots -0.01 X_{13}$$

The simple linear model explained 72% of the variance which is very good for this type of attitude study (see Bass, 5). The results were significant at p = 99.9%.

The first five variables were significant at p 95%, i.e. 'tenderness', 'versatility', 'prestige', 'cooking' and 'nutrition'. The model leads to the following conclusions. Firstly, that if the 'tenderness' rating of the three cured products were increased tnen the consumption of these three meats would fall by some 0.23 lb/week/household for each unit increase in 'toughness'. Similarly, with 'prestige', if the 'prestige' rating was increased by one unit, then the consumption of these three cured products would fall by some 0.07 lb/week/household. However, with 'nutrition', 'cooking' and 'versatility', any increase in the products' ratings on these three variables would see an increase in the consumption of the products.

The Palmerston North housewives did not appear to mind tough meat products if the above results are true, in fact they even thought that they were too tender and possibly ought to be toughened. Current efforts in the bacon industry are aimed at producing a more tender product and the above results would suggest that their efforts have been ill placed.

'Versatility' was included for this analysis of bacon because the respondents' answers to this question showed a normal distributional pattern indicating that they seemingly knew what the questions meant. The respondents appeared to value 'versatility' in bacon, but the regressional results suggest that more 'versatility' could be built into the products. These results tend to tie in with those of the Pork Industry Council in their

Survey of the Bacon Consumer Market in New Zealand (77) who found that consumers used bacon, both as a snack meat and also as a flavouring agent in main meal dishes; this was particularly true of side bacon.

6.4.3. Conclusions. Step wise multiple regression isolated 'nutrition', 'prestige', 'cooking', 'versatility' and 'tenderness' as important variables in the consumption of sliced ham, side bacon and shoulder bacon. The first three factors were also isolated when snack meats were examined by factor analysis. The analysis showed that consumption of these products would decline if either the 'tenderness' or the 'prestige' ratings of the three products were decreased then the consumption of these products would decrease, but if the 'nutritional', 'cooking' or 'versatility' ratings of the products were increased then the consumption of these products would increase.

6.5. ISOLATION OF VARIABLES ASSOCIATED WITH INDIVIDUAL PRODUCTS

6.5.1. Variable Isolation by Factor Analysis. The 24 meat cuts were individually factored by Principal Component analysis to find out whether consumers viewed each product as something quite unique or whether they thought products consisted of the same characteristics but of differing intensities. Factor analysis was carried out on both the raw and normalised semantic differential response in line with Bass's suggestion. (5) As the results for both analyses were the same only one table has been included in the text, and the results are displayed in table 40. The appearance of a number in one of the columns indicates that that factor was isolated for that particular meat and the actual number indicates the factor in which the variable was isolated.

The most striking thing about table 40 is the fact that no single variable appeared for the 24 meats, though 'would buy' and 'flavour' appeared in 22 of them, while 'cooking', 'nutrition' and 'type of meal' appeared in 21 of the meats. The least common variables appeared to be 'preparation', 'wastage', and 'frequency of usage', appearing in 18 or less of the meats. However, if a closer examination of the table 40 is made it can be seen that consumers

Table 40: Grouping of the Variables within each factor for the 24 meats

(Eigenvalues $\geq$ 1.0, $\delta \leq$ 1.0)
Data: Normalised and Raw

Meat	Variable												
	Would buy	Flavour	Nutrition	Prestige	Type of meal	Cooking	Preparation	Frequency	Expense	Tenderness	Wastage	Season	No. of factors
Rump steak	1	1	1	2	5	5	-	2	4	3	-	4	5
Stew steak	4	4	-	1	3	1	5	5	-	-	-	3	5
Rolled beef	1	1	1	1	2	-	-	1	4	-	-	-	4
Corned beef	2	1	3	3	1	3	1	1	2	2	3	2	4
Shoulder bacon	3	1	3	4	2	2	-	1	3	1	4	6	6
Side bacon	3	5	6	4	1	1	-	-	-	2	5	5	6
Boiling bacon	4	1	4	1	3	5	5	1	2	1	-	3	6
Ham-on-the-bone	4	1	2	3	2	5	-	-	3	1	6	3	5
Sliced ham	1	4	-	3	2	2	3	3	1	4	4	-	4
Hawaiian ham	1	1	-	4	1	2	2	5	-	3	-	4	6
Pork chops	3	1	1	5	2	4	3	-	2	5	6	4	5
Pork pieces	1	-	2	1	4	1	1	-	3	3	-	-	4
Leg of pork	1	1	4	1	2	2	5	1	-	3	-	2	5
Loin chops	1	1	1	-	-	3	5	1	4	1	-	2	5
Neck chops	3	2	2	1	2	-	-	1	-	-	4	1	4
Leg of hogget	1	-	3	1	3	-	1	1	4	-	2	4	5
Lambs fry	1	1	2	2	-	3	3	-	-	1	2	5	5
Beef sausages	2	1	1	1	1	4	-	-	5	3	-	-	5
Pork sausages	3	3	3	-	4	1	1	3	-	2	5	-	5
Luncheon	3	3	3	-	5	1	2	3	-	2	4	4	5
Salami	1	1	1	1	-	2	2	5	-	2	-	4	5
Saveloys	4	1	1	-	1	2	2	-	3	2	3	4	4
Frankfurters	1	1	1	3	1	2	2	1	5	-	-	-	5
Chicken	-	4	6	6	3	2	2	4	3	1	5	6	6
Frequency of variable isolation	22	21	21	20	21	21	17	17	15	19	14	19	-

tended to view meats as unique. For example, if two meats are examined there are obviously variables which are common to both meats, but there are also variables which are quite unique to each meat cut.

The above results raise a very important point as far as the designer is concerned and it is this, "was the popularity of a meat cut a result of the variables common to all meats or a particular group of meats, or was it due to the unique subset of variables associated with the respective meat cuts?" Unfortunately this cannot be answered by the present project as the respondents were not asked to state which variables were important in the consumption of individual meat cuts.

6.5.2. Conclusions. People appeared to see products as being unique entities though certain variables were seemingly common to all meats. The variables which appeared in most of the meats were: 'nutrition', 'flavour', 'would buy', 'cooking', 'prestige' and 'type of meal'; variables which were isolated when all the meat were taken together and analysed by factor analysis.

6.6. COMPARISON OF RESULTS

The quantitative mathematical techniques used in the survey appeared to produce differing results to the rating question. In the case of the latter, the consumers when considering the variables of importance in their selection of meat in general, thought the sensory characteristics of the meat such as 'flavour', 'tenderness', 'appearance' and 'nutrition' were more important than the more subjective societal variables such as 'prestige', 'length of cooking' and 'preparation'. Principal Component factor analysis agreed with the relative rankings of 'nutrition' and 'flavour', but suggested that some of the more subjective variables such as 'prestige' and 'length of cooking' were more important in the respondents' consumption of meat than 'tenderness' or 'wastage', two of the sensory characteristics. Factor analysis suggested that consumers did not in fact think of all 13 variables included in the survey when purchasing

meat, but rather of just a few, in the case of this survey, only five.

Principal Component analysis of all the meats taken together and also for specific meat groupings showed that four variables were common to all these groupings and therefore important in the consumption of all the meats. The four variables were: 'would buy', 'flavour', 'prestige' and 'nutrition'. But here the similarity ended as the additional variables isolated in each analysis tended to differ. In the case where all the meats were taken together an additional variable to those mentioned above was isolated, namely 'cooking', while for main meal meats two additional variables were isolated: 'preparation' and 'expense' and for snack meats three further variables were isolated: 'preparation', 'cooking' and 'type of meal'. This tends to indicate that the consumers expected different characteristics in different meat groupings. In the case of meat in general the consumers were concerned with the amount of 'cooking' and this was probably a result of the influence of snack meats where 'cooking', 'preparation' and even 'type of meal' were important. In the case of main meal meats it was 'expense' and 'preparation' that concerned them. In other words it was these other distinctive characteristics which enabled them to differentiate the meats.

For cured meats 'nutrition' and 'prestige' are the only two variables which were isolated by multiple regression as being common for all the meat groupings, while the variable 'cooking' was common to the snack meat group, a result which was not entirely unexpected in view of the fact that the consumers considered the three cured meat products to be snack meats. But the variables' 'tenderness' and 'versatility' were not isolated for any of the other meat groupings and there is a suggestion that it was these two additional variables which were responsible for the uniqueness of these three products when compared with the other two meat groups, i.e. main meal and snack meal meats.

An examination of individual products showed that no single variable was common to all the meat cuts, though some variables were more common than others. This was probably a function of the sample size used in the survey as the results for the individual products were based on an effective sample size of 30. But it could also mean that consumers do not

in fact see products as being unique. It was shown that there is a common subset of variables for all the meat products and that there is also a unique subset of variables for each product. It is probably this unique subset of variables that enables the respondents to differentiate the products. For instance, if we were to examine a group of homo sapiens we would find certain features which were common to all, such as arms, legs, nose etc. but if we were to examine them more closely then we would differentiate them on more personal characteristics such as facial features, name etc. and the same probably holds for the meats where there are certain variables which are common, but also others which enable the consumers to differentiate the different meat products.

6.7. APPLICATION OF RESULTS TO DESIGN

The existence of five common variables for all meats provides a framework within which meats can be compared and contrasted. The isolation of 'would buy' or preference provides a means of ranking the meats in some order of preference and if the meats' scores on the other factors are also examined then it should be possible to find some trend in these other variables relative to their preference. In the case of the present project, the more highly preferred meats were generally the main meal meats and they were also seen to have a better flavour, to be more nutritious, to be more prestigious and to require more cooking than snack meats. In other words, there appeared to be a trend in these other isolated variables relative to preference. This has some important implications for the development of new products and even the reformulation of existing products. The fact that there is a trend in these variables with preference provides a direction for the development of new products. If the less acceptable products were taken and the characteristics of the more acceptable products were built into them then they ought to be more acceptable to the consumers. For instance, if the more acceptable products had a very bland flavour, while the less acceptable products had a spicy flavour, then if the flavour of the less acceptable products were made more bland they ought to be more acceptable to the consumers.

The results from the examination of individual products create certain problems for the designer because of the unique subset of variables associated with each product. In the case where the designer is faced with the problem of redesigning an existing product there are no problems, but where the problem is one of designing a completely new product, then there are obvious problems.

Consider the first design problem and suppose that the designer is asked to design a better luncheon. Now, in the analysis of all the meats taken together 'would buy', 'flavour', 'nutrition', 'prestige' and 'cooking' were isolated for all meats. In addition to these variables 'tenderness', 'season', 'type of meal', 'versatility' and 'frequency' were isolated as being important in the consumption of luncheon and it is these latter variables which can be thought of as the blueprints of luncheon. It is these last variables which enables the consumer to differentiate luncheon from all the other meats. These variables cannot be changed too much otherwise the product ceases to be luncheon in the eyes of the consumer. But 'flavour', 'nutrition' and 'prestige' because they were found to be common to all meats can be changed without affecting the consumers' image of luncheon. The more preferred meats had a blander 'flavour', were seen to be more 'nutritious' and generally more 'prestigious' than luncheon so any effort to improve the product on these variables ought to meet with approval from the consumers and should improve the preference rating of the product.

Consider the second design problem where the designer is faced with the problem of designing a completely new product, let's say, a new bacon type product for example. Suppose we wanted a bacon product to compete with rump steak. Now if table 40 is examined it can be seen that even in the case of three bacon products, certain variables are common to all three cuts, but that there are also certain variables which are unique to each cut. What bacon cut should be selected as the starting point? One way round the problem is to select those variables that are associated with all three cuts and to say that the variables characterise the product 'bacon' and they are: 'season', 'cooking', 'would buy', 'flavour', 'nutrition', 'prestige' and 'type of meal'. Now all of these variables are also common

to rump steak, so the group of variables which have been selected to represent the product 'bacon' are not unique, and some others ought to be included to make the product 'bacon' unique. But which ones? Now rump steak is also characterised by 'expense' and 'frequency' which differentiate it from the product group 'bacon'. Because there are so many variables common to both rump steak and 'bacon' it should be possible to build many of the attributes of the more preferred rump steak into the new bacon product so that it effectively competes with rump steak in the market place. Rump steak was seen to be a main meal meat, while bacon was not and it was also seen to be more nutritious than bacon. It appears as though the nutritional rating was responsible for the meal ratings of the different meats - the more nutritious a meat the more acceptable it is as a main meal meat. It was also seen to have a more acceptable flavour than bacon. Now there are two problems facing the designer; the first is concerned with the question of how far should he go in building in the more acceptable attributes of rump steak into the new bacon product and the second is concerned with the number of variables. Consider the first problem. It is possible to take bacon and make into rump steak in every respect, but the product ceases to be bacon and becomes instead rump steak. If would appear then, that only marginal changes can be made to the unique subset of variables which characterise bacon before it ceases to be bacon in the eyes of the consumer.

The second problem or fault of the present survey was the fact that insufficient variables related to the actual physical product were included. These included the colour of the meat, the colour of the fat and also the texture of the meat. In the present survey the lighter coloured meats such as chicken, pork and ham were the most preferred meats, but because colour was not included in the survey it is not really known whether the new meat products ought to be light in colour or whether they ought to have a dark colour. The meats which were included in the survey had a range of textures from meat like right through to the highly 'size-reduced' sausage products but once again this variable was not included in the survey and therefore nothing can really be said about what texture the new meat products ought to have. The lack of physical variables in the survey is not critical if the project was to design an existing meat product as the physical variables

associated with the product are already defined. But if the problem was to design a completely new meat product, then there would obviously be insufficient information to adequately design the physical product, as two of the most important variables associated with a product, namely its colour and texture, would be missing.

This problem of inadequate variables being considered in the project is highlighted by the results of both the factor analyses and multiple regression where the variables only explained a portion of the variance. Only 55% of the variance was explained in the factor analyses and 70% by the multiple regression on the data for the three cured meat products. More variables should have been included in the survey if the consumption of the meats was to be more adequately described.

A number of the variables which were included in this survey would have to be rephrased for any further work. The respondents did not appear to really know what 'tenderness' meant and it should possibly be replaced by an adjective such as 'chewiness', a word that has more meaning for the average consumer.

'Versatility' was another adjective which the consumers did not really understand, probably because it could be interpreted in many ways. For instance, it could mean the number of ways in which the meat could be cooked, or it could mean the number of dishes which could be made from it, or it could even be the number of ways of serving the meat. Possibly all three adjectives ought to be used for subsequent design work.

As has already been stated, there are indications that additional variables would need to be included in any further work and these are: 'colour', both of the lean and fat, 'texture' and also 'whether liked by children or adults or both'. In the first survey a number of mothers stated that their children did not like a certain meat or they liked another meat, usually luncheon and saveloys, and this would tend to indicate that a question relating to the individual family members' meat preferences ought to be included in any further work. This last mentioned variable would be very important from a marketing angle as it would enable the designer to design

a meat product which had appeal to either children or adults or both, depending on which was needed.

Multiple regression on the attitudes towards cured products produced promising predictive results and this technique ought to be extended to include all the meats used in the survey.

6.8. CONCLUSIONS

Principal component factor analysis and also rating was used to determine which variables were the most important for Palmerston North housewives when they selected their meat. The two techniques showed that 'nutrition' and 'flavour' were very important and that the more subjective emotional and rational variables associated with meat products such as 'prestige', 'length of cooking' and 'length of preparation' were less important.

Principal component factor analysis was also carried out on the two meat groups: main meal meats and snack meal meats. The analysis showed that in addition to the variables which had been isolated for all meats such as 'would buy', 'flavour', 'nutrition', 'prestige' and 'cooking' other variables were isolated as being important for specific meat groups. In the case of main meal meats, 'preparation' and 'expense' were isolated in addition to those already mentioned. 'Preparation', and 'type of meal' were the additional variables which were isolated as being important in the consumption of snack meal meats.

Multiple regression on the data for the three cured meat products showed that 'tenderness' was the most important variable affecting the consumption of these meats. This was followed by 'nutrition', 'versatility', 'prestige', and 'cooking'. 'Nutrition', 'cooking' and 'prestige' were the only variables isolated by multiple regression which were also isolated by factor analyses of the different meat groupings.

The factor analyses of the data on specific meat groupings and in particular

the factor analyses of the data on individual meat products suggests that consumers did in fact conceptualize meat products as embodying a distinct set of variables, some of which were common to all meat, some to specific meat groupings, but more importantly there was always a unique subset of variables that enabled them to differentiate a product from all the other products included in the survey.

The factor analyses and multiple regression showed that consumers did in fact change the priority of the different variables depending on the type of meat they were purchasing.

The factor analyses and multiple regression of the attitude data did not fully predict the consumption of the different meats and for this reason additional variables ought to be included in subsequent surveys. 'Colour' of the lean and fat plus some variable relating to the texture of the meat ought to be included so that the physical nature of the desired new products could be more adequately described. A question relating to individual family members' meat preferences ought to be included so that products could be designed for children and/or adults.

The respondents did not understand what 'tenderness' and 'versatility' meant and for this reason the variables ought to be rephrased to more meaningful adjectives, adjectives that the consumers would have no difficulty in interpreting.

CHAPTER 7

STRATEGY FOR NEW CURED MEAT PRODUCTS

Why are products successful? This question can be looked at from two angles, namely the consumer and the firm or industry. Consider the consumer first. A product owes its success to the fact that it meets the needs and wants of the specific target group. (53) It also owes its success, according to Angelus (2), to its uniqueness and this uniqueness appears to be due to the real product differences which it possesses, differences which are required and can be detected by the consumer. From this a successful product can be defined as a unique blend of sensual, physical and rational appeals which meet the needs and wants of a specific target group.

But to just consider the consumer requirements of a product is too one-sided and clearly quite dangerous. A product must also meet certain criteria required of it by either firm or industry. These include: capital expenditure for the new product, total sales and/or production volume, relation to present distribution channels, relation to present product lines, effect of sales on present products, productive ability, i.e. equipment and personnel. Quite clearly, the product will never reach the production stage if it fails particularly badly on any one of the above variables.

A successful product then, is one which has a unique blend of consumer and industrial appeals which guarantee its success. On the one hand, the consumers want it, and on the other the industry or firm want it because it meets their specifications.

How can a successful product be firstly designed and secondly produced? What are the steps required in the whole process? Design, like any other discipline, requires a systematic approach to the whole process to enhance the chances of success. The first stage requires the development of the product strategy. The objectives set out in the product strategy stage

then become the design brief to the product developers and also become the criteria by which new product ideas are screened. Within the product development stage, two processes have to occur. Firstly ideas must be generated which are then evaluated on the basis of the criteria established in the product strategy stage and secondly the few ideas that successfully pass the evaluation stage are translated into product concepts - concepts which follow the guidelines established in the strategy stage. These concepts are then consumer tested and those which meet the greatest consumer acceptance go onto the actual development of the physical product.

7.1. PRODUCT STRATEGY

This is a critical step for the development of any new product as it acts as a brief for the research and development production, advertising and marketing personnel. It also acts as a set of criteria against which the above people can evaluate what they have designed and produced. (53) To develop an adequate product strategy the following variables must be examined.

7.1.1. Target Group. The relevant market research data is used at this stage to define what group is likely to buy the products. This is particularly difficult in cases where the company is producing a pioneering product, but in most cases the group that is likely to consume the product can be found from consumers of similar or related products. This variable is particularly difficult to define, until such time as the product ideas have been developed and evaluated and because of this, the target group should be as broad as is possible and then redefined in the light of subsequent findings. The initial target group specification provides the people who are generating the ideas with some guidelines as to who the products are to be aimed at.

7.1.2. Target Responses. According to King (53) this is the statement of the desired sensual, rational and emotional responses that the firm wishes to arouse in the consumer.

Consider first the sensual response. Here we are essentially concerned with the target group's senses of sight, hearing, taste, touch and smell. The structure, design or formulation of the physical product clearly have the most important effect on how the consumers perceive the product. We are really concerned with the problem, "What sensual sense do we particularly want to arouse about the new product?" We are not so much interested in what goes into the product, but rather the effect it has on the consumer.

The next problem to consider is the question of rational responses which we want to evoke in the consumers. Here we are really setting out a statement of what we want the consumer to believe about the product. Once again we are really concerned with the structure and/or ingredients of the product; its function, performance and purpose.

Finally the emotional responses, and here we are really concerned with the problem of what we want the target group to feel toward the new product. What are its nature, style and associations to be?

The definition of the responses that the product is going to evoke in the consumer requires a thorough understanding of existing products on the market and how consumers relate to them in terms of the sensual, rational and emotional characteristics of the products, so that the characteristics of the new product will be such that it will clearly be a new product - a product that is quite unique as far as the consumers are concerned, so that they will differentiate it from any other similar products on the market.

7.1.3. Financial Aspects. These are probably the most important characteristics of a new product, as far as a firm or industry is concerned. There are many different ways in which the economics of a product can be evaluated, but probably the three most common criteria used to judge the financial success of a product are: the rate of return on investment, the estimated annual sales of the product, and the amount of money required for new plant.

The rate of return measures a product's profitability after the expenses of

making it and selling it have been deducted and it is an estimate of how much the product earned with respect to the money invested in the project.

Estimated sales, represents the gross dollars which can be expected of the product at its mature growth stage. But we are also concerned with the problem of how long it will take before the product reaches its maximum annual sales.

The most critical investment in new product development is the amount spent on new equipment. Unlike raw materials which can be sold or returned, the investment in new equipment is likely to be lost if the product fails. So here we are really concerned with how long it takes to recoup this part of the total investment, i.e. the new fixed capital payout time.

These three financial considerations are generally handled by discounted cash flow and the ratios must be calculated for each new product idea so that the ideas can be compared and contrasted.

7.1.4. Production and Engineering Aspects. The development strategy adopted by a company can often be dependent on its size. A small company, for instance, is not likely to consider new products if the production facilities required for the production of the new product are much larger than they are used to, or larger than they could afford. A larger company, however, would probably choose some product idea that required major capital investment in large plant because in this way it would ensure the elimination of any competition from smaller firms. As the plant size required to produce a product decreases, so the number of potential competitors is increased and these smaller firms can quite often produce the product at a cheaper price than the larger companies. (37) For a large firm, the bigger the requirements for a given product, the safer it is from lower cost competition and the reverse is true for smaller companies.

Raw materials for a new product should be readily available, ideally from inside the company itself, or at least from more than one supplier. Quite clearly a raw material which is in tight supply or controlled by a competitor will be a disadvantage.

Then there is the equipment. A plant represents the investment of not only money, but engineering time. It would be desirable to find a new product that would use existing equipment, provided the equipment was not fully utilised in the production of existing products. In this way, not only are idle plant charges absorbed, but often a lower actual investment cost of the new product is possible.

The final production consideration is process familiarity. A new type of production operation can generally be expected to give more trouble and require more time to start up production. It could also require the employment of new staff, staff who are familiar with the new techniques. On the other hand, if a new process shows promise of being widely applicable or opens up new vistas for the company, this will be a distinct advantage, off-setting to some degree the difficulties that will likely be encountered.

7.1.5. Research and Development Aspects. This expense can vary greatly from project to project and really depends on the type of development to be undertaken. According to Heininger (39) there are four product types:

Type I: Improved Product - essentially a model or style change of an existing product in a known market

Type II: Addition to the line; more of the same, familiar marketing problems, related technology

Type III: New to Company - Known to the market - 'me-too' product, entry into a market already known by competitor, but new to company. Product type accepted by the consumers

Type IV: New product, new market - true pioneering, high risk on both technology and market acceptance

The expense and problems involved in developing new products could be expected to increase in going from product Type I to Type IV. Here we are really dealing with the question of research knowledge in the field. Whenever new products are to be developed outside of the research knowledge of the firm, then the firm obviously faces problems and can do one of two things; allow its research staff to proceed with the requisite experimental

programme to build up the knowledge - and this usually happens when the company is undertaking Type IV product development - or buy the requisite knowledge which can be done in three ways: firstly, purchase the production rights if the knowledge is held by some other company; secondly, hire personnel with the required background or thirdly, hire consultants.

Finally, of course, the firm is faced with problems if the product is covered by patents and as has already been discussed above, the company can buy the production rights from whichever company holds the patent or it can proceed with an experimental programme to by-pass the patents. Depending on what type of product is being developed will affect the decision. If the new product is Type I then the company would probably purchase the production rights, but if it were Type IV then they would probably try and find some way of by-passing the existing patents.

7.1.6. Marketing Aspects. From the marketing viewpoint there are a number of characteristics of a potential new product which should be considered. The first is the similarity of the new product to existing lines, which is essentially a measure of how well a new product fits into the existing framework of the firm. It can obviously have a marked effect on the marketing, sales and promotional aspects of the firm. The effect on present products is a measure of whether the new product will replace or enhance the sales of existing products.

The company must also define the target group at which to aim the product. Here we are really concerned with the problem of whether to sell the new product to existing customers or whether to new customers. The second problem is how many customers? When the sales of a product are dependent upon one to three customers then the loss of one could be quite serious. On the other hand, when customers are numbered in the thousands and even millions, it becomes an increasingly difficult task to reach them. The choice of an ideal number will depend on the company, the product and the sales force.

7.1.7. Product Aspects. There are four major areas that directly impinge on a new product. The first deals with the problem of competition. The fewer the competitive products or producers the better. Imports as well as locally produced products have to be considered.

The second criterion is that of product advantage, i.e. the unique product characteristics already discussed in the target responses, which clearly differentiate it from others on the market. The more distinctive the product provided it is needed by the consumers, then the easier it should be to introduce and the more likely it is to be a success.

A third area revolves around the question of product life cycles. Certain products have shorter life cycles than others and the life cycle of the new product is likely to follow that of a similar product. However, the firm could decide to manipulate the life cycles in such a way that when a new product just reaches its maturity stage it is replaced by a new product and so the company maintains its impetus and also its position in the market.

Finally of course, there is the problem of the cyclical or seasonal demand for products. If the company already produces products which are seasonal in nature, then it ought to produce some complementary product whose demand peaked at a time when the demand for their other products was low.

A summary of the factors which must be considered in the overall product strategy can be found in table 41. (37, 39, 53, 79)

Table 41: Factors to be considered in the product strategy

Industry Factors

Production	Financial	R. & D.
Size of company	Rate of return on investment	Research knowledge and personnel
Equipment necessary	Estimated sales and growth of sales	Existing patents
Production knowledge and personnel necessary	New fixed capital payout time	
Raw materials: price and availability		

Market Factors

Consumer	Marketing	Product
Target group	Relation to present distribution channels	Competing products
Responses to be evoked:	Relation to present lines	Product uniqueness
Emotional	Promotional relationships with existing products	Resistance to seasonal fluctuations, cyclical fluctuations
Rational	Quality/price relationships	Product life cycles
Sensual	Effect on sales of present products	

7.2. THE NEW ZEALAND BACON INDUSTRY

The whole industry has been examined for two reasons. Firstly, because the statistics only deal with the whole bacon industry and secondly, because the firms supplying the Palmerston North market with bacon, ham and small-goods are sited as far north as Auckland and as far south as Christchurch.

7.2.1. The Structure of the Bacon Industry. The New Zealand bacon industry consists of two sections, on the one hand the farmers who are represented by the Pork Industry Council and on the other, the manufacturers who are loosely banded together in the Association of New Zealand Bacon Curers and Meat Processors (Inc.). The Pork Industry Council has wide ranging powers to act for the farmers in all matters except those related to the sale of bacon and ham. The latter are handled independently by the individual bacon companies.

The Pork Industry Council was officially established on 29 October, 1974 by the Pork Industry Act, 1974.

The Council consists of seven members, consisting of:

(a) The Director General of Agriculture and Fisheries
(b) Four producer members
(c) Two members to be appointed by the Minister of Agriculture and Fisheries

The principal functions of the Council are:

(a) To promote and organise the orderly development of the pork producing industry in New Zealand
(b) To assist in the organisation and development of the orderly marketing of pigs
(c) To maintain and improve the quality of the stock used in the pork industry
(d) To increase production of the stock used in the pork producing industry
(e) To ensure, as far as is practicable, that measures and practices

are adopted by the persons engaged in the pork producing industry which will promote greater efficiency in that industry and will further the interests and welfare of those persons

(f) To ensure, as far as is practicable, a supply of feedstuffs for pigs

According to the Act, the Council has all the powers that are reasonably necessary or expedient to enable it to carry out its functions.

7.2.2. Number of Establishments in the Bacon Industry. Between the years 1964-1971 the number of establishments in the bacon industry has fallen by some 35% from a high of 54 in 1964 to a low of 35 in 1971. In 1971-72 season five additional establishments entered the industry. Details of the changes in the number of establishments are to be found in table 42.

Table 42: Changes in number of establishments, 1964-1972

	Number of Employees						
	6	6-10	11-20	21-50	51-200	200	Total
1964-65	13	10	15	9	6	1	54
1965-66	11	11	11	12	4	2	51
1966-67	11	9	9	12	4	2	47
1967-68	7	7	12	7	5	1	39
1968-69	10	3	9	7	4	1	36
1969-70	7	5	9	7	6	2	35
1971-72	4	8	12	9	5	2	40

If table 42 is examined it can be seen that the very small firms employing 20 or less employees have been responsible for the fluctuations in establishment numbers in the period 1964-1972. These small firms, i.e. those

employing 20 or less employees, accounted for 70% of the establishments in the industry in 1964. In 1971 they accounted for 57% of all the establishments in the industry and by 1971-72 the percentage of small firms had increased to 60%.

In table 43 the changes in the number of establishments in each of the statistical areas is presented. Just about every province has contributed to the decline in bacon establishments over the period 1964-72, but the main areas of decline have been Hawkes Bay, Taranaki and Canterbury. Wellington province has the most establishments, ten, followed by Canterbury and then Central Auckland with seven. But of these provinces, the number of establishments in Central Auckland has remained almost static over the period under review; suggesting that the very large Auckland market encourages firms with more than 20 employees, and is also a market that is buffered from economic fluctuations. The five establishments which were set up in 1971-72 went to Central and South Auckland, Wellington and Canterbury provinces - areas that have the largest proportion of the New Zealand population and also areas that are continuing to grow in response to the urban drift and urban centralisation trends that are evident in the New Zealand population. (73)

7.2.3. Pig Numbers and the Supply Situation. In the period 1960-1974, total pig numbers have gone through a number of phases: (see Fig. 18)

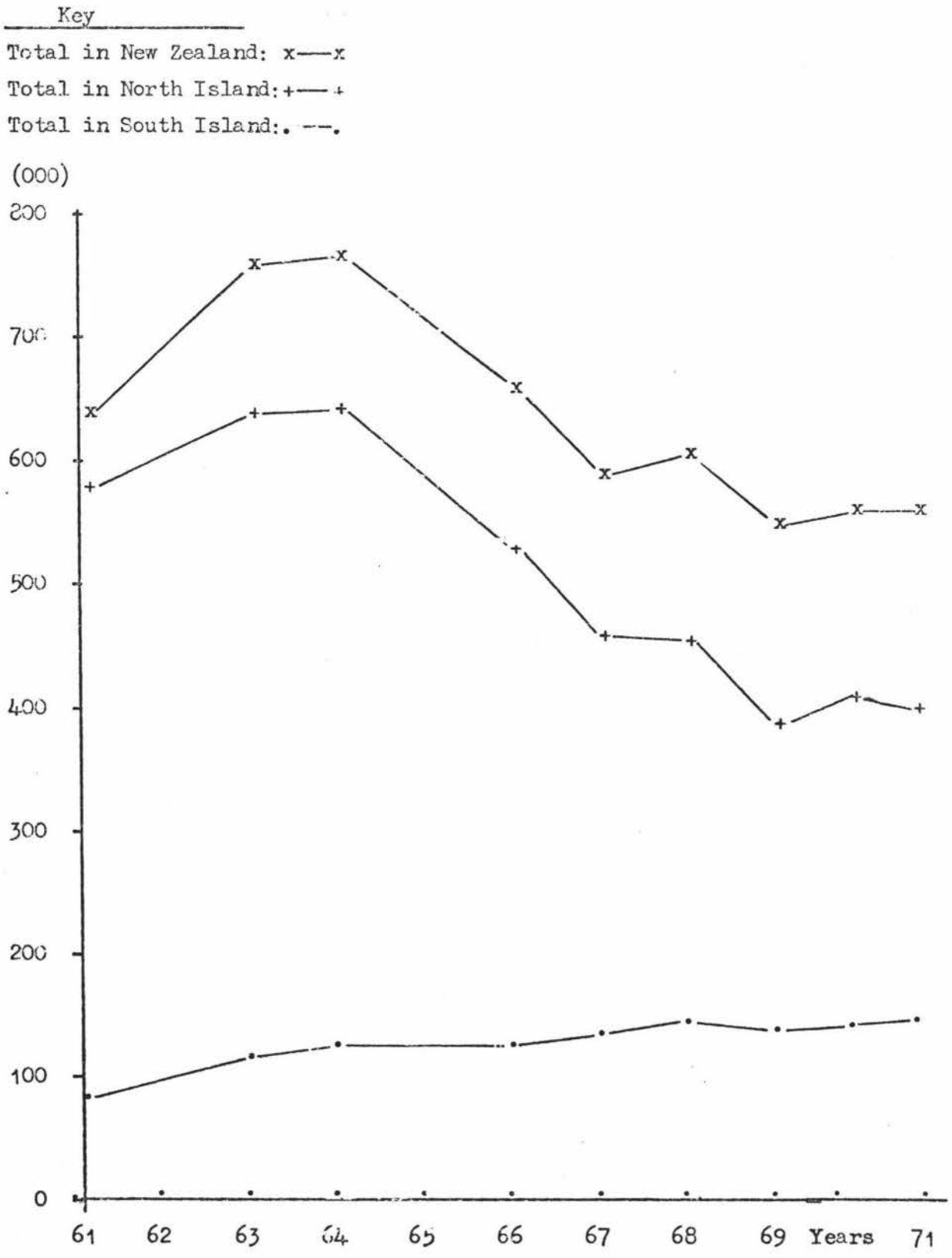
(a) In the period 1960-64, pig numbers increased from 660 000 to 771 000, a 17% increase
(b) However, pig numbers fell from 771 000 to 553 000 over the period 1964-69, a 39% decrease which more than erased the previous increase
(c) Pig numbers showed a marginal increase over the period 1969-71 from 553 000 to 617 000, but by 1972 pig numbers had decreased to 507 000, representing a 30% drop from the high of 771 000 in 1964.

If pig numbers in both the South Island and also the North Island are examined (see Appendix 14) it can be seen that the fluctuations associated with the total New Zealand pig population are mainly a result of the fluctuations in the North Island pig numbers, because the overall trend in the South Island has been for an increase in the pig numbers.

Table 43: Number of establishments in the ten statistical areas

	Central Auckland	South Auckland/ Bay of Plenty	East Coast	Hawkes Bay	Taranaki	Wellington	Nelson	Canterbury	Otago	Southland
1964-65	6	4	1	6	4	11	2	13	4	3
1965-66	6	3	1	6	4	10	2	13	3	3
1966-67	6	3	1	6	3	9	2	11	3	3
1967-68	6	2	1	4	3	8	1	8	3	3
1968-69	5	2	1	4	3	7	1	8	3	2
1969-70	5	2	1	5	3	7	1	7	3	2
1970-71	5	2	1	4	2	8	1	7	3	2
1971-72	7	3	1	4	1	10	1	8	3	2

Fig. 18 Total Pigs in New Zealand.



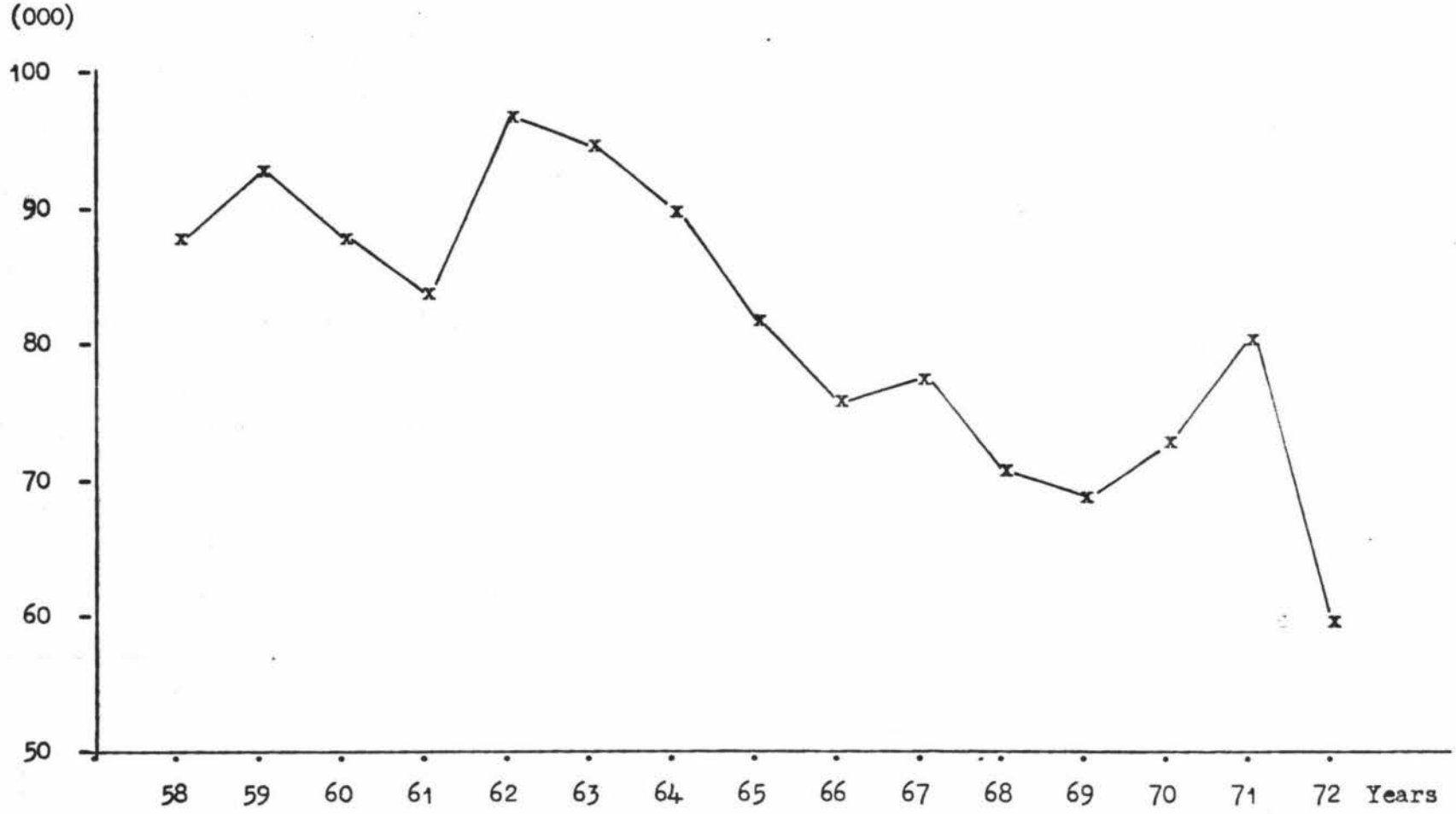
The areas to suffer most in the North Island have been Northland and Auckland provinces. The Wellington and Taranaki provinces have suffered marginal decreases, while Gisborne and Hawkes Bay provinces have even shown signs of increasing pig numbers, but their contribution to the total North Island pig population is very small, being 2.8% and 3.4% respectively. With the exception of Westland, most of the South Island provinces have built up their breeding sow numbers since about 1960.

The pig industry is clearly going through a transition stage, re-establishing itself in areas where either grain or maize is grown. This is particularly true of the North Island where the industry was based on the milk industry as a raw material food supply. But with the advent of bulk milk collection the source of a cheap food supply was lost almost overnight and hence the drastic reduction in pig production in the Northland and Auckland provinces - two provinces with very strong links to the dairy industry. The major grain areas in New Zealand are Canterbury, parts of Otago and Southland, and parts of the southern half of the North Island. The major maize growing areas in New Zealand are the Waikato, Bay of Plenty and Hawkes Bay provinces and it is in these maize and grain production areas that pig numbers are once more building up.

Two of the largest processing establishments in the country have their own pig production facilities, capable of producing ten thousand pigs annually. One is situated just south of Auckland at Tuakau, and the other just outside of Christchurch. These have been started up by the two companies to buffer themselves from the rather uncertain pig supply situation.

Breeding sow numbers have gone through a number of phases in the period 1958-72 (see Fig. 19). With the exception of 1959, sow numbers tended to decline over the years 1958-62, but in 1963 they sprang up from 84 499 to 97 039 and over the years 1963-69 continued the declining trend evident in the 1958-62 period. The trend was halted over the years 1969-71, but this was only temporary as sow numbers once again fell in 1972 to the lowest point in the whole period under review - 60 319. Despite one or two fluctuations, the overall trend for sow numbers in the years 1958 to 1972 has been one of decline and during this period sow numbers have fallen

Fig. 19 Changes in the Number of Breeding Sows in New Zealand 1958-1972.



by some 31%.

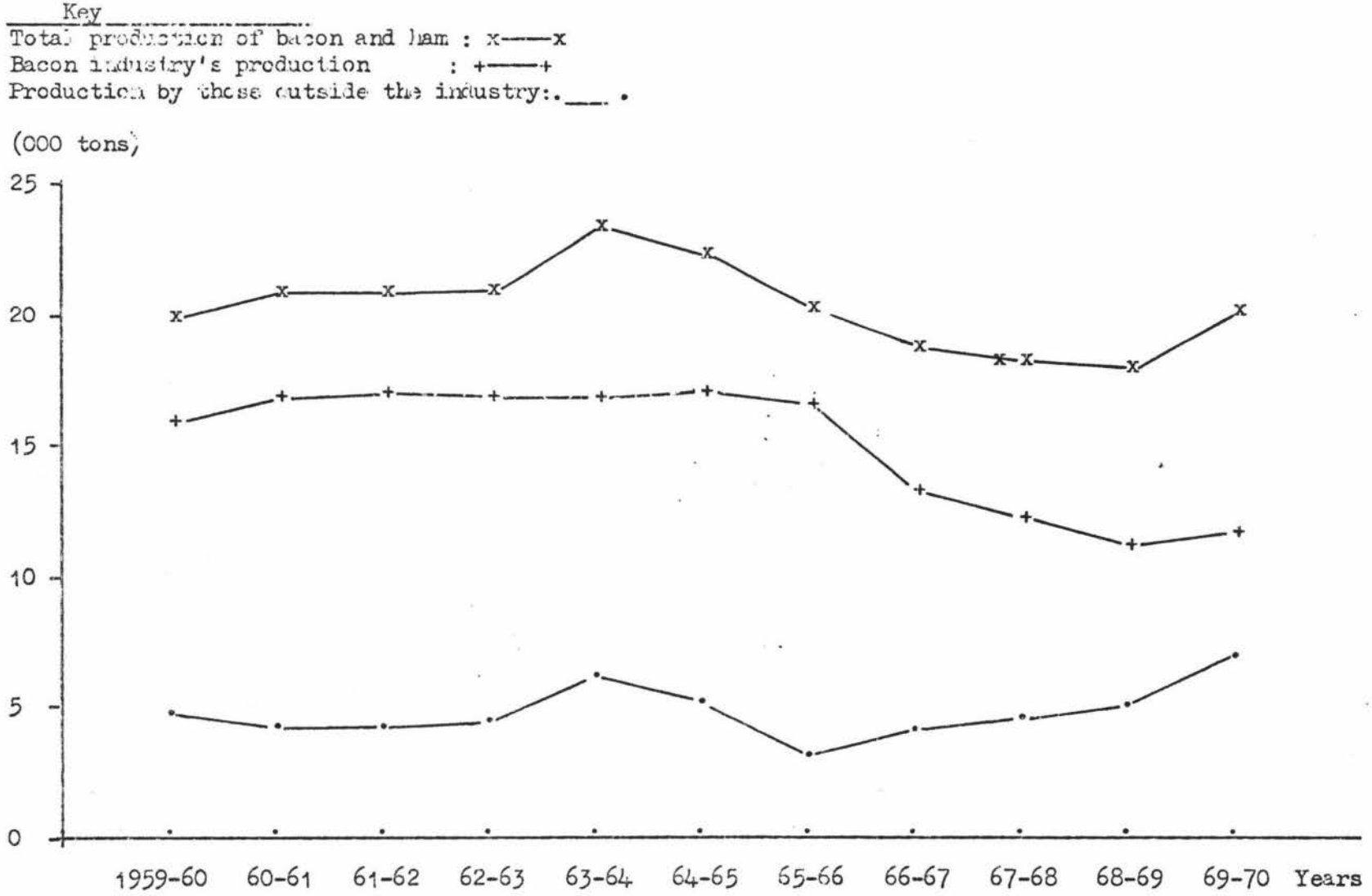
The outlook for the bacon industry in the light of the above trend is grim as the number of breeding sows sets the upper limit for the number of baconers and porkers that are going to be available in any one year to the bacon industry. Sow numbers have dropped by 38% from the high of 97 039 or 3.8% per annum and if the trend continues. sow numbers will be down to 30 600 by 1980. Measures must be adopted to encourage farmers to keep, and where necessary, build up their breeding sow numbers otherwise the country will be faced with the prospect of having to import practically all its pig meat requirements.

7.2.4. Production by the Bacon Industry. Bacon and ham production by the bacon industry in the period 1954-72 appears to have occured in three distinct phases (see Fig. 20 and Appendix 15 for details).

1. The first phase, which lasted from 1954-57, was characterised by a very rapid increase in the production from 257 321 cwt. in 1953-54 to 307 550 in 1956-57, a 19.5% increase.
2. The second phase took place in the years 1956-57 to 1964-65 and was characterised by a much more gradual increase, with one or two fluctuations from 307 550 cwt. to 353 161 cwt., a 15% increase.
3. Since the 1964-65 season bacon production has slumped from the high of 353 161 cwt. in 1964-65 to 242 429 cwt. in 1971-72 - a 31% drop - and there is every indication that this trend continues.

This slump in production by the industry has been made up by sectors outside the industry. In 1966 interests outside the industry produced 53 000 cwt. or 13.2% of the country's bacon and ham requirements, but by 1969-70 their contribution had grown to 126 000 cwt. or 31.5% of the market, and this trend appears to be continuing. The butchery trade is mainly responsible for this additional production. It would appear that their cheaper pricing policy and possible dissatisfaction with products from the industry has been responsible for their taking an increasingly large share of the bacon and ham market. In the course of the market survey (see Chapter 2), it was observed that butcheries that made their own bacon and ham sold the products at prices which were up to 30 cents per

Fig. 20 Bacon Industry's Share of the Bacon and Ham Market in New Zealand 1959-70.



lb. cheaper than industry's products (see Appendix 17 for details).

The industry's share of the fresh pork trade has shown two phases of decline over the period 1954-1972 (see Fig. 21 and Appendix 15 for details):

1. In the period 1954 to 1964-65 there was a gradual decline in production from 50 000 cwt. to 35 000 cwt. in 1965, a drop in the market share from 16% to 13%.
2. Since 1965, pork production by the industry has continued to fall and by 1972 the industry was only producing 5 400 cwt., or 2% of the total market requirements. Total pork production fell by 89% over the period 1954-72, or by 5.56% annually.

Smallgoods is the only product line that has shown an overall increase over the period 1954-72. Production has generally increased every year, and in the 1971-72 season stood at 363 000 cwt., a 133% increase over the 1954 production figure of 153 000 cwt. The 1967-69 period showed a sharp drop in smallgoods production by the industry, but this was mainly due to comparatively cheap beef and sheep meat prices on the local market. Smallgoods consumption is dependent on the prices of beef and sheep meat; if the prices of beef and sheep meat are high then smallgoods consumption tends to be also high and the reverse is true when the prices of the two meats fall. The main reason for this is that meat only forms a portion of the ingredients of smallgoods so their prices do not rise in the same way as fresh meat prices, but only in the proportion of their meat content (see Appendix 15 for details).

The number of companies that employed 50 or more employees grew from three in 1954 to six by 1959, and ever since then the number of large establishments has fluctuated between six and eight, though in 1972 there were seven such large companies. During this period these large establishments have increased their share of the industry's production from a low of 29.3% of the total industry's output in 1954 to 66.2% in 1968-69, a growth rate of almost 2.5% per annum, and if the trend had continued over the last few years then their share would have been 80% by 1974. But the

Fig.21 Bacon Industry's Share of the Pork Market 1954-72.

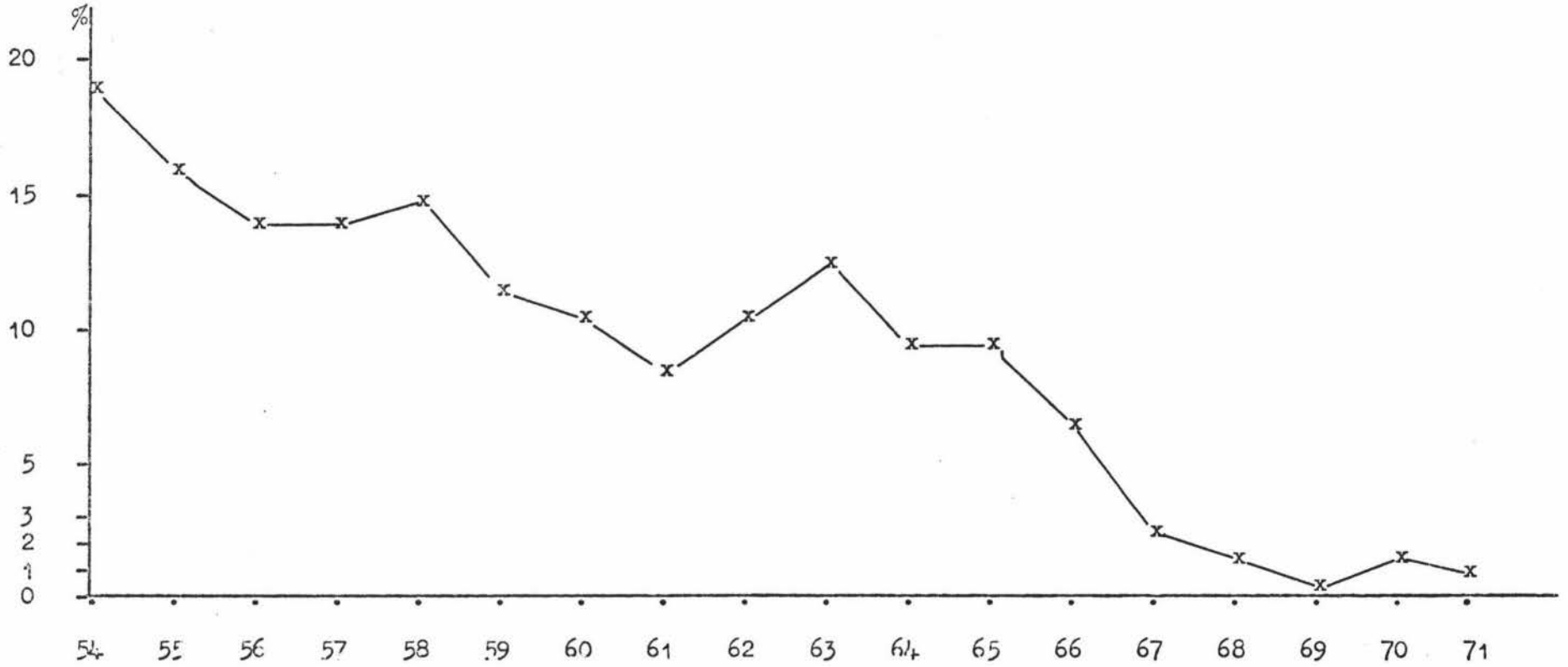
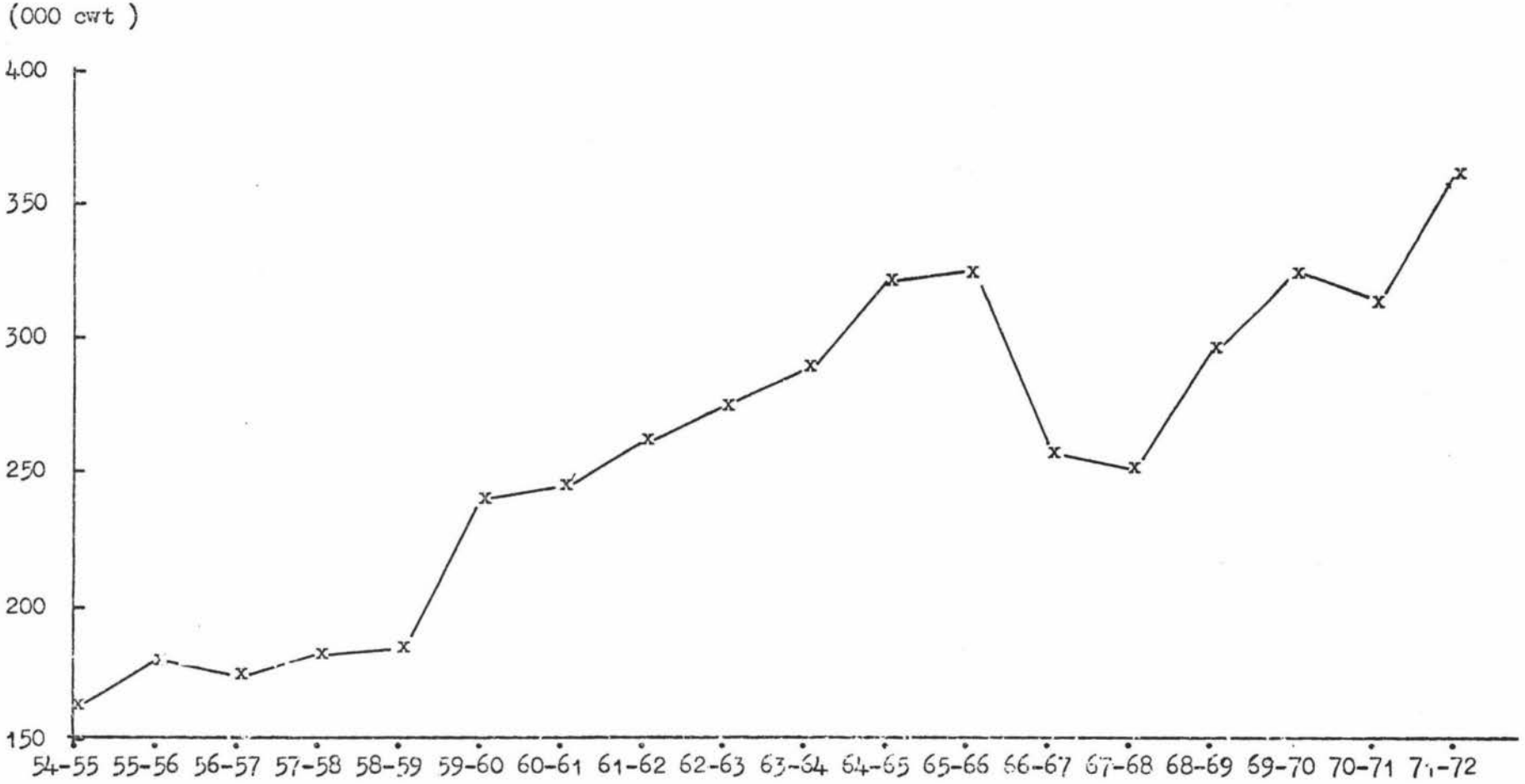


Fig. 21 Smallgoods Production by the Bacon Industry, 1954-72.



trend did not continue over the period 1969-72, remaining static for two years and actually declining in 1971-72. This decline was caused by the closure of one of the establishments which employed more than 50 employees. It is particularly difficult to predict whether the trend towards increasing centralisation in the industry, which was observed over the years 1954-69 will continue, i.e. the period 1969-72 representing a temporary set-back in the trend, or whether the smaller firms will once again re-establish themselves in the industry. The increasing price of fuel might favour the smaller firms as their distribution costs form a much smaller proportion of their overall costs compared with the larger firms who have more widespread markets to reach, which forces their distribution costs up proportionately (for details see table 44).

7.2.5. Financial Aspects of the Bacon Industry. The bacon industry includes almost all aspects of production in New Zealand. It buys from the producers, processes and then distributes to the different retail outlets such as supermarkets, groceries, dairies and even butcheries. The smaller establishments with six or less people and even those with less than 11 people do not generally buy from the producers nor do they kill their own stock, and so their costs are proportionately lower than those companies that do. The very small firms, by virtue of their production capacity, do not face the same distribution problems and costs that face the larger companies. As the productive capacity of a firm increases, so it has to distribute its products further and further afield to gain sufficient customers, unless of course the company is sited in Auckland, Wellington or Christchurch - areas that have a substantial market at the firms' doorsteps. But those firms which have a very large production are forced to distribute nationally. The geographical nature of New Zealand and the distribution of the population means that distribution costs tend to rise quite substantially as the firm has to go further and further afield for its customers.

All these costs are reflected in tables 45 and 46 where the net value added is compared firstly, with the size of establishment and secondly, with province. It can be seen that there is a general trend in net value added

Table 44: Production of bacon industry in relation to factory size

Year ended March	Total factory Production $ 000	Production volume of those employing 50	No. factories employing 50	% of N.Z. production
54-55	10 846	3 098	3	29.3
55-56	11 964	4 504	4	38.0
56-57	12 838	5 348	5	41.5
57-58	13 814	6 360	6	47.5
58-59	14 358	6 058	5	42.0
59-60	15 686	7 560	6	48.0
60-61	18 256	10 432	7	57.1
61-62	19 384	10 090	6	52.0
62-63	20 180	10 782	6	53.4
63-64	n.a.	n.a.	6	n.a.
64-65	24 500	14 600	7	60.0
65-66	25 917	21 049*	6	-
66-67	21 869	11 698	6	53.5
67-68	20 906	12 058	6	57.7
68-69	22 398	14 838	7	66.2
69-70	24 884	16 652	8	66.9
70-71	25 507	17 405	8	66.8
71-72	27 921	17 398	7	62.3

* Includes factories employing 21 to 50 employees

Table 45: Net value added ($) by number of employees in each establishment (Per man)

	Under 6	6-10	11-20	21-50	51-100	100-200	Over 200
	$	$	$	$	$	$	$
1965-66	2 957	3 196	2 991	2 858	n.a.*	n.a.	3 905
1966-67	2 804	3 720	3 928	2 956	2 315	n.a.	4 350
1967-68	3 970	4 003	3 383	3 650	2 586	n.a.	3 831
1968-69	3 752	2 851	3 317	2 784	2 385	n.a.	4 738
1969-70	4 006	2 868	3 073	3 615	n.a.	n.a.	5 839
1970-71	5 860	4 621	4 108	4 827	n.a.	n.a.	4 944
1971-72	6 601	6 165	5 628	4 336	n.a.	n.a.	5 562

* not available

Table 46: Average net output ($ 000) of firms in each statistical area

Area	Year						
	64-65	65-66	66-67	67-68	68-69	69-70	70-71
	$ (000)	$ (000)	$ (000)	$ (000)	$ (000)	$ (000)	$ (000)
Central Auckland	956	1 256	1 431	1 341	1 290	3 745	3 695
Sth Auckland/Bay of Plenty	1 052	1 412	1 531	1 105	1 668		
East Coast						108	138
Hawkes Bay	178	183	164	77	48		
Taranaki	674	768	164	120	135	70	919
Wellington	688	735	804	815	694	729	
Nelson	656	739	639	700	656	1 322	1 143
Canterbury							
Otago	81	103	112	105	73	285	259
Southland	56	52	106	60			

with the size of the establishment. As the size of the firm increased from six employees to one with less than 200 so the net value tended to decrease. Firms with more than 200 employees tended to have the highest net value added per man figures of all the different sized companies. This trend is likely to continue as transport costs increase with each increase in the price of petrol. The net value added by firms in the Auckland province were generally higher than those in any other province and they were followed by Wellington and Christchurch. These figures reflect the distribution costs faced by companies outside of the larger population areas in obtaining sufficient customers. Auckland firms with the comparatively huge population of Auckland at their doorstep have much cheaper distribution costs than a company of equivalent size based in Palmerston North which has to distribute its products in Palmerston North, Wellington and other centres to reach the same market size as the company based in Auckland.

There appears to be two optima for establishment size: less than six employees or more than 200 employees. Only with these two establishment sizes are the distribution and labour costs minimised relative to production output.

The bacon industry has three cost centres: labour, raw material and 'others', i.e. interest, capital, overheads, etc. and these are displayed in tables 47 and 48.

If table 47 is examined it can be seen that the costs facing the industry have gone through three stages over the period 1960-72. In the period 1960-66 all costs, i.e. wages, materials and other costs, steadily increased. Between 1966 and 1969 all costs except 'others' declined. This was largely achieved by staff reductions and also raw material reductions. 'Other' costs generally increased throughout the period 1960-72. The value of production over the same period tended to follow the same trend as the cost cycle, i.e. as total costs increased so the net value of production increased.

Table 47: Production costs for the whole bacon industry

	Salaries and wages	Materials	Other expenses	Total costs	Value of production
	$ 000	$ 000	$ 000	$ 000	$ 000
1960-61	2 098	14 280	1 050	17 428	18 258
1961-62	2 326	15 010	1 182	18 518	19 384
1962-63	2 534	15 212	1 408	19 154	20 180
1963-64	2 706	15 888	1 538	20 132	21 184
1964-65	3 056	18 308	1 708	23 074	24 398
1965-66	3 180	19 053	1 670	23 903	25 917
1966-67	3 034	15 330	1 647	20 011	21 869
1967-68	2 655	14 872	1 788	19 315	20 906
1968-69	2 859	16 126	1 759	20 745	22 398
1969-70	3 208	16 866	1 787	21 880	24 884
1970-71	3 503	17 397	2 023	22 905	25 507
1971-72	4 261	18 375	2 513	25 149	27 921

Table 48: Individual production costs expressed as a percentage of the total costs

	Salaries and wages	Materials	Other Expenses	Total costs Value of Production	1- Total cost Value of Production
	%	%	%	%	%
1960-61	12	82	6	95	5
1961-62	13	81	6	96	4
1962-63	13	79	8	95	5
1963-64	13	79	8	95	5
1964-65	13	79	8	95	5
1965-66	13	80	7	92	8
1966-67	15	77	8	92	8
1967-68	14	77	9	92	8
1968-69	14	78	8	93	7
1969-70	15	77	8	88	12
1970-71	15	76	9	90	10
1971-72	17	73	10	90	10

In table 48 the three cost centres, i.e. labour, raw materials and 'others' have been expressed as a percentage of the total costs. The ratio of total costs/value of production has also been included to show how profits have been going over this period. Over the period 1960-72 salaries and wages have contributed an increasing share to the total costs of the industry. In 1960 salaries and wages contributed 12% of the total costs, but by 1971-72 the proportion had risen to 17% of the total costs of the industry. 'Other' costs expressed as a percentage of the total costs have also tended to increase over the period from 6% of the total costs in 1960 to 10% in 1971-72. Raw material costs as a percentage of the total costs have tended to decrease over the period from 82% of the total costs in 1960 to 73% in 1971-72, a 9% decrease. Pigs make up the largest proportion of the raw material costs, and as has been shown already the production of bacon, ham and pork by the bacon industry has fallen, i.e. the bacon industry has cut back on its purchases of pig. If the ratio of total costs/value of production is examined, it can be seen that total costs have decreased relative to revenue from 95% in 1960 to 90% in 1971-72. In other words, the industry has raised its profit margin from 5% in 1960 to 10% in 1971-72. The trends of increasing profits and decreasing raw material purchases would tend to indicate that a number of firms are getting out of the less profitable side of the business - bacon and ham production - and concentrating on the more profitable smallgoods side of the industry. If this is so, i.e. that bacon and ham production are insufficiently profitable, then there is clearly a need for research to develop more economical methods of curing bacon, so that this section of the industry is once again a viable concern.

7.2.6. Research and Development, Technical Knowledge and Automation in the Bacon Industry. The bacon industry as a group has a very low technical base, though certain companies, particularly the larger ones, have a very sound technical base and these tend to be more the innovators in the industry because they do carry out a certain amount of research into the development of new products and processes. The smaller firms tend to

rely on the technical information supplied by supply companies for any product or processing developments. There are very few University graduates employed by the industry, less than ten, and these tend to be employed by the larger companies. Similarly the number of Meat Diplomates employed in the industry is very low, though higher than the number of University graduates, and even these tend to be found in the larger companies.

The industry can, however, call on the services of the Meat Industry Research Institute of New Zealand (Inc.) for any major research work needed by the industry. The last major contribution by M.I.R.I.N.Z. was their study into new techniques for curing and smoking of bacon. (21) Because the smaller firms in particular have a very poor technical base for any research into new product and process development, it is envisaged that they will have to call on the services of M.I.R.I.N.Z. more frequently than they have done in the past. The help of such a research organisation is needed at the present moment in view of the very serious problems faced by the industry, particularly in relation to research into more economical methods of curing bacon and ham.

The larger firms have a very sound technical knowledge of the following technologies: smoking, curing, emulsion, reformulated products and packaging. The smaller firms tend to be steeped in tradition and for this reason much of the technology is an art to them rather than a science.

One of the fastest developing technologies in the United States is that of reformulation or fabrication. In 1972, sales of fabricated foods topped the $13 billion mark and have been forecasted to reach $23 billion by 1980. (25) A large number of the larger firms in the bacon industry are experienced in this technology, but it seems that more research is required both to improve the process and also to develop new products.

The industry has introduced a number of technical improvements in the last few years in the way of new machinery. Parts of the industry now use conveyors, multi-needle pumps, automatic smokestoves, semi-automatic bowl cutters, automatic sausage filling and linking machines, semi-automatic

tumbling machines, high speed slicing machines and high speed vacuum packaging machines. Unfortunately, most of these machines require a large capital outlay and so the larger firms have benefited from the improvements. But even these larger firms have to recoup the capital expended on the new machinery.

7.2.7. Problems facing the New Zealand Bacon Industry. The bacon industry, at least with respect to bacon and ham, is faced with the following problems:

(a) A declining raw material supply
(b) An increase in the cost of pigs via the baconer schedule
(c) Increasing costs due to wage increases
(d) Decreasing output, with associated effects of loss of output, increased machinery down-time and under utilisation of plant
(e) Decreasing demand as a result of the high cost of their products
(f) Decreasing demand as a result of changes in meal habits
(g) Increasing competition from the butchery trade who can produce the products more cheaply than the bacon industry and this difference in production costs is reflected in products' prices

The industry can temporarily overcome some of these problems by centralising and thereby maintaining full production in their larger plants. But if the trends are allowed to continue there is every likelihood that even these large centralised plants will soon face problems of under utilisation of facilities given the present decline rate in cured pork products.

If cheaper bacon products are not produced, then there is every indication that the decline in bacon consumption will continue into the 1980's and that the industry will lose a large revenue centre if this were to happen. At present bacon and ham account for 75% of the earnings of the industry, and bacon alone accounts for 45% of the industry's earnings.

Production of bacon and ham were seen to be on the decline, while that of smallgoods appeared to be increasing.

An examination of the establishments engaged in the industry showed that those with less than six employees and those with more than 200 were the most profitable. Establishments in the larger cities of Auckland, Wellington and Christchurch were the most profitable. The industry now operates on a 10% profit margin whereas in the early 60's they used to operate at a 5% profit margin. This has been achieved by sections of the industry seemingly getting out of bacon and ham production and concentrating on more profitable lines.

The larger companies appear to be gaining most from the advances in machinery and technology. Much of the new machinery tends to be high volume equipment so the larger companies, because they have high sales, can afford to install the equipment. These larger firms are also gaining from the recent technological advances because of their better technical base when compared with the smaller firms.

7.3. CONSUMER ASPECTS

7.3.1. Target Group. The consumer survey showed that approximately 65% of the households contacted in the Palmerston North survey bought bacon and this could be generalised to mean that 65% of all the households in Palmerston North purchased bacon. There appeared to be no possibility of segmenting the market as a broad cross section of the sample bought the product on a regular basis, though smaller households with one to two occupants tended to consume more per capita than households with four or more occupants. Any new 'bacon' products ought to be aimed at the whole population of Palmerston North in view of the large proportion of the survey which bought bacon.

7.3.2. Target Responses. Compared with fresh meats, the present bacon products were seen by the consumers to have the following characteristics: a lower 'nutritional' value, a less acceptable 'flavour' than most fresh meats except rolled beef, loin and neck chops and lambs fry, a very low

'prestige' value, significantly greater financial cost than most fresh meats except leg of pork. These, then, are the variables on which bacon scored badly compared with the fresh meats. On the positive side it was seen to require less 'cooking' and 'preparation' than most main meal meats. It was also seen to be more tender, have less wastage and more versatility than any of the other main meal meats. Principal component factor analysis of the main meal meats showed that the following variables were important in the consumption of these meats: 'would buy' or preference, 'flavour', 'nutrition', 'prestige', 'preparation' and 'expense', variables on which bacon generally scored worse than the fresh meats with the exception of 'would buy' and 'preparation'. The 'flavour', 'nutrition', 'prestige' and 'expense' of any new bacon product aimed at the main meal market would have to be made more acceptable before the product could compete successfully with the other main meal meats.

Consider first the flavour requirements for a new bacon product aimed at the main meal meat market. As pointed out above, the traditional bacon flavour was not as acceptable as most of the fresh meat flavours except in the cases detailed above. In Chapter 5, the meats were arranged in order of flavour preference and with the exception of rump steak, the most acceptable flavour was ham, followed by chicken and then pork, and these were then followed by the beef cuts and finally the sheep meat cuts, and then came the bacon cuts, salami and pork sausages, and then the other smallgoods products. It would appear that consumers in Palmerston North prefer the more bland meat flavours of ham, chicken and pork to the stronger meat flavours of beef and sheep meat, rump steak being an exception. The least acceptable flavour was the highly spiced smallgoods flavours. It would appear that any flavour experiments for the new bacon product should be aimed at producing a blander product with a more ham to pork flavour if possible. By doing this, the product's flavour should become more acceptable as a main meal meat flavour than the present flavoured products.

On the 'nutrition' variable, bacon did not score well compared with the other fresh meats, suggesting that changes to the product would have to

be made if the 'nutritional' rating of the product were to be improved. What emerged from the attitude survey was the fact that consumers appeared to think that processing of any kind tended to lower the 'nutritional' rating of a product. This even applied to curing, because the consumers gave bacon and corned beef a lower 'nutritional' rating than their respective parent meats, though ham was an exception. The reason for ham receiving a higher 'nutritional' rating than bacon would have to be considered in any further research as this could be a very important aspect leading to the acceptance of the new bacon products as main meal meats. The consumers even appeared to think that any size reduction tended to lower the 'nutritional' rating of a product.

Colour could have a very important bearing on how consumers perceive the nutritional status of a meat. In the most preferred meats as far as flavour is concerned it can be seen that ham, chicken and pork were the most highly flavoured meats. They are also quite pale meats compared with beef, sheep or bacon. Chicken and ham were also given comparatively high nutritional ratings compared with some of the other meats, but not so for pork. The ham colour is very similar to the product from which it is derived, while bacon is quite dark in comparison. The consumers may think that ham is not quite as processed as bacon, but this would have to be proved in subsequent research.

From the above discussion it appears that any new bacon product which was aimed at the main meal market would have to be as unprocessed as possible, or at least convey that impression. The nutritional image of the new product could be helped by ensuring that the product is not geometrical, i.e. not packaged in circular casings which give a product a processed image, but rather something that looks like a piece of steak. It could possibly be improved by ensuring that the product has a high lean meat to fat ration; high fat to lean content appears to downgrade the product's nutritional rating. If people associate bacon with a low nutritional content, then the industry might have to rename the product so that the poor nutritional image of bacon is not carried over to the new product,

possibly ham. The product should not be sliced too thinly, thus avoiding the poor nutritional image associated with overly "size" reduced products. Care should be taken in the selection of packaging materials, ensuring that the product is packed in very similar packages to fresh meats, rather than the conventional vacuum packages, thus associating the product more with fresh meats than processed products and hence, hopefully, improving the nutritional image.

The three bacon products generally had a poorer 'prestige' rating than the fresh meats or ham products. Loin chops, neck chops and lambs fry were the exception. The 'prestige' rating of any new bacon product aimed at the main meal market will have to be raised if it is to compete successfully with the fresh meat products. Ham-on-the-bone and Hawaiian ham were seen by the consumers to be highly 'prestigious', evoking an association with special occasions. This response is more at the rational and emotional levels than at the sensual levels and is something which is created either by advertising, or as in the case of these two products it's traditional in New Zealand to serve ham on special occasions such as Christmas and weddings. In the case of a new bacon product, this image of being a luxury product would have to be produced by correct naming of the product, for example Hawaiian ham which borrowed something from the exotic Pacific; by advertising, i.e. creating an atmosphere for the product and associating it with special functions; by pricing the product so that people feel that they are getting something special, provided it is not priced right off the market; by producing a recipe book with ideas of how to use the new cut, all of which deal with special occasions and just generally producing the correct image for the product so that the consumers feel that the new product is a prestigious product.

The final variable associated with main meal meats is 'expense'. The consumers felt that ham and bacon were too expensive compared with the other meats which were included in the survey. The other meats which were given a high 'prestige' rating, leg of hogget and chicken, were seen to be comparatively cheap meats; so it is quite possible to create a reasonably prestigious product without pricing it too high. Ham and bacon consumption

have been declining over the period 1954-74, and one of the reasons for their decline is their price - more their real price than the constant dollar price - and for this reason any new product should, if at all possible, be priced at a level below those of the present products. Pork retails at $1 per lb at present, and a 30-40% retail price above this should be reasonable. I must stress that this is an arbitrary estimate, but as bacon is currently retailing at $1-60 per lb, a price that is seemingly too expensive for most consumers, a price of $1-30 or so a lb does not seem too high in view of the raw material expenses. If a cheaper raw material were used than pork, then the price of the new product could be lowered to a dollar a lb to more effectively compete with rump steak and pork. Mutton or veal are possible sources of cheap raw materials.

Side and shoulder bacon, because the consumers felt that they were snack meats, compete with the other snack meats produced by the industry, namely smallgoods. How then do these bacon products compare with these other snack meats? Principal Component factor analysis showed that the following variables were important in the consumption of all meats, main meal meats, and also snack meats, namely: 'would buy', 'nutrition', 'flavour', 'prestige' and 'cooking'. If we examine the median scores accorded the two bacon products and also the smallgoods products (see Chapter 5) it can be seen that the two bacon products were given higher scores on all of the above variables. 'Type of meal', 'cooking' and 'preparation' were isolated as being important in the consumption of snack meats and on these the two bacon products did not fare quite so well, particularly on the 'type of meal' question where the consumers did not think that the two meats were sufficiently snack meal in character. The two bacon products scored badly on 'expense', 'tenderness' and 'wastage' compared with the other snack products. At present, the two bacon products are almost a dollar more per lb than most of the smallgoods products.

Because 'flavour', 'nutrition', 'prestige', 'would buy' and 'cooking' were isolated as being important in the consumption of all meats, the two bacon products can be improved on all these variables to increase acceptability of the two products. But in terms of creating a more snack-like product

probably the most significant thing that could be done is to lower the price of the two bacon products so that they more effectively compete with other snack products. The only way the bacon industry can produce a product which will compete on price with other snack products is to use a much cheaper raw material, and once again mutton and veal are possibilities. It is doubtful, even with the use of veal or mutton, whether the price of the new product could be dropped sufficiently low enough for the product to compete on price with the smallgoods products, unless more efficient and faster methods of curing and smoking products are found. One way round the problem is to use extenders to cheapen the product even further, but this would involve the industry in some major research and development if they wanted a product which had very similar properties to either side or shoulder bacon.

7.4. MARKETING

The survey carried out by the Pork Industry Council (77) and also the present study, have shown that side and shoulder bacons are aimed at three markets:

(a) The snack market
(b) The main meal market
(c) The flavouring market

The product life cycle of bacon suggests that the present products do not adequately fulfil these roles. For this reason there appears to be a need for the development of at least two new products and possibly three products which would be designed for specific markets, namely: main meal, snack meal and possibly even flavouring markets, though the flavouring market could be serviced by the products aimed at the snack market.

The consumer and market surveys showed that the supermarkets, groceries and butcher shops accounted for almost 63% of the sales of bacon and ham in

Palmerston North. The market survey (see Chapter 2) showed that the larger companies at least were mainly marketing their ham and bacon through these outlets. The smaller companies did not appear to have the same share of the major outlets as the larger companies and for this reason had to service the smaller retail outlets such as dairies, though they did sell their products through some of the supermarkets, groceries and butcheries. The development of new cured products should not necessitate in any change in channel policies as the companies already supply the retail outlets which command the largest share of the bacon and ham market.

The consumer and market surveys suggested that the bacon industry was competing in the snack market and for this reason the development of new products for the main meal market will demand the development of a new product line. The development of a new snack meal cured product will just be an extension of an existing product line.

7.4.1. Quality/Price Relationships. The companies did not appear to have a quality pricing policy until this year, 1975, when one of the larger companies started to market a new bacon product called 'Danish Style bacon' and they priced this some ten cents per lb in excess of their mild cured product. If the new 'bacon' products are made from cheaper raw materials such as mutton or veal, then the industry will be faced with a great opportunity of having a quality/price policy. The companies could conceivably produce a number of products with varying proportions of the cheap raw material and pricing their products accordingly.

Something which did come out of the market survey was the almost uniform price of industry produced products in most of the retail outlets indicating possible collusion between the companies. But a closer inspection of events showed that a number of the supermarkets and large grocery chains were supplied by contractual agreements between companies and that competition was so fierce between companies for these contracts that the firms' and therefore the industry's profit margin was rapidly being eroded. It seems that the industry ought to carefully examine their present pricing policies and attempt to extricate themselves from the present train of events which

are only harming the industry.

7.4.2. Number of Package Sizes. The companies appeared to supply the Palmerston North market with bulk bacon in the form of boneless middles and rolled sides and two sizes of vacuum package: half lb and 5 lb packs. The bulk bacon is mainly sold to the supermarkets, butcheries and grocery chains. The supermarkets and grocery chains then slice the bacon themselves and package it in their own brand named packages. One retail outlet actually sold their bacon by the slice and reported much higher bacon sales as a result. One retail outlet included both their brand name and that of the supplying company on their packaged meat products.

The market and consumer surveys highlighted the problem of expense associated with the present sizes that bacon is packaged in, and if the cost of the product cannot be decreased, then there would appear to be a need for a smaller package size than the half lb pack. By reducing the pack size, the industry would achieve a pseudo price cut and hence boost sales and secondly this packaging policy would enable the large singles and two person sized households, which account for almost 40% of all the households in New Zealand, to buy the product.

There would appear to be a need for three package sizes for bacon. One which could be bought by the single and two person households, the second for the three and four person households, and the third for the bulk purchase market and catering industry.

7.4.3. Packaging. The consumer survey highlighted two problems associated with vacuum packaged bacon and ham. The first concerned the problem of inadequate quality control of many firms supplying the Palmerston North market of their packaging operations. Almost 70% of the consumers contacted in the first consumer survey (see Chapter 3) reported buying vacuum packaged bacon and ham which had a good slice at the top of the packet, but underneath they found bacon scraps. An adequate quality

programme would prevent such occurrences. The second problem was concerned with the problem of slice adhesion of both bacon and ham. Efforts should be directed at overcoming these problems if the companies are interested in producing more acceptable products.

Cured meat products demand special packaging to provide an oxygen and moisture barrier, thermoformability and machinability. It should maintain organoleptic qualities until consumption and be aesthetically appealing. Bacterial growth should also be minimised and fat rancidity reduced.

The trend in food packaging, particularly of meat demands that meat be visible in a package. So an alternative to the complete exclusion of light involves vacuum packaging coupled with minimum exposure to light. Most conventional meat vacuum packing machines have thermal heating systems using a thermoplastic film. The packaging material tends to be a laminate of polyethylene which serves as the heat sealing medium, cellophane which provides the structural strength and a coating of polyvinylidene as the oxygen barrier. In New Zealand there are a number of legal requirements which specify that the manufacturer must include the name of the company, the weight, the maximum retail price, the contents and where the product is made and these requirements take up a large portion of the panels on existing bacon products. The supermarkets and grocery chains did not package their own sliced bacon and ham in vacuum packages; instead they used polyethylene overwrap, a packaging material that is only moisture proof. It is felt that the industry could not use this type of packaging for its products because the polyethylene overwrap would not provide a sufficiently long shelf-life for the products.

All the companies supplying the local market packaged their bacon and ham in very similar vacuum pouches, the only difference between them being the colouring and printing on the pouches. There appears to be a need for more aesthetic packaging particularly in regard to the packaging of quality products, to differentiate the new products from their conventional ones. There is no reason why the companies should not use a cardboard external package as is being done with their rissole products to provide some

differentiation. The industry must be awake to new packaging developments. For instance, aluminium foil packaging could enable the industry to produce bacon products which could be cooked in a toaster. A person would take the slice of bacon packed in aluminium foil and pop it into the toaster with their slice of toast and, in this way, they could have a slice of toast and bacon for breakfast.

Packaging is a very important vehicle for creating a unique product, for setting the emotional and rational responses that the manufacturer wants to evoke in the customer and, for this reason, the industry should look to its packaging, not just from the physical requirements, though these are very important, but also to the aesthetic aspects as these enable the manufacturer to outdo his competitors.

7.4.4. Effect on Sales of Present Products. As has already been shown, the bacon industry faces a number of problems; on the one hand the raw material supply is declining, at least the domestic production is declining because the country is importing pigs from Canada to make up the shortfall and, on the other, the demand for its cured products is falling, particularly that of bacon. Because of the raw material shortage, and the desire of the Government to conserve overseas funds, any development of new products which are made exclusively from pork will mean that the present bacon products, namely side and shoulder bacon, will have to be phased off the market to free enough raw materials for the new products. The consumer survey (see Chapter 5) suggested that the present bacon products are too expensive and that any new products ought to be considerably cheaper if they are to stimulate the demand for 'bacon'. For this reason, it is envisaged that a cheaper raw material source ought to be used as the base in the new products and because the new products ought to be cheaper than existing ones, it is felt that the sales of side and shoulder bacon will decline as these old products will not be able to compete on a price basis with the new products.

7.5. THE PRODUCTS

The four major product characteristics to be considered are: competing products, product uniqueness, product life cycles and seasonal or cyclical changes.

7.5.1. Competing Products. The attitude survey of the 24 meats (see Chapter 5) showed that the 30 respondents in Palmerston North thought that the bacon industry was competing in the snack market with all its products except Hawaiian ham and ham-on-the-bone, and even these were not thought of as main meal meats in the same way as fresh meats. The industry does not really have any products on the market to vie for the main meal market. Instead, the industry's products are competing with such products as baked beans, cereals, eggs, bread, cheese and similar products. The products are also competing with the cold and/or hot left-overs from roasts and stews. Boiling bacon was aimed at the main meal market, but apparently failed in this quest, so there would appear to be a need for a 'bacon' product aimed exclusively at the main meal market, which means that the product would be competing with all the other fresh meat products which are currently used as main meal meats.

If the product is to compete successfully on this market it must be unique and have properties that appeal to the consumer. Some of the bacon products which were being supplied to the Palmerston North market did not appear to be sufficiently differentiated. There were a large number of products which were supposedly differentiated on the basis of flavour, namely mild cured, sugar cured and Danish style bacon, but a small consumer panel could not detect any significant flavour differences between samples of the different bacons. The bacon industry must avoid this problem in the future.

7.5.2. Product Life Cycles. An examination of the product life cycle of bacon (see Chapter 2) suggested that the per capita consumption of this product had been declining since 1954, and may have been declining for some years prior to 1954, so it is particularly difficult to predict the

product life cycles of any new 'bacon' products from the product life cycle of bacon.

There have been numerous changes in the last ten years in the curing methods used in New Zealand. (21) Some of these changes have led to detectable product differences. There have also been new product introductions such as shoulder bacon and 'brunch' bacon. But neither the curing changes nor the product introductions have had any affect on the overall product life cycle of bacon in this country. Because there are no past product behavioural patterns to predict future product life cycles, the industry will have to closely monitor the sales histories of any new 'bacon' products it produces, ensuring that it has a systematic product strategy of replacing any products with new ones, once the old products enter a 'static growth stage'.

7.5.3. Seasonality. The three bacon products which are currently on the market, i.e. side, shoulder and boiling bacons, were seen by the consumers to be products which could be used all year round. The ham market on the other hand is a decided summer market, so it would seem that the new products should be aimed more at the winter market with the idea of complementing the ham trade and thus ensuring an even production of cured products throughout the year.

7.5.4. Product Characteristics. The three bacon products, i.e. side, shoulder and boiling bacon, are almost unique in terms of their 'colour' and 'flavour'. There is a very small range of products with similar properties and these are: ham, mutton ham and corned beef. Ham and corned beef were seen to be more acceptable to the consumers in terms of preference and most of the preference dependent variables such as 'prestige', 'nutrition' and 'flavour'. So, despite their uniqueness, the consumers appeared to be dissatisfied with the three bacons, thinking that the 'flavour', 'nutrition' and 'prestige' of the products could be improved.

The multiple regression analysis suggested that the products were too 'tender' and that they could be 'toughened' to increase sales. The consumers

thought the 'versatility' of the meats could also be improved. 'Expense' was probably the single most important factor limiting the sales of bacon. The consumers thought the products were exceedingly expensive compared with practically all the other meats included in the survey.

The product life cycle of bacon is now in its decline phase, and the bacon industry's future is largely tied up with the product's future. At the present moment, bacon accounts for almost 45% of the industry's earnings. So there is a desperate need for new product lines which will provide as large a revenue centre as the current bacon products. Side and shoulder bacon are the principal products and these products have filled a multi-purpose role, both as a snack food and a supposed main meal meat. The attitude survey suggested that the two products were not in fact fulfilling these two roles, and that the products were failing particularly badly in respect to their main meal role. To overcome this, the industry should develop two product lines, the first aimed exclusively at the main meal market and the second at the snack meal market.

7.6. REQUIREMENTS OF THE NEW CURED PRODUCTS

The bacon industry is currently faced with a number of problems, namely: declining domestic raw material supply; a high cost raw material supply; a declining per capita demand for one of their major products - bacon - which has been going on for at least 20 years; sections of the industry are switching to more profitable products than bacon; the industry is losing an increasingly large share of the market to sectors outside the industry, in 1969 the industry's share of the bacon market had dropped to 68%; rising costs, particularly labour which now accounts for 18% of the total costs; closure of many smaller plants, while some of the larger plants are under-utilised as far as their bacon production facilities are concerned; and lastly, competition between firms for the lucrative super-market and grocery chain contracts is seriously eroding industry profits.

The bacon industry desperately needs new products for the following reasons: to reverse the per capita consumption trend of bacon from one of decline to one of growth; to restore confidence in the industry; to provide work for equipment and facilities which are either idle or under-utilised and finally to provide the industry with a healthy profit centre.

It is envisaged that the industry should attempt to produce two new product lines. The first aimed exclusively at the main meal market and the second at the snack meal market. It is felt that side and shoulder bacons have failed in their multi-purpose role as shown by the product life cycle for bacon (see Chapter 2) and that these products ought to be replaced by two product lines that are designed to fulfill specific roles. Unfortunately, the only companies capable of undertaking the required product research are the larger ones who have the required technical base, but as these larger companies only account for 40% of those in the industry it is felt that the research ought to be carried out by the Meat Industry Research Institute of New Zealand (Inc.) on behalf of the whole industry. Only in this way will the smaller companies benefit from the value of the new products.

The market and consumer surveys showed that almost 70% of the households bought bacon on a regular basis and for this reason it is anticipated that the new products ought to be aimed at the whole population. An analysis of current trends in the New Zealand population plus the results of the market survey suggested that the new products should be packaged in three sizes: the first for the large single and two person households who account for over 40% of all the households in New Zealand; the second for the three and four occupant households; and the third for the bulk purchase and catering markets.

The current shortage of pigs, and the fact this is likely to continue for the next five years or so given present trends, plus the fact that the new products are going to have to be considerably cheaper than the existing cured products if the industry is to achieve sufficient product volume, means

that cheaper raw materials such as beef, sheep meat and veal will have to be considered for the new products. The high consumer acceptance of corned beef (see Chapter 5) shows that consumers are not averse to being sold cured products made from meats other than pig meat, and so the new line of products could be made from these other meats or if the companies want to retain a certain association of pig meat in the minds of the consumer, they could include a set proportion of the cheaper raw materials, enough to enable them to drop the price to a consumer acceptable level.

If the industry decides to only use a proportion of the cheaper raw materials in their new cured products, then it is envisaged that the new products will have to be fabricated products - a technology that most of the industry understands and uses.

What should the new products be? These requirements can best be summarised under the following headings: sensual target responses, emotional target responses and rational target responses.

7.6.1. Sensual Target Responses. The present bacon products, namely side, shoulder and boiling bacons, were evaluated on the following sensory properties: 'tenderness', 'wastage' and 'flavour', and all three products were seen to possess sensory properties which were intermediate between those of fresh meat and those of the sausage products, i.e. smallgoods. The multiple regression data suggested that if bacon were made a little more tough then consumption would increase by some 0.23 lb/household/week. The seeming unimportance of 'tenderness' in the selection of main meal meats would tend to suggest, initially anyway, that no additional work is required on this variable for the development of any new products aimed at the main meal market, but in the case of snack products the variable ought to be examined with a view to finding out whether a tougher bacon product would be more acceptable as a snack product, though the other snack type products such as luncheon, sausages and saveloys were given high 'tenderness' ratings, suggesting that people valued a very 'tender' snack product. But as has been stated above, additional work would be needed to determine the 'tenderness' requirements of the consumers toward the snack cured products.

With 'wastage', the multiple regression analysis predicted that consumption of bacon products would be increased if the 'wastage' of these products were eliminated or at least reduced. The consumers appeared to accept a certain 'wastage' content in main meal meats, but certainly did not tolerate it in any snack products. This means that some control is required on the 'wastage' level of any main meal bacon product, but that more stringent wastage standards should be applied in the development of any snack bacon products.

As has already been shown in section 7.4, the respondents in Palmerston North appeared to prefer the more bland 'flavours' associated with ham, chicken and pork to the stronger meat 'flavours' of beef, sheep meat and bacon, and because this variable was common to all meats the suggestion is that in the development of any new bacon products, efforts ought to be made to get away from the bacon 'flavour' associated with the present products to a more bland, ham-pork flavour.

7.6.2. Emotional Target Responses. The three bacon products were evaluated on the following emotional variables: 'prestige', 'nutrition', 'versatility' and 'meal type'. The respondents once again thought that the products only reached an intermediate level on these variables compared with fresh meats. The most dominant feature about side and shoulder bacon was their 'versatility' and the whole personality of the two products appeared to revolve round this variable. The defects of the present products on the emotional variables have already been discussed in section 7.4.

This emotional aspect is a very important method for building up a product's image and is generally achieved by the advertising themes adopted for the product, plus the way the product is packaged and generally presented to the consumer. Any new bacon products which are developed for the main meal market will require a better product image than their current products on the following variables: 'flavour', 'prestige', 'nutrition', 'preference' or 'would buy'. The methods for obtaining improvements on these variables have been discussed in section 7.4.

7.6.3. Rational Target Responses: Main Meal. The industry wants to make the consumers believe that their main meal meats are:

1. As nutritious as any other main meal meat.
2. More prestigious than most of the main meal meats if they are trying to create the impression of a luxury product, or equally prestigious to the other main meal meats if they should decide to create a high volume product. They could even decide to do both, and the first product could be a quality product.
3. Depending on what strategy they adopt above, so the pricing policy should be set, but the industry should attempt to price its new products below that of their current products so that people believe that these new products are relatively cheap compared to the old bacon products. The luxury product could possibly be priced somewhere above rump steak, say 30-40% above, while the standard product should be about the same price as rump steak if the industry is going to create a volume product.
4. People should be made to feel that the flavour of the new product is one that is associated with a main meal meat.

7.6.4. Rational Target Responses: Snack Meal. Consumers felt that the two products, side and shoulder bacon, surpassed all the other snack meats on all the variables important in the consumption of snack meats, except on 'expense' and 'type of meal'. On this last variable, the consumers were not altogether convinced that the two products were sufficiently snack meal and this was probably due to the high 'versatility' of these two meats which enabled the consumers to use them in main meal dishes and also for snack meals, though price was curtailing the latter. The industry has to make the consumers believe that its new snack products are:

1. As 'nutritious' as their existing products or better
2. As 'prestigious' as their present products or better
3. The present bacon 'flavour' should be retained
4. The new products should be priced to enable them to compete with the other snack meats on a price basis
5. The new products should be as quick to 'prepare' and 'cook' as their present products

6. Most importantly, they want the consumers to believe that the new products really are snack meats and not the multi-purpose products that they have traditionally produced.

7.7. PRODUCT CONCEPTS

7.7.1. Main Meal. The products will be cured main meal meats, high in 'prestige' and 'nutrition'. A new concept in 'bacon' with very little resemblance to existing products. The 'flavour' will be different to existing bacon products. The 'flavour' of one line of products will lie between that of ham and pork. One product line should be raw products.

7.7.2. Product Suggestions. IT IS MOST IMPORTANT THAT THE INDUSTRY GETS AWAY FROM THE TRADITIONAL BACON CONCEPTS FOR THESE NEW PRODUCTS. THE NEW PRODUCTS SHOULD NOT HAVE THE WORD BACON ANYWHERE IN THEIR NAME AS IT IS FELT THAT THE WORD BACON HAS TOO MANY CONNOTATIONS WITH EXISTING PRODUCTS: CONNOTATIONS THAT COULD AFFECT THE SUCCESS OF THE NEW PRODUCTS.

The attitude survey (see Chapter 5) suggested that roast type meats such as roast beef and, in particular, leg of hogget and leg of pork, generally had a higher 'prestige' rating than most of the other meats. Leg of hogget and leg of pork also had a high 'nutritional' rating. So one way of creating a 'prestige' concept for the new cured products would be to sell a roast cured meat. Rump steak was another meat which was given a higher 'prestige' rating than many of the other meats and it was also given a very favourable 'nutritional' rating. The industry could take advantage of this favourable consumer image that consumers have of steak, and produce a cured steak product. Now these two products could be made from beef, veal or even mutton. The consumers had a very favourable image of corned beef, and if the industry could convince the consumers that corned beef could be roasted - they of course would have to call the meat by another name - then they would have a product which required very little additional research before it could be marketed. If the required 'flavour' for the new product

cannot be produced without the addition of a proportion of pork, then the industry will have to consider fabricated products.

It is envisaged that these two product ideas would be given a luxury product image by suitable packaging and more importantly by the correct T.V. advertising. The consumer survey showed that very few consumers had any brand awareness and still less had any brand preference - this by way of brand name and not brand loyalty to a specific package which consumers may recognise when they are out shopping. The industry must advertise their products more effectively, particularly if they want the new product ideas to succeed.

If the industry wanted less 'prestige' oriented products then it could possibly turn to a cured range of 'casserole' dishes or even a range of boil-in-the-bag steak dishes. The attitude survey showed that stewing steak had a high 'nutritional' rating and a 'prestige' rating slightly below average. Now the industry could take advantage of this 'nutritional' association that consumers have about stewing steak and produce the above-mentioned products. Because the products would involve a certain amount of processing, the 'nutritional' rating is likely to be lower than if the people were making the dish in their own kitchen, but this is where the 'prestige' associated with some casserole dishes might overcome the 'nutritional' downgrading due to processing. Beef Stroganoff and similar dishes have a higher 'prestige' rating than the ordinary beef stew and so the industry could manufacture a cured beef Stroganoff and other similar type dishes.

Once again, the correct image for the range of products would have to be conveyed by the type of packaging and more importantly the advertising.

Some companies in the bacon industry currently supply the Palmerston North market with steakettes and hamburgers. This range of products could be extended to include cured steakettes and hamburgers.

The main meal product ideas for cured products can be summarised as

follows:

(a) Cured roasts
(b) Cured steaks
(c) Boil-in-the-bag steaks in a whole range of sauces
(d) Cured 'prestige' casserole dishes
(e) Cured steakettes
(f) Cured hamburgers

7.7.3. Snack Meals. These products will be cheap, cured products aimed at the snack market. Substitutes for existing products. They should be pre-cooked.

7.7.4. Product Suggestions. It is envisaged that this range of products will be very similar to side and shoulder bacon. Products which can be used for sandwiches, breakfast or lunch. It is felt that the price of side and shoulder bacon was the limiting factor in the decline of this product. These two bacon products scored far better on most of the attitude variables than the sausage products which are currently produced by the bacon industry and yet the sales of bacon are declining while those of smallgoods are on the increase. If a cheaper bacon product could be manufactured then the sales of this product should halt the present decline evidenced in the product life cycle of bacon. One product idea would be to produce a product which was identical to either side or shoulder bacon in every respect except cost.

Comments in the consumer survey (see Chapter 2) suggested that a large number of consumers were no longer having bacon for breakfast on a regular basis. Cost appeared to be one factor in their changing breakfast habits and the advent of cereals have also contributed to the decline in the consumption of bacon for breakfast. Some consumers also said that they had stopped eating bacon on a regular basis because of the inconvenience of hauling out a fry pan to cook eggs and bacon. To overcome some of the problems associated with cooking bacon at breakfast, the industry could develop a much cheaper bacon product and package it in foil so that it

could be cooked in a toaster. Provided the product was much cheaper than the existing bacon products, imitated the existing products in every respect, it ought to overcome the inconvenience associated with the present products and, hopefully, boost sales by encouraging more bacon consumption at breakfast.

The industry should attempt to develop the new main meal cured meat products as it is envisaged that the developmental costs for the snack cured meat products is likely to be much higher than for the main meal meats. The industry already has a main meal cured meat, namely corned beef, which could provide the first product in the cured, main meal meat product line.

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Appendix 1 Per Capita Consumption of the Red Meats in New Zealand 1954-1970 (lbs/capita/annum).

Year	Beef	Mutton	Lamb	Pork and Chopper	Bacon	Ham	Pork and Pork Products	Sausages	Total
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
1954	100.2	71.0	9.2	12.4	10.9	5.9	29.2	7.3	234.5
1955	105.0	71.7	8.7	12.5	12.9	6.5	32.3	8.9	242.3
1956	106.4	68.2	8.0	11.8	11.6	6.2	29.6	8.5	237.1
1957	106.4	66.5	9.8	12.5	11.6	6.2	30.3	8.7	235.8
1958	92.6	76.3	11.9	15.8	11.2	6.0	32.0	8.5	237.6
1959	91.4	81.4	14.3	16.2	11.2	6.1	33.5	8.2	245.5
1960	90.0	78.7	14.4	13.9	12.3	6.7	32.9	11.4	243.3
1961	97.9	78.3	17.9	14.4	12.2	6.5	33.1	12.0	256.6
1962	103.7	78.0	17.6	15.4	11.6	6.3	33.3	12.2	262.2
1963	92.7	76.3	18.0	16.0	12.7	6.8	35.5	12.5	252.5
1964	101.6	73.0	16.3	15.2	11.2	6.0	32.4	13.8	254.2
1965	101.3	64.0	18.4	14.5	10.9	5.9	31.3	13.7	245.7
1966	101.6	63.7	22.1	13.6	9.8	5.3	28.7	11.4	244.9
1967	98.7	66.1	21.5	14.3	10.4	5.6	30.3	10.2	245.2
1968	99.2	67.7	20.3	14.3	10.0	5.4	29.7	12.1	247.1
1969	96.4	68.2	21.2	14.6	10.1	5.5	30.2	13.0	247.7
1970	96.4	68.2	21.1	13.0	10.3	5.6	28.9	13.1	246.4

Appendix 2 Per Capita Consumption of the Red Meats in New Zealand Expressed as a Percentage of the Total.

Year	Beef	Mutton	Lamb	Pork and Chopper	Bacon	Ham	Pork and Pork Products	Sausages	Veal and Offal	Total
	%	%	%	%	%	%	%	%	%	%
1954	42.7	30.3	3.9	5.3	4.6	2.5	12.4	3.1	7.6	100.0
1955	43.3	29.6	3.6	5.0	5.3	2.8	13.1	3.7	6.7	100.0
1956	44.9	28.8	3.4	5.0	4.9	2.6	12.5	3.6	6.8	100.0
1957	44.9	28.1	4.1	5.3	4.9	2.6	12.8	3.7	6.4	100.0
1958	39.0	32.1	5.0	6.6	4.7	2.5	13.8	3.6	6.5	100.0
1959	37.2	33.2	5.8	6.6	4.6	2.5	13.7	3.3	6.8	100.0
1960	37.0	32.3	5.9	5.7	5.1	2.8	13.6	4.7	6.5	100.0
1961	38.2	30.5	7.0	5.6	4.8	2.5	12.9	4.7	6.7	100.0
1962	39.5	29.7	6.7	5.9	4.4	2.4	12.7	4.7	6.7	100.0
1963	36.1	29.7	7.0	6.3	4.9	2.6	13.8	4.9	8.5	100.0
1964	40.0	28.7	6.4	6.0	4.4	2.4	12.8	5.4	6.7	100.0
1965	41.2	26.0	7.5	5.9	4.4	2.4	12.7	5.6	7.0	100.0
1966	41.5	26.0	9.0	5.6	4.0	2.2	11.8	4.7	7.0	100.0
1967	40.3	27.0	8.8	5.8	4.2	2.3	12.3	4.2	7.4	100.0
1968	40.1	27.4	8.2	5.8	4.0	2.2	12.0	4.9	7.4	100.0
1969	38.9	27.5	8.6	5.9	4.1	2.2	12.2	5.2	7.6	100.0
1970	39.1	27.7	8.6	5.3	4.2	2.3	11.8	5.3	7.5	100.0

Appendix 3 Red Meat Consumption in the United States (lbs/Capita/annum).

Year	Beef and Veal		Pork Products		Other		Total	
	lbs	%	lbs	%	lbs	%	lbs	%
1968	109.7	59.6	58.3	31.8	15.2	8.3	183.2	100.0
1969	110.8	60.6	58.3	31.9	13.4	7.3	182.5	100.0
1970	113.7	61.0	58.3	31.3	14.3	7.7	186.3	100.0
1971	113.0	59.0	58.3	30.4	20.5	10.7	191.8	100.0
1972	115.9	61.4	58.3	30.9	14.6	7.7	188.8	100.0

Source U.S.D.A. Livestock and Meat Situation 1968-1973.

Appendix 4 Household Consumption of Meat and Meat Products in the United Kingdom (lbs/capita/annum).

Year	Beef and Veal		Mutton and Lamb		Pork		Bacon and Ham		Pork Products		Sausages		Other		Total
	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs
1964	27.7	20.1	20.5	14.9	7.6	5.5	17.3	12.6	24.9	18.1	13.5	9.8	25.6	18.6	137.7
1967	28.0	19.5	19.7	13.7	7.4	5.1	16.8	11.7	24.2	16.8	14.4	10.0	28.9	20.1	143.9
1968	25.1	17.4	18.4	12.8	8.2	5.7	16.7	11.6	24.9	17.3	15.1	10.5	30.2	21.0	144.1
1969	25.0	17.3	17.3	11.9	9.0	6.2	16.6	11.5	25.0	17.3	15.4	10.6	31.1	21.5	144.9

Figures from 'The Market for Manufacturing Grade Beef in the United Kingdom and the E.E.C.", International Trade Centre UNCTAD/GATT, Geneva 1971.

Appendix 5 Telephone Survey: Pork Products.

Date _____

Respondents Phone N°. _____

Name: _____

Address: _____

_____

Result of Interview: Answered ____ Refused to Answer ____

Not Home ____

Good (morning/afternoon) my name is _____ and I am from Massey. I should like to ask you a few questions about meat. The questions will be about the amount of meat your family eats each week, where you buy your meat, and how much you spend on meat each week on meat?

Would you be willing to answer these questions?

SECTION A

Q1. Do you buy meat each week ? Yes ____ No ____

IF YES GO TO QUESTION 4. IF NO CONTINUE.

Q2. Do you buy your meat every two weeks ? Yes ____ No ____

IF YES GO TO QUESTION 4. IF NO CONTINUE.

Q3. Do you buy all your meat in Bulk ? Yes ___ No ____

IF YES GO TO QUESTION 5

Q4. IF THEY BOUGHT MEAT EVERY WEEK ASK

I should like to know approximately how many lbs of the different meats you bought your family last week. If I run through the list, could you tell me how much of each meat you bought last week ?

IF THEY BOUGHT EVERY 2 WEEKS ASK

I should like to know approximately how many lbs of the different meats

you bought on.....?

IF THEY MENTION THAT THEY PURCHASE A PARTICULAR MEAT EVERY SO OFTEN RECORD HOW OFTEN AND THE QUANTITY IN THE "OTHER" COLUMN.

	BUY 1 WEEK	BUY 2 WEEKS	OTHER
Frying steak			
Stewing steak			
Roast beef			
Mince			
Lamb chops			
Hogget chops			
Mutton chops			
Lego of lamb+			
Leg of hogget +			
Leg of mutton +			
Pork chops			
PORK fillet			
Leg of pork			
Sausages			
Luncheon			
Ham			
Bacon			
Chicken			

+ Include forequarter sales in these rows.

Q5. If you buy your meat in bulk, how much of the following meats would you buy at each purchase ? And how long would each last ?

	Quantity	Time
Beef		
Lamb		
Hogget		
Mutton		
Pork		
Bacon		
Ham		
Sausages		
Luncheon		
Chicken		

Q6. If you buy your meat in bulk do you buy any other meat separately ?

IF NECESSARY ASK WHETHER THEY BUY BACON AND HAM TO JOG MEMORY

Yes ____ No ____

IF YES GO BACK TO QUESTION 4 AND ASK " If I run through the ..... last week ?" IF NO CONTINUE.

Q7. At which shop do you most often buy your meat ?

HERE ASK ABOUT FRESH MEAT, THEN HAM AND FINALLY BACON

	FRESH MEAT	HAM	BACON
Suburban butcher			
City butcher			
Supermarket			
Grocer			
Dairy			
Delicatessen			
No regular shop			
Other			

Q8. Do you always buy a particular brand of..... ?

MENTION HAM FIRST THEN BACON

	HAM	BACON
Yes	___	___
No	___	___

IF YES CONTINUE. IF NO GO TO QUESTION 10.

Q9. What brand do you buy ?

Ham_____ Bacon_____

Q10. Would you know what brands ..... are available on the local market ? ASK FIRSTLY ABOUT BACON AND THEN HAM

	BACON	HAM
Yes	___	___
No	___	___

IF YES CONTINUE. IF NO GO TO QUESTION 12.

Q11. Could you name the Brands of BACON AND HAM available in Palmerston ?

HAM BACON

Q12. Approximately how much did you spend on meat last purchase ?

_____; Don't know _____ ; Not answered _____

SECTION B

Q1. How many people over the age of 15 do you have living at home? _____

Q2. How many children under the age of 13 do you have living at home ? _____

Q3. How many people are working in your household ? _____

IF WORK PART TIME GIVE $\frac{1}{2}$

Q4. What does your husband do for a living ? _____

IF SINGLE OR WIDOWED, ASK WHAT THEY DO FOR A LIVING

Q5 Would you mind telling me which of the following age groups you belong to ?

Less than 20 Between 20 and 30 Between 30 and 50

Between 50 and 60 Over 60's Other

Q6. How much does your husband earn ?

MENTION PER YEAR FIRST. IF DON'T KNOW ASK HOW MUCH PER WEEK

IF SINGLE ASK HOW MUCH THEY EARN

PER ANNUM	PER WEEK
Less than $ 5,000	Less than $ 60
Between $ 5,000 - 7,000	Between $ 60 - 80
Between $ 7,000 - 9,000	Between $ 80 -110
Over $ 9,000	Over $110
No answer	

COMMENTS:

THANK YOU FOR YOUR HELP !

Appendix 6 A Study of People's Attitudes Towards Meat.

Good (Morning / Afternoon). My name is..... and I am from Massey. May I ask you a few questions about meat, please ? I should like to obtain your views on a number of different aspects of meat such as: expense; tenderness; wastage· fat and a number of other things as well. Would you mind answering the questions?

My first question will deal with your meat preferences. I should like you to arrange the following 24 cards which represent meats currently available in Palmerston North in order of your preference for the meats, putting the ones you like most, first and the least liked last. You may be unfamiliar with some of the meats, but please could you place them in some sort of order. I would also like you to list the meats that are unfamiliar to you.

The second question concerns the relative importance of certain factors which have been found to be important in people's purchase of meat. I have here 13 cards representing the different factors and I would like you to arrange the different cards in the order you think is important in the purchase of your meat, putting the most important, first and so on.

My last question is concerned with the different meats. I want you to tell me how strongly you feel each meat performs on the following factors: expense; tenderness; flavour and more. You have a number of 1 to 7 to express how strongly you feel about the different factors. If you use the number, 7 then I shall take it, that you FEEL that the meat scores very well on the factor, and a score of 1 will mean the reverse.

Respondents name: _____

Telephone N°: _____

Address: _____

_____

QUESTIONNAIRE FOR PART THREE OF THE SURVEY.

Q1. Would you use..... more often in Summer (picnics, camping, etc.) or would you use it more often in winter. Repeat for each meat.

MORE OFTEN IN SUMMER 1 2 3 4 5 6 7 MORE OFTEN IN WINTER

A score of 4 would indicate that you use it in winter and summer.

Q2. Do you think that..... requires long cooking or could it be cooked quickly ?

LONG COOKING 1 2 3 4 5 6 7 Quick COOKING

Q3. Do you think that..... requires a lot of preparation or can it be prepared quickly ?

LONG PREPARATION 1 2 3 4 5 6 7 Easily PREPARED

Q4. Would you buy..... if all the meats were at the same price ?

WOULD NOT BUY 1 2 3 4 5 6 7 WOULD BUY

Q5. Do you think that..... is an expensive meat or a cheap meat ?

INEXPENSIVE MEAT 1 2 3 4 5 6 7 EXPENSIVE MEAT

Q6. Do you think that..... is a tender meat or a tough meat ?

TOUGH MEAT 1 2 3 4 5 6 7 TENDER MEAT

Q7. Do you think that..... contains a lot of wastage such as excess bone or fat or do you think it contains little waste ?

CONTAINS MUCH WASTE 1 2 3 4 5 6 7 LITTLE WASTE

Q8. Would you serve..... it often or rarely ?

SERVE RARELY 1 2 3 4 5 6 7 SERVE OFTEN

Q9. Do you like the flavour of..... or do you dislike the flavour ?

DISLIKE THE FLAVOUR 1 2 3 4 5 6 7 LIKE FLAVOUR

Q10. Do you think..... is a nutritious meat ?

POOR NUTRITIONALLY 1 2 3 4 5 6 7 HIGH NUTRITIONALLY

Q11. Would you serve ..... to special guests, guests, or family ?

NEVER SERVE TO GUESTS 1 2 3 4 5 6 7 SERVE TO SPECIAL GUESTS

Q12. Do you think that ..... is best for a main meal or would you use it only for snacks ?

SNACK MEALS 1 2 3 4 5 6 7 MAIN MEALS

Q13. Do you think that ..... is a versatile meat for cooking with ?

NOT VERSATILE 1 2 3 4 5 6 7 VERSATILE

A SPACE HAS BEEN PROVIDED FOR EACH ANSWER, CORRESPONDING TO THE QUESTION AND MEAT. PLEASE COULD YOU FILL THE NUMBER THAT CORRESPONDS TO YOUR VIEWS ON EACH QUESTION IN THE SPACE PROVIDED.

ANSWER FORM FOR QUESTIONS FROM PART THREE OF THE SURVEY.

MEATS	QUESTION NUMBERS												
	Q1.	Q2.	Q3.	Q4.	Q5.	Q6.	Q7.	Q8.	Q9.	Q10.	Q11.	Q12.	Q13.
Rump steak													
Stewing steak													
Rolled beef													
Loin chops													
Neck chops													
Leg of hogget													
Pork chops													
Pork pieces													
Leg of pork													
Corned beef													
Shoulder bacon													
Side bacon													
Boiling bacon													
Ham-on-the-bone													
Sliced ham													
Hawiian ham													
Lambs fry													
Chicken													
Beef sausage													
Pork sausage													
Luncheon													
Salami													
Saveloys													
Frankfurters													

Appendix 7 Kendall's Coefficient of Concordance Test.

According to Kendall, this test is a measure of the concordance of the observers taken as group. The test is generally used in cases when there are several rankings, say m in number, of n individuals and the aim is to investigate the general relationship between them. For example, suppose four observers rank six objects as follows:

	Object					
Observer	A	B	C	D	E	F
P	5	4	1	6	3	2
Q	2	3	1	5	6	4
R	4	1	6	3	2	5
S	4	3	2	5	1	6
Total of ranks:	15	11	10	19	12	17

..... (1)

The quickest method of evaluating the concordance between the respondents is to consider the sum of the ranks alloted by the observers. These numbers must sum to $\frac{1}{2}mn(n+1)$, i.e., 84 in the above example, for they are composed of a sum of m sets each of which is the sum of natural numbers 1 to n. The means of the sums is then $\frac{1}{2}m(n+1)$, in the above example, 14. And if the deviations are considered about the mean: 1, -3, -4, 5, -2, 3

If all the rankings were identical the sums in (1) would consist of: m, 2m, ...nm

(though not necessarily in that order) and their deviations accordingly

$-\frac{1}{2}m(n-1)$, $-\frac{1}{2}m(n-3)$.....$\frac{1}{2}m(n-1)$

The sum of squares of these deviations would be given by

$$\frac{1}{12}m^2(n^3 - n) \qquad \text{..... (2)}$$

This is the maximum value which the sum of squares may have. Its extreme value at the other end of the range is exactly zero if m is even or n is odd, or both, and in the contrary case is relatively small. If S is used to denote the sum of squares of the actual deviations, then W the coefficient of concordance is given by the following equation:

$$W = \frac{12\,S}{m^2(n^3 - n)}$$

W measures, in a sense the communality of judgements for the m observers. If they all agree W = 1. If they differ very much among themselves the sums of ranks will be more or less equal and consequently the sum of squares S becomes small compared with the maximum possible value, so that W is small. As W increases from 0 to 1 the deviations become "more different" and there is a greater agreement in the rankings.

Test of Significance: If all the observers are independent in their judgements, then any set of rankings is just as probable as any other set. We shall therefore consider the distribution of W in the $(n!)^m$ possible sets of ranks and use it in the customary way to reject or accept the hypothesis that the observers have no community of preference.

The actual distribution of W has been worked out for the lower values of m and n : n = 3, m= 2 to 10; n = 4, m = 2 to 6; n = 5, m = 3. For higher values the following approximation may be used. For n greater than 7, then:

$$X_r^2 = m(n-1)W = \frac{S}{\frac{1}{12}mn(n+1)}$$

and X_r^2 is distributed in the form known in statistics as X^2 with $v = n - 1$ degrees of freedom.

Adapted from "Rank Correlation Methods", Kendall, M.G., 3rd edition, Charles Griffin & Company Limited, London, 1962.

Appendix 8 Variables Displayed for each Meat According to the Mean Score.

	Variables												
	Season	Cooking	Preparation	Would buy	Expense	Tenderness	Wastage	Frequency	Flavour	Nutrition	Prestige	Type of meal	Versatility
Rump steak	4.0	5.6	6.5	5.8	5.4	5.3	6.4	5.1	6.3	6.2	5.1	6.6	4.4
Stewing steak	4.8	2.7	4.0	4.6	3.3	4.4	5.0	4.3	5.9	5.6	3.4	6.2	5.1
Rolled beef	4.5	2.9	5.8	4.8	5.3	4.6	4.9	4.0	5.4	5.2	4.2	6.2	3.1
Loin chops	4.4	4.8	5.9	4.6	3.9	4.8	3.1	3.9	5.5	5.0	3.1	5.6	4.0
Neck chops	5.4	3.4	4.7	2.9	3.0	4.4	3.4	3.0	4.6	4.8	2.2	5.4	2.8
Leg of hogget	4.3	2.4	6.0	5.4	5.0	5.1	4.7	5.1	5.8	5.4	5.0	6.2	3.7
Pork chops	4.4	4.1	5.8	5.3	5.9	5.2	3.6	3.9	5.9	5.0	4.3	6.6	4.3
Pork pieces	4.7	4.1	4.2	3.6	5.0	4.4	4.2	3.0	5.1	4.1	3.4	4.9	4.7
Leg of pork	4.4	2.1	5.9	5.6	6.4	5.6	4.7	3.2	6.2	5.4	5.6	6.4	4.0
Corned beef	3.7	2.2	5.7	5.2	5.4	5.3	5.8	4.5	5.5	4.6	4.3	5.8	2.9
Shoulder bacon	4.2	5.6	6.1	4.6	6.0	5.0	5.6	3.4	5.3	4.8	3.0	2.8	3.6
Side bacon	4.2	5.7	5.9	4.8	6.1	5.2	5.2	4.1	5.7	4.6	3.1	2.8	3.8
Boiling bacon	3.8	2.8	5.6	4.0	5.9	4.9	5.1	2.7	5.1	4.7	3.0	4.1	3.1
Ham-on-the-bone	2.5	2.6	5.1	5.3	6.4	5.8	4.6	3.0	6.4	5.4	5.7	4.6	3.8
Sliced ham	2.3	6.8	6.1	5.6	6.6	6.1	5.8	3.7	6.1	5.2	4.2	3.5	4.0
Hawiian ham	3.5	4.7	5.7	5.2	6.2	5.5	5.8	3.0	5.9	5.2	5.3	5.2	4.2
Lambs fry	4.9	5.1	5.2	3.3	3.6	4.8	5.8	2.8	4.4	6.3	2.2	4.8	3.1
Chicken	3.9	3.9	4.6	6.0	4.9	6.1	4.9	4.8	6.4	5.8	6.3	5.5	6.3
Beef sausage	4.2	5.0	6.1	3.3	3.3	5.3	6.1	3.5	3.8	2.6	2.1	3.5	4.0
Pork sausage	3.8	5.0	6.1	3.8	3.0	5.1	6.3	4.3	4.2	2.6	1.8	3.3	3.9
Luncheon	2.5	6.8	6.3	3.1	2.7	5.6	6.5	3.6	3.9	2.5	1.7	1.8	2.2
Salami	3.2	5.1	6.1	3.8	3.9	5.1	6.4	2.8	4.1	3.0	3.1	2.2	2.9
Saveloys	3.9	6.0	6.2	3.0	3.0	5.4	6.3	2.8	3.2	2.2	1.5	2.1	2.1
Frankfurters	3.7	5.8	6.2	3.2	3.2	5.3	6.3	2.8	4.0	2.4	1.7	2.2	2.2

Appendix 9 Variables Displayed for each Meat According to the Median Score.

Meat	Variables												
	Season	Cooking	Preparation	Would buy	Expense	Tenderness	Wastage	Frequency	Flavour	Nutrition	Prestige	Type of meal	Versatility
Rump steak	4.0	6.1	6.7	6.6	5.4	5.6	6.6	5.2	6.7	6.6	4.5	6.9	4.5
Stewing steak	5.0	1.6	4.1	4.7	3.6	4.3	5.3	4.3	6.3	5.4	3.7	6.6	5.6
Rolled beef	4.2	2.6	6.6	5.9	5.4	4.9	5.1	4.1	5.3	5.4	4.1	6.7	2.9
Loin chops	4.1	5.0	6.3	4.6	4.1	4.9	2.9	4.0	5.4	4.9	3.1	5.9	3.8
Neck chops	5.6	3.8	4.9	1.6	2.7	4.3	3.4	3.3	4.3	4.6	1.5	6.2	2.4
Leg of hogget	4.1	2.3	6.5	6.3	4.8	5.4	4.5	5.3	6.2	5.7	4.9	6.7	3.3
Pork chops	4.1	4.2	6.2	5.9	6.3	5.3	3.8	3.8	6.3	5.0	4.3	6.8	4.3
Pork pieces	4.3	4.0	4.1	4.1	5.3	4.4	4.3	2.9	5.1	4.0	3.7	5.3	4.9
Leg of pork	4.2	1.6	6.2	6.4	6.8	6.1	4.7	2.4	6.6	5.3	6.6	6.8	4.1
Corned beef	3.8	1.9	6.3	5.3	5.6	5.7	6.0	4.4	6.1	4.5	4.2	6.4	2.1
Shoulder bacon	4.1	6.5	6.8	5.6	6.3	5.1	5.7	3.7	5.9	4.6	3.0	2.7	3.6
Side bacon	4.1	6.6	6.8	5.8	6.4	5.6	5.2	4.1	6.1	4.4	3.1	2.9	3.9
Boiling bacon	3.8	2.4	6.2	4.0	6.2	5.0	5.1	2.3	5.1	4.4	3.3	4.1	3.1
Ham-on-the-bone	1.8	1.7	6.0	6.4	6.8	6.3	4.8	2.2	6.8	5.6	6.3	4.4	3.8
Sliced ham	1.9	6.8	6.8	6.1	6.8	6.5	6.1	3.7	6.6	5.3	4.2	3.3	4.0
Hawiian ham	3.7	4.7	6.3	5.9	6.8	6.0	6.2	2.7	6.3	5.3	5.4	5.3	4.1
Lambs fry	4.4	5.3	5.4	2.9	3.3	4.9	6.3	2.4	4.3	6.8	1.4	4.6	2.9
Chicken	4.0	3.9	4.3	6.5	5.1	6.6	5.3	4.8	6.6	6.0	6.7	5.8	6.7
Beef sausage	4.1	5.4	6.8	2.4	3.3	5.7	6.7	3.4	3.6	2.2	1.3	3.6	3.9
Pork sausage	4.0	5.3	6.8	3.6	3.2	5.6	6.8	4.2	4.1	2.2	1.3	3.6	3.9
Luncheon	2.4	5.4	6.9	1.9	2.6	6.5	6.9	3.8	3.4	2.0	1.2	1.4	1.4
Salami	3.7	5.9	6.8	4.0	3.9	5.3	6.9	2.3	4.1	3.1	3.3	1.5	3.0
Saveloys	4.1	6.6	6.8	2.4	3.1	6.0	6.8	2.4	3.0	1.6	1.1	1.6	1.4
Frankfurters	4.0	6.2	6.8	3.0	3.2	5.9	6.7	2.4	3.8	1.9	1.3	1.8	1.5

Appendix 10 Respondents' Ranking of the 24 Meats for Preference.

Respondent	Meats																Meats							
	Rump steak	Stewing steak	Rolled beef	Loin chops	Neck chops	Leg of hogget	Pork chops	Pork pieces	Leg of pork	Corned beef	Shoulder bacon	Side bacon	Boiling bacon	Ham-on-bone	Sliced ham	Hawaiian ham	Lambs fry	Chicken	Beef sausage	Pork sausage	Luncheon	Salami	Saveloys	Frankfurters
1	1	5	7	11	15	10	2	6	8	23	18	9	4	13	19	12	24	3	22	16	20	14	21	17
2	3	20	7	11	18	5	2	21	1	14	13	8	22	9	10	23	4	6	15	12	17	18	16	24
3	16	6	22	21	13	3	20	15	2	4	8	18	17	19	11	14	12	1	10	5	7	23	9	24
4	5	9	4	11	21	10	2	13	1	14	22	12	23	7	8	6	15	3	16	19	17	24	20	18
5	4	9	15	10	18	14	11	8	1	13	17	16	19	6	12	2	5	3	22	7	20	17	23	24
6	3	16	13	9	12	1	10	17	4	6	11	14	15	8	7	2	18	5	20	19	23	24	21	22
7	16	24	15	21	20	2	5	10	19	22	1	11	14	17	12	7	8	4	18	3	23	9	6	13
8	13	9	5	10	22	1	8	20	18	4	23	24	21	3	6	14	12	2	11	19	15	7	16	17
9	5	12	9	16	7	2	10	18	8	11	20	17	21	6	3	1	24	2	15	19	13	23	14	22
10	1	18	4	14	11	6	23	17	3	12	10	13	16	2	7	8	15	5	20	21	22	9	21	19
11	4	14	3	11	23	6	5	13	1	12	17	18	19	2	9	7	10	8	21	20	24	16	22	15
12	14	6	11	10	15	4	3	21	2	8	7	13	9	22	12	5	23	1	19	16	18	24	17	20
13	11	20	10	14	15	6	2	3	1	9	18	19	17	4	12	7	13	5	22	21	24	8	23	16
14	4	14	8	6	22	2	17	21	18	7	19	3	23	20	16	5	15	1	10	9	11	24	13	12
15	4	6	12	8	17	7	5	15	2	13	9	11	16	1	10	24	14	3	19	18	22	23	20	21
16	15	14	2	6	11	4	20	19	16	5	10	9	17	1	8	3	12	7	21	18	24	13	22	23
17	4	7	6	14	18	3	15	9	2	5	20	12	17	8	11	16	10	1	19	13	21	24	22	23
18	2	3	1	15	16	14	12	13	10	5	21	22	24	8	7	23	17	18	4	11	6	9	19	20
19	6	5	7	2	3	1	21	22	20	4	16	19	15	14	17	18	24	23	12	10	13	9	11	8
20	7	5	8	11	15	2	17	24	19	3	12	6	21	16	20	18	4	1	10	9	13	23	14	22
21	6	11	5	10	13	3	14	9	1	4	19	17	23	2	7	8	20	12	18	16	15	24	22	21
22	9	19	16	14	24	12	4	10	3	23	6	11	18	1	7	5	13	2	21	17	20	8	22	15
23	4	16	13	11	18	8	15	14	10	7	6	12	5	1	3	9	24	2	22	17	20	23	21	19
24	8	4	18	2	19	1	6	20	14	3	5	17	15	21	13	22	11	7	9	23	12	16	10	24
25	1	5	11	8	13	18	12	15	16	2	17	23	10	7	21	6	20	22	19	14	24	3	9	4
26	1	7	15	17	18	16	2	8	4	24	19	11	10	6	9	5	21	3	22	13	20	12	23	14
27	3	5	24	8	22	6	1	2	13	7	17	10	9	20	11	12	4	14	18	19	15	23	16	21
28	1	10	8	6	15	5	17	22	4	2	14	7	18	9	16	19	12	3	13	11	20	23	24	21
29	5	19	7	12	21	14	1	4	10	3	13	20	16	2	8	9	11	6	18	22	24	15	23	17

Appendix 11 Analysis of Meat Preference Data by Kendall's Coefficient of Concordance.

Meat	Rank	Mean Score	Total	Difference	Difference^2
Rump steak	2	6.1	176	186	34,596
Stewing steak	11	11.0	318	44	1,936
Rolled beef	8	9.9	286	76	5,776
Loin chops	12	11.0	319	43	1,849
Neck chops	19	16.4	475	-113	12,769
Leg of hogget	3	6.5	188	174	30,276
Pork chops	7	9.7	282	80	6,400
Pork pieces	15	14.1	409	- 47	2,209
Leg of pork	4	8.0	231	131	17,161
Corned beef	6	9.3	269	93	8,649
Shoulder bacon	14	14.1	408	- 46	2,116
Side bacon	13	13.9	402	- 40	1,600
Boiling bacon	18	16.3	474	-112	12,540
Ham-on-the-bone	5	8.8	255	107	11,449
Sliced ham	10	10.8	312	50	2,500
Hawiian ham	9	10.7	310	52	2,704
Lambs fry	16	14.3	415	- 53	2.809
Chicken	1	6.0	173	189	35,721
Beef sausage	20	16.8	486	-124	15,376
Pork sausage	17	15.2	440	- 78	6,084
Luncheon	23	18.0	523	-161	25,921
Salami	21	16.9	489	-127	16,129
Saveloys	22	17.9	520	-158	24,964
Frankfurters	24	18.5	536	-174	30,276
Mean			362.3		12,992.3
Total			3,696		311,814

$$W = \frac{12 \times 311,814}{576 \times 24,360} = 0.267$$

$$p_{av} = 0.235$$

$$X^2 = m(n - 1) W = 24 \times 28 \times W = 179.4$$

Highly significant even at the 99.9 % level.

Appendix 12 Respondents' Ranking of the 13 Attitude Variables.

Respondents	Variables												
	Season	Cooking	Preparation	Expense	Tenderness	Wastage	Flavour	Nutrition	Prestige	Versatility	Type of meal	Appearance	Fat
1	13	6	7	1	10	4	3	2	12	[illegible]	[illegible]	[illegible]	5
2	12	10	9	1	5	3	6	2	11	4	[illegible]	7	13
3	7	11	12	13	4	2	5	1	8	6	[illegible]	[illegible]	[illegible]
4	13	8	9	11	[illegible]	3	5	2	7	[illegible]	12	1	4
5	12	9	10	3	6	1	5	4	7	8	2	[illegible]	13
6	12	6	7	3	[illegible]	2	10	1	13	[illegible]	[illegible]	[illegible]	11
7	10	5	6	3	1	7	4	11	8	12	13	2	9
8	12	5	4	2	6	7	8	11	3	10	[illegible]	[illegible]	9
9	13	11	12	1	4	2	5	6	10	[illegible]	7	[illegible]	3
10	10	12	13	8	6	9	3	1	5	[illegible]	4	[illegible]	2
11	12	7	8	3	6	4	5	2	9	10	13	[illegible]	11
12	12	10	7	6	3	9	4	1	5	8	11	2	13
13	10	9	8	13	4	2	3	5	12	7	1	[illegible]	6
14	7	11	8	6	4	2	5	1	9	12	10	3	13
15	13	11	10	7	2	6	[illegible]	4	8	[illegible]	9	5	12
16	11	9	10	[illegible]	1	4	5	2	8	[illegible]	12	7	13
17	8	11	10	[illegible]	4	6	5	2	[illegible]	3	13	[illegible]	9
18	12	10	9	1	5	3	6	2	11	4	[illegible]	[illegible]	13
19	13	11	12	2	10	4	9	5	7	6	[illegible]	[illegible]	[illegible]
20	12	8	10	[illegible]	4	9	6	2	7	5	[illegible]	3	13
21	12	3	2	5	6	9	8	7	11	1	13	4	10
22	4	6	2	7	10	12	8	11	9	13	5	3	1
23	11	10	12	3	4	6	2	1	9	8	13	5	7
24	12	7	11	2	5	10	6	3	8	[illegible]	9	4	13
25	8	10	9	11	3	12	4	1	6	2	7	5	[illegible]
26	10	12	13	5	3	7	4	2	6	[illegible]	1	9	[illegible]
27	13	7	9	12	5	10	3	2	8	4	1	6	[illegible]
28	8	10	9	[illegible]	3	12	4	1	6	2	7	5	13
29	8	11	10	1	3	2	5	6	12	[illegible]	9	4	7
30	11	10	9	3	1	8	4	2	12	[illegible]	[illegible]	5	7
31	11	10	9	3	1	8	4	2	12	[illegible]	[illegible]	5	7

Variable	Mean	Std. Dev.	Total	Sum of Squares
Season	10.7	2.3	332	3,708
Cooking	8.9	2.6	276	2,620
Preparation	8.9	2.7	276	2,682
Expense	5.2	4.1	162	1,340
Tenderness	4.5	2.4	139	797
Wastage	6.0	3.4	185	1,455
Flavour	5.0	2.0	155	895
Nutrition	3.4	3.0	105	631
Prestige	8.7	2.6	271	2,567
Versatility	6.9	3.6	214	1,860
Type of meal	8.5	4.1	263	2,735
Appearance	5.2	3.0	161	1,099
Fat	9.1	3.8	282	3,000

Appendix 13 Analysis of the Attitude Variables by Kendall's Coefficient of Concordance Test.

Variable	Rank	Mean Score	Total	Difference	Difference^2
Season	13	10.7	332	-115	13,225
Cooking	10.5	8.9	276	- 59	3,481
Preparation	10.5	8.9	276	- 59	3,481
Expense	5.0	5.2	162	55	3,025
Tenderness	2.0	4.5	139	78	6,084
Wastage	6.0	6.0	185	32	1,024
Flavour	3.0	5.0	155	62	3,844
Nutrition	1.0	3.4	105	112	12,544
Prestige	9.0	8.7	271	- 54	2,916
Versatility	7.0	6.9	214	3	9
Type of meal	8.0	8.5	263	- 46	2,116
Appearance	4.0	9.1	282	- 65	4,225
Mean			217		4,178
Total			2,821		59,110

W the coefficient of concordance is defined as

$$W = \frac{12S}{m^2(n^2 - n)}$$

where S is the sum of squares of the actual deviations

m = the number of articles to be ranked, and

n = the number of respondents

$$W = \frac{12 \times 59,110}{169 \times 29,760} = 0.141$$

The mean value of the Spearman coefficient between the $\binom{m}{2}$ possible pairs of observers is given by the following relationship:

$$p_{av} = \frac{mW - 1}{m - 1} = \frac{(13 \times 0.141) - 1}{12} = 0.0629$$

$X_r^2 = m(n - 1)W = 54.99$ which means that there was significant agreement between the respondents even at the 99.9 % level.

Appendix 14. Total Pigs in New Zealand 1961-1969.

Area	Year									
	1961	1962	1963	1964	1965	1966	1967	1968	1969	% of Total '69
Northland	100,139		120,902	122,466		95,642	70 652	60,957	50,782	9.18
Central Auckland	74,127		91,304	88,911		82,670	73,550	72,333	59,695	10.78
Sth. Auck. B.O.P.	222,461		241,152	246,331		201,419	165,949	162,572	132,897	24.01
East Coast	7,187		8,039	8,125		8,125	7,774	9,429	7,020	1.27
Hawke's Bay	14,284		15,204	14,750		13,299	12,405	13,341	15,189	2.74
Taranaki	77,142		97,115	94,617		82,214	75,819	76,566	72,476	13.10
Wellington	73,788		81,400	82,655		65,722	59,171	62,564	66,823	12.07
Total North Island	569,128		655,116	657,865		549,131	465,529	455,735	404,882	73.15
Marlborough	8,546		11,258	12,744		13,752	14,333	16,396	17,383	3.14
Nelson	22,757		27,212	28,403		28,812	33,559	32,350	28,832	5.21
Westland	9,208		11,649	11,431		11,515	11,379	12,256	5,279	0.90
Canterbury	30,892		41,687	42,222		47,647	59,160	73,932	69,541	12.57
Otago	8,372		10,980	10,210		8,817	10,572	12,612	14,353	2.59
Southland	6,529		8,128	8,545		7,231	8,163	10,896	13,118	2.45
Total South Island	86,304		110,909	113,585		117,774	137,166	158,442	148,506	26.00
Total New Zealand	655,432		766,025	771,450		666,905	602,695	614,177	553,388	100.00

Appendix 15 Volume of Product Produced by the Bacon Industry.

Year	Product		
	Bacon + Ham	Smallgoods	Pork
	cwt	cwt	cwt
54-55	271,410	158,973	40,327
55-56	289,610	174,223	33,357
56-57	307,550	169,741	32,026
57-58	303,008	176,080	28,178
58-59	325,491	179,585	32,586
59-60	319,142	241,964	39,508
60-61	331,544	245,955	31,991
61-62	336,741	263,893	30,285
62-63	333,000	276,028	27,670
63-64	346,511	289,983	33,530
64-65	353,161	323,795	38,660
65-66	346,887	326,610	29,740
66-67	289,348	257,865	29,057
67-68	278,158	252,784	22,125
68-69	260,492	297,679	9,856
69-70	273,603	324,657	6,899
70-71	246,422	314,890	3,990
71-72	242,429	363,567	5,403

Appendix 16 Ranking of the 24 Meats on the 13 Attitude Variables.

Meat	Preference	Would Buy	Frequency	Expense	Flavour	Nutrition	Prestige	Wastage	Tenderness	Type of meal	Versatility	Cooking	Preparation	Season
The 8 Most Preferred Meats:														
Chicken	1	2	3	13	4	3	1	13.5	1	10	1	16	22	16.5
Rump steak	2	1	2	10.5	2	2	6	7	13.5	1	4	5	10	16.5
Leg of hogget	3	5.5	1	14	9	4	5	20	13.5	4.5	15	20	12	9
Leg of pork	4	3.5	21.5	4.5	4	9	2	19	5	2.5	6.5	23.5	17	9
Ham-on-the-bone	5	3.5	24	4.5	1	5	3	18	4	14	12.5	22	19	24
Corned beef	6	5.5	4	9	10.5	15	8.5	11	9.5	7	21	21	14	18
Pork chops	7	9	11	4.5	7	11	7	22	14.5	2.5	5	14	17	9
Rolled beef	8	9	7	10.5	14	6.5	10	17.5	20	4.5	17.5	18	11	9
The 8 Medium Acceptable Meats:														
Hawiian ham	9	5	17	4.5	7	9	4	9	6.5	11.5	6.5	13	14	20.5
Sliced ham	10	7	12.5	4.5	4	9	8.5	10	2.5	18	8	1	5.5	23
Stewing steak	11	13	5	17	7	6.5	11	13.5	23.5	6	2	23.5	23.5	2
Loin chops	12	14	9	15	13	12	15.5	24	20	9	12.5	12	14	9
Side bacon	13	11	7	4.5	10.5	16.5	15.5	15	11.5	19	10	2.5	5.5	9
Shoulder bacon	14	12	12.5	4.5	12	13.5	17	12	17	20	14	4	5.5	9
Pork pieces	15	15	16	12	15.5	18	12	21	22	11.5	3	15	23.5	4
Lambs fry	16	20	20.5	18	17.5	1	19	8	20	13	17.5	10.5	20	3
The 8 Least Acceptable Meats:														
Pork sausage	17	18	7	21	19.5	20.5	21	3.5	11.5	16.5	10	10.5	5.5	16.5
Boiling bacon	18	16	20.5	4.5	15.5	16.5	13.5	16.5	18	15	16	19	17	11
Neck chops	19	24	15	23	17.5	13.5	18	23	23.5	8	20	17	21	1
Beef sausage	20	21.5	14	19	22	20.5	21	5.5	9.5	16.5	10	8.5	5.5	9
Salami	21	17	20.5	16	19.5	19	13.5	11.5	15.5	23	17	7	5.5	20.5
Saveloys	22	21.5	17.5	22	24	24	24	3.5	6.5	22	23.5	2.5	5.5	9
Luncheon	23	23	10.5	24	23	22	23	1.5	2.5	24	23.5	8.5	1	22
Frankfurters	24	19	18.5	20	21	23	21	5.5	8	21	21	6	5.5	16.5

Appendix 17 Bacon Industry's Share of the Bacon and Ham Market.

Year	Total Production Bacon + Ham (000 tons)	Industry's Production Bacon + Ham (000 tons)	Industry's Share of Market %
1959-60	19.9	16.0	80.2
60-61	21.4	16.6	77.5
61-62	21.6	16.8	77.9
62-63	21.6	16.6	77.1
63-64	24.1	17.3	71.9
64-65	23.2	17.7	76.1
65-66	21.3	17.3	81.4
66-67	19.1	14.5	75.7
67-68	18.8	13.9	74.0
68-69	18.3	13.0	71.2
69-70	21.1	13.7	64.8