ATTITUDES AND BEHAVIOUR OF CONSUMERS TO MEAT

IN PALMERSTON NORTH, NEW ZEALAND

1979 - 1985

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

Brian Herbert Patrick Wilkinson

1985

ABSTRACT

Consumer attitudes and behaviour towards meat products were studied as a basis for meat product development. Meat consumer studies have traditionally taken two distinctive approaches. Economists have tended to use demand analysis, concentrating on the effects of price, income, and family structure on the consumption of 'beef' or 'lamb' or other aggregated commodity. Market researchers have tended to concentrate on consumer requirements and attitudes, frequently ignoring price and income. The present study examined meat consumer behaviour from both perspectives and made a detailed study of some of the techniques using 15 meats and 41 meat cuts.

In consumer preferences, the use of a Semi-structured Linear Scale with the most-preferred and least-preferred meats anchored at either end of the scale and the remaining meats arranged along the scale at distances that reflected the consumers' preferences was equally effective at determining interval scale distances between meats as the traditional methods of measuring preferences, the Thurstone Case V Interval Scale. Also for Multidimensional Scaling, substitutability measurements were the most appropriate data measurements as the resulting solutions were stable, whilst the preference solutions tended to degenerate into unidimensional solutions. The study also showed that less predictable solutions resulted from MDS if substitutability measurements were made on meat cuts rather than at a species level. Fenker's and Krusdal et al.'s methods produced very similar ideal point solutions which were slightly different to solutions from a newly-developed method. The latter had the advantage of being able to identify the dimension most sensitive to changes in preference and to indicate whether an ideal point or vector model was the most appropriate method of determining new product opportunities in an MDS space.

Factor Analysis showed that it was possible to identify three main Factors underlying consumers' attitudes to meat in general. They included: a 'meat quality on buying' Factor; a 'meat quality on eating' Factor and a 'meat quality on cooking and serving' Factor. However, the study showed that the structure of the Factors changed depending on whether attitudes to meat in general, to specific cuts from each species

of meat, or individual cuts of meat were being examined. The use of Q-Factor Analysis to categorise meats on the basis of consumer attitudes showed that it was possible to categorise meats into 9 Hypothetical Product groupings based on the consumers' attitudes to the products. The groupings were shown to be based on the similarity of the attitude profiles of the cuts, cuts with similar profiles being grouped in the same Hypothetical Product.

Three quantitative regression models were developed for 41 meat cuts. The models showed that the situation was not quite as complex as other studies had indicated. Per capita consumption of meat was shown to depend on the price, preference and prestige ratings of a meat cut, i.e. a typical demand model. The model accounted for 61% of the variance in the dependent variable, substantially higher than other studies. Meat cut preference was shown to depend on the acceptability of the flavour, juiciness and presence of bone in the cut. The model typified a Fishbein/Rosenberg attitude model and accounted for 91% of the variance in the dependent variable.

The proportion of households buying model accounted for over 93% of the variance in the dependent variable and typified a demand model. All the predictor variables in the model were consumer attitudes. The model indicated that the proportion of households that would purchase a cut was dependent on the tenderness, value for money and perceived price of a cut.

The models indicated what had to be done to improve existing meat products and the areas that should be concentrated on for successful new meat product development.

ACKNOWLEDGEMENTS

The research contained in this thesis was supported by the financial assistance of the Massey University Food Technology Research Centre.

I should like to thank Dr. Mary Earle, who took over as main supervisor when Dr. Allan Anderson left Massey University, for creating the opportunity to start this thesis, and for her encouragement and support, and most of all for her patience and unselfish allocation of time, particularly during these latter stages of the thesis when she had so many other commitments.

I should also like to thank Dr. Allan Anderson for all the fruitful discussions at the conceptual stage of the research programme and his thoughts at critical times during the execution of the thesis, and also his continued support throughout the six very long years.

I would also like to express my appreciation to the many people who assisted in a variety of ways. In particular my thanks go to:

Mr. Chris Freyberg and the staff of the Computer Unit at Massey University for the computing facilities and programming advice;

The Library staff at Massey University for their willing assistance in locating and obtaining reference material;

Professor Richards and the Food Technology Department for the use of facilities and for their support throughout;

Mr. Bing Soo, for his help with the coding and part of the analysis of the 1985 survey results, and also to the people who helped decode the three very long 1979 questionnaires;

Mr. Robert Beausire, for the suggestions which were incorporated into the 1985 survey form;

Mrs. Elizabeth Baxter who typed this thesis so magnificently. Only she knows what a mammoth task it was. My sincere thanks for coping with such a large task at the eleventh hour.

A special vote of thanks must go to the 300 respondents who gave up so much of their time to complete the four very long questionnaires.

Finally to my wife Helen and two boys, Ben and Tim, who had to live with a very cranky lodger for this last year. Thank you for your patience and understanding.

Brian Wilkinson,
Palmerston North,
New Zealand.
September, 1985.

PREFACE

Food product development is the procedure by which raw materials are selected, combined and then processed to produce a product that is acceptable to the final consumer. Twenty-five to thirty years ago, the number of food products on the shelves of supermarkets and corner dairy stores was small in comparison to the huge array of products that are available today. Consequently, in the past, it was possible to use a less systematic approach to product development than is the case today when the failure of a new product to meet its intended objectives can spell ruin for some firms or at best a down-turn in company profits for one or two years. It was common to see firms relying on intuition and experience in their development of new products. However, in today's world, where the risks of failure can be extremely damaging to a firm, more systematic and quantitative techniques have to be used to ensure a higher probability of success than one in forty (Booz and Allen, 1984). The Booz and Allen report stressed the need for a systematic product development programme for a company. The steps outlined in the report included:

* Development of a company strategy for new product development;
* Systematic product idea generation;
* Quantitative screening of product ideas;
* Initial feasibility analysis of the project;
* Development of product concepts;
* Consumer evaluation of the product concepts;
* Systematic and quantitative product formulation procedures;
* Consumer testing of products through development phases;
* Feasibility analysis of product and assessment of probability of success;
* Market testing of product;
* Evaluation of economics before decision for launch.

A number of quantitative techniques have been developed to aid the researcher in the various areas outlined above; these include:

* Market and product gap analylsis using MDS to identify new product opportunities;

* Market evaluation based on Bayesian decision tree analysis or cost benefit analysis;
* Formulation based on linear and non-linear programming;
* Mixture designs and other experimental design techniques to aid with formulation and process design;
* Business analysis including market forecasts, market surveys and buyer simulation models.

The introduction of these techniques has been largely in a haphazard fashion. The Food Technology Department at Massey University has been carrying out a research programme with the specific aim of developing systematic and quantitative techniques for new food product design and development. The design of nutritional products for consumers in developing countries has been used as the basis for this programme. An overview of the programme is given by Edwardson, Anderson, Chittaporn, Ngaramsak and Earle (1985).

Edwardson provided an objective procedure for the selection of raw materials to be used in low cost nutritional products for the Philippines. The major problem encountered by Edwardson was the incompatibility of raw materials selected by linear programming based on nutritional criteria. It was only possible to produce an acceptable product from these raw materials through extensive processing and addition of flavouring ingredients.

Anderson (1975) complemented and extended Edwardson's work by devising a procedure whereby raw material selection was made on the basis of their predicted acceptability in Thai dishes. Anderson used similarity measurements which were then analysed by non-metric Multidimensional Scaling to derive the metric acceptability scale values for the 40 raw materials and the ideal point. These values were used to derive a linear function relating raw materials to food dish acceptability. This function was used in a linear programming model together with nutritional constraints to provide a systematic method of raw material selection for nutritious and acceptable Thai food dishes. The raw materials selected by the model showed a marked improvement over those chosen by the linear programme subject to only nutritional constraints. However, there were still problems with the selection of the raw materials as ingredients

for the new food products as the developed dishes did not have as high an acceptability rating as was expected from the model.

It was clear from Edwardson's and Anderson's work that further research was needed in the area of exactly defining the consumers' requirements for new food products and what raw materials they considered to be acceptable for inclusion in the new products, if the linear programming model was to be more effective in the development of acceptable new food products. Anderson had used an indirect method to obtain the acceptability ratings for the raw material ingredients rather than one of the traditional methods of ascertaining consumer requirements, such as the Semantic Differential. The question was then posed "Which of the two approaches, i.e. the indirect method of Anderson or the more traditional approach, is the most appropriate for the measurement of consumer requirements, given that the indirect methods can sometimes pick up important product attributes which may otherwise be missed by the traditional methods, particularly if the attributes happen to be symbolic or psychological?"

The object of this study was to compare the more traditional methods of obtaining consumer requirements and preferences, such as the Semantic Differential and the Thurstone Case V Interval preference scale, with the newer and less direct methods, such as non-metric Multidimensional Scaling and arrive at some conclusions regarding the advantages and disadvantages of the two approaches and also some recommendations as to the best approach for new product development studies if the linear programming model was to be more successful for the development of new products.

CONTENTS

Page

Abstract

Acknowledgements

Preface

1 CONSUMER RESEARCH AND MEAT PRODUCT DEVELOPMENT 1

1.1 Reasons for Product Development in the Meat Industry 2

1.1.1 Does the Product Life-Cycle Theory Apply to Meats? 3

1.1.2 Effect of Technology on the Meat Industry 6

1.1.3 Need for Growth in the Meat Industry 7

1.2 The Design of a Successful Product 10

1.3 The Consumer in Product Development 13

1.4 Consumer Attitudes towards Meats 14

1.5 The Consumer Surveys 15

1.5.1 Types of Meat 16

1.6 Aims of the Present Study 17

PART ONE CHANGES IN THE RETAILING AND CONSUMPTION OF MEAT 20

2 CHANGES IN MEAT RETAIL OUTLETS IN PALMERSTON NORTH 21

2.1 Introduction 21

2.2 Consumer Survey Method 22

2.2.1 First Consumer Survey, November 1979 22

2.2.2 Second Consumer Survey, January 1985 24

2.2.3 Method of Analysis 25

2.3 Changes in the Retail Outlets for Fresh Meat in Palmerston North from 1974 to 1985 25

2.4 Changes in the Retail Outlets for Processed Meats in Palmerston North from 1974 to 1985 27

2.5 The Effect of Socio-Economic Factors on the Choice of Retail Outlets for Buying Meats 30

2.6 Conclusions 31

3 THE CONSUMPTION OF DIFFERENT MEATS IN PALMERSTON NORTH 32

3.1 Meat Consumption in New Zealand from 1950 to 1979 32

CONTENTS (continued)

Page

3.2 The Consumer Surveys in Palmerston North 34
3.3 Per Capita Consumption of Meat in Palmerston North in 1979 35
3.4 Consumption of Beef Cuts in Palmerston North in 1979 40
3.5 Consumption of Sheep Meat Cuts in Palmerston North in 1979 42
3.6 Consumption of Pig Meat Cuts in Palmerston North in 1979 46
3.7 Consumption of Offal in Palmerston North in 1979 48
3.8 Consumption of Sausage Products in Palmerston North in 1979 50
3.9 Consumption of Chicken, Shellfish and Fish in Palmerston North in 1979 53
3.10 Discussion on Meat Consumption in Palmerston North in 1979 54
3.10.1 Proportion of Households Consuming Different Meats 54
3.10.2 Hierarchy of Meats in Palmerston North in 1979 56
3.11 Changes in Meat Consumption over the Period 1979-1985 as Observed by Respondents in Palmerston North 59
3.12 Comparison of Per Capita Consumption Levels for 1979-1985 61
3.13 Comparison of Hierarchical Ratings for Meat Cuts from 1979-1985 62
3.14 Discussion 65
3.15 Conclusions 68

PART TWO THE EFFECT OF SOCIO-ECONOMIC VARIABLES ON THE CONSUMPTION OF MEATS 70

4 THE INFLUENCE OF SOCIO-ECONOMIC VARIABLES ON THE CONSUMPTION OF MEAT IN PALMERSTON NORTH 71
4.1 Introduction 71
4.2 The Surveys 72
4.2.1 Determination of Per Capita per Annum Meat Consumption 73
4.2.2 The 1979 Survey Sample 74
4.2.3 The 1985 Survey Sample 76
4.2.4 Analysis Method 77

CONTENTS (continued)

		Page
4.3	Effect of Household Composition on Meat Consumption in 1979 and 1985 Surveys	78
	4.3.1 Total People in Household (1979 Survey)	78
	4.3.2 Children under 2 (1979 Survey)	79
	4.3.3 Families with Children between 2 and 10 (1979 Survey)	79
	4.3.4 Households with Children over the Age of 10 (1979 Survey)	80
	4.3.5 Summary of 1985 Findings on the Effect of Household Composition on Meat Consumption	81
4.4	Effect of Age of Respondent on Meat Consumption in 1979 and 1985 Surveys	82
	4.4.1 Summary of 1985 Survey Findings on the Effect of Age of Respondent on Meat Consumption	84
4.5	Family Life Cycle as it Applies to Meat Consumption	84
4.6	Effect of Occupation and Income of the Principal Income Earner on Per Capita Consumption of Meat in 1979 and 1985 Surveys	86
4.7	Discussion	87
	4.7.1 Criticism of the 1979 and 1985 Studies	89
	4.7.2 Recommendations for Future Studies	90
4.8	Conclusions	90
5	PER CAPITA CONSUMPTION OF MEAT BY LOW, MEDIUM AND HIGH MEAT CONSUMERS IN 1979 IN PALMERSTON NORTH	92
5.1	Introduction	92
5.2	The Survey	93
	5.2.1 Analytical Method	93
5.3	Meat Consumption Patterns of Low, Medium and High Meat Consumers in Palmerston North in 1979	94
5.4	Comparison of Per Capita Consumption of Meat by Low, Medium and High Consumers of Beef, Sheep Meat and Pig Meat	99
5.5	Discussion	101
5.6	Conclusions	102

CONTENTS (continued)

		Page
6	REASONS FOR CHANGES IN MEAT CONSUMPTION FROM 1979 TO 1985	103
	6.1 Introduction	103
	6.2 Survey	105
	6.2.1 Analytical Method	105
	6.3 Reasons for Decline in Per Capita Consumption of Meat	106
	6.4 Changes in Food Consumption Pattern with Increasing Income	108
	6.5 Changes in Food Consumption by Low, Medium and High Meat Consumers	109
	6.6 Discussion	110
	6.7 Conclusions	113
PART THREE	A STUDY ON THE USE OF MULTIDIMENSIONAL SCALING ON CONSUMER ATTITUDES TO MEAT	115
7	A COMPARISON OF SCALING METHODS IN STUDYING CONSUMER MEAT PREFERENCES	116
	7.1 Introduction	116
	7.1.1 Thurstone's Law of Comparative Judgements	118
	7.1.2 Semi-structured Linear Scale	120
	7.1.3 Multidimensional Scaling	121
	7.2 Research Procedure	125
	7.2.1 The Sample	127
	7.2.2 The Questionnaire	127
	7.2.3 The Interviews	130
	7.2.4 The Analysis	130
	7.2.4.1 Thurstone Analysis	130
	7.2.4.2 Semi-structured linear scale	131
	7.2.4.3 Multidimensional scaling method	131
	7.3 Comparison of Preference Testing Methods	134
	7.3.1 Analysis of General Meat Preference Paired Comparison	134
	7.3.2 Thurstone's General Method Data	139
	7.3.3 Semi-structured Linear Preference Scale	144

CONTENTS (continued)

		Page
7.3.4	Comparison of the Thurstone Case V, Thurstone General and Semi-structured Linear Scales	147
7.3.4.1	Derived ranks for the 15 meats	147
7.3.4.2	Comparison of scales	149
7.3.4.3	Discussion of comparison of scales	150
7.4	Multidimensional Scaling Analysis of Preference Data for 15 Meats	153
7.4.1	Matrices	153
7.4.2	MDS Spaces for Fifteen Meats	153
7.4.3	Effects of Re-arranging Matrices	159
7.4.4	Evidence for One Dimensional Solution	161
7.4.5	Re-analysis of 'Percentage Preference' Data Set	162
7.4.6	Recovery of Original Preference Rank Order - Comparison of Methods of Collecting Data	167
7.5	Cluster Analysis of Preference Proximity Data for 15 Meats	168
7.5.1	Summary of 15 Meat Preferences Analysis	169
7.6	Preference for 41 Cuts of Meat	169
7.7	MDS Analysis of Preference Data for 41 Meat Cuts	172
7.8	Conclusions	176
7.8.1	Techniques	176
7.8.2	Meats	178
8	SUBSTITUTABILITY OF MEATS AND MEAT CUTS	179
8.1	Introduction	180
8.1.1	Direct Data	180
8.1.2	Indirect Data	182
8.1.3	Summary	183
8.1.4	Cluster Analysis	184
8.2	Research Procedure	185
8.2.1	The Sample	185
8.2.2	The Questionnaire	186
8.2.3	The Interviews	187
8.2.4	The Analysis	187
8.3	Substitutability of the 15 Meats	188
8.4	41 Meat Cut Substitutability Analysis	191

CONTENTS (continued)

		Page
8.5	Comparison of the Meat Cut Substitutabilities Configuration with the Meat Species Configuration	200
8.6	Substitutabilities Analysis of Cuts from Specific Species of Animals	202
	8.6.1 Discussion	211
8.7	Cluster Analysis	214
8.8	Recommendations for Future Work	217
8.9	Conclusions	219
9	COMPARISON OF SIMILARITIES FROM PREFERENCE AND SUBSTITUTABILITY	222
9.1	Research Procedure	222
9.2	Preference Data for the 15 Meats	223
	9.2.1 Similarities Derived from Thurstone Case V Data for the 15 Meats	223
	9.2.2 Similarities of the 15 Meats Derived from the Thurstone General Data	226
	9.2.3 Similarities of the 15 Meats Derived from the Semi-structured Linear Preference Scale	226
	9.2.4 Comparison of the 3-dimensional Preference Similarity Configurations for the 15 Meats Obtained from Thurstone Case V, Thurstone's General Method and the Semi-structured Linear Scale Data	231
9.3	Comparison of the 3-dimensional Configuration of the 15 Meats Derived from Substitutability Measurements and Similarity Measurements based on Preference	233
9.4	Comparison of the Substitutability and Preference Similarity 3-dimensional Configurations for each of the Meat Cut Sub-groups	235
9.5	Discussion of Results	237
	9.5.1 Similarity MDS Spaces Derived from Preference Measurements	237
	9.5.2 Stability of Substitutability Measurements	238
	9.5.3 Comparison of Preference Similarity MDS Solutions with the Substitutability MDS Solution for the 15 Meats	238

CONTENTS (continued)

Page

9.5.4 Comparison of Preference Similarity with Substitutability Solutions for Individual Meat Groupings 239
9.6 Conclusions 240

10 'IDEAL' MODELS TO IDENTIFY PRODUCT OPPORTUNITIES 241
10.1 Preference Models 241
10.1.1 Dominance Model 243
10.1.2 Non-compensatory Models 243
10.1.2.1 Lexicographic models 243
10.1.2.2 Conjunctive model 244
10.1.2.3 The Disjunctive model 244
10.1.3 Compensatory Models 244
10.1.3.1 The Vector model 244
10.1.3.2 Ideal Point model 246
10.1.3.3 Conjoint Measurement model or part-worth model 248
10.1.4 Comparison of Compensatory Models 248
10.1.5 Choice of Preference Models 249
10.2 Research Procedure 251
10.2.1 Fenker's Method of Locating the Population Ideal Point for the 15 Meats 251
10.2.2 Kruskal, Young & Seery's Method of Locating Ideal Points for Individual Respondent's for 15 Meats 253
10.2.3 Author's Method of Locating a Population Ideal Point for the 15 Meats 255
10.2.4 Axis Identification of the 15 Meat and 41 Meat Cut Substitutability Space 257
10.2.5 Axis Identification for the 41 Meat Cut Substitutability Space 257
10.3 Population Ideal Point Located by Fenker's Method in the 15 Meat 3-Dimensional Substitutabilities Space 258
10.4 Population Ideal Point Located by Fenker's Method in the 41 Meat Cut 3-dimensional Substitutabilities Space 262

CONTENTS (continued)

Page

10.5 Respondents' Ideals Located by Kruskal, Young & Seery's Method in the 15 Meat Substitutability Space 267
10.6 Respondents' Ideals Located by Kruskal, Young & Seery's Method in the 41 Meat Cut Substitutability Space 271
10.7 Population Ideal Point Located by Author's Method in the 3-Dimensional Substitutabilities Space 271
10.8 Population Ideal Point Located by Author's Method in the 41 Meat Cut Substitutabilities Space 278
10.9 Discussion 278
10.9.1 Comparison of the 3 Methods for Locating Ideals in the 15 Meat Substitutabilities Space 278
10.9.2 Comparison of the 3 Methods for Locating Ideals in the 41 Meat Cut Substitutabilities Space 283
10.10 Conclusions 285
10.10.1 Methods of Locating Ideals 285
10.10.2 New Meat Product Opportunities 285

PART FOUR: THE USE OF FACTOR ANALYSIS TO EVALUATE CONSUMERS' ATTITUDES TO MEATS 287

11 FACTOR ANALYSIS OF CONSUMER ATTITUDES TO SENSORY, COOKING AND OTHER CHARACTERISTICS OF MEAT IN GENERAL 289
11.1 Introduction 289
11.1.1 Scales for Attitude Measurement 290
11.1.2 Types of Meat Studied 292
11.1.3 Methods of Factor Analysis 293
11.1.4 Number of Factors Extracted 295
11.1.5 Rotation of Factors 296
11.1.6 Salient Loadings 298
11.2 Research Procedure 299
11.2.1 The Sample 299
11.2.2 Questionnaire Design 300
11.2.2.1 The meat characteristics 300
11.2.2.2 Types of meat 303

CONTENTS (continued)

		Page
	11.2.3 The Analysis	304
11.3	Results	306
	11.3.1 Meat Attitude Scores for Different Meat Groups	306
	11.3.2 Factor Analysis of Attitudes Towards Meat in General	308
	11.3.2.1 Number of Varimax rotated principal factors	308
	11.3.2.2 Confirmation of factors	311
	11.3.3 Factor Analysis of Attitude Data for 7 Beef Cuts	312
	11.3.3.1 Number of Varimax rotated principal factors	312
	11.3.3.2 Confirmation of factors	314
	11.3.4 Factor Analysis of Attitude Data for 12 Sheep Meat Cuts	316
	11.3.4.1 Number of Varimax rotated principal factors	316
	11.3.4.2 Confirmation of factors	317
	11.3.5 Factor Analysis of Attitude Data for 8 Pig Meat Cuts	319
	11.3.5.1 Number of Varimax rotated principal factors	319
	11.3.5.2 Confirmation of factors	323
	11.3.6 Factor Analysis of Attitude Data for Offal Cuts	323
	11.3.6.1 Number of Varimax rotated principal factors	323
	11.3.6.2 Confirmation of factors	325
11.4	Discussion of Results	326
	11.4.1 Rotational Method	326
	11.4.2 Saliency of Variable Loadings	328
	11.4.3 Extraction of Factors	331
	11.4.4 Comparison of Varimax Rotated Factors for Meat Groupings	333
11.5	Conclusions	337

CONTENTS (continued)

		Page
12	FACTOR ANALYSIS OF CONSUMER ATTITUDES TO 45 MEAT CUTS	340
	12.1 Introduction	340
	12.2 Research Procedure	342
	12.2.1 General Factor Analysis	342
	12.2.2 Factor Analysis of Typical Products Using Q-Factor Analysis	344
	12.3 Q-Factor Analysis of the 45 Meat Cuts on the Basis of 'Meat Buying' Attitudes	345
	12.3.1 Q-Factor Analysis	345
	12.3.2 Structure of Varimax Rotated 'Meat Buying' Factor of each of the 9 Meats Selected to Represent the 9 Hypothetical Products	347
	12.3.3 Mean 'Meat Quality on Buying' Attitude Scores for the 9 Meats Representing the 9 Hypothetical Products	349
	12.4 Q-Factor Analysis of the 45 Meat Cuts on the Basis of 'Meat Eating' Attitudes	352
	12.4.1 Q-Factor Analysis	352
	12.4.2 Structure of Varimax Rotated 'Meat Eating' Factor of each of the 9 Meats Selected to Represent the 9 Hypothetical Products	354
	12.4.3 Mean 'Meat Quality on Eating' Attitude Scores for the 9 Meats Representing the 9 Hypothetical Products	356
	12.5 Q-Factor Analysis of the 45 Meat Cuts on the Basis of 'Cooking and Serving' Attitudes	360
	12.5.1 Q-Factor Analysis	360
	12.5.2 Structure of Varimax Rotated 'Cooking and Serving' Factor of each of the 9 Meats Selected to Represent the 9 Hypothetical Products	363
	12.5.3 Mean 'Meat Quality on Cooking and Serving' Attitude Scores for the 9 Meats Representing the 9 Hypothetical Products	365
	12.5.4 Q-Factor Analysis of the 45 Meats on the Basis of the 18 Attitude Variables	368

CONTENTS (continued)

		Page
12.6	Discussion of Results	371
	12.6.1 Grouped Meats	371
	12.6.1.1 Sheep meats	371
	12.6.1.2 Sausage products	373
	12.6.1.3 Offal products	375
	12.6.1.4 Ham cuts	376
	12.6.2 Wandering Products	376
	12.6.2.1 Pig meats	376
	12.6.2.2 The other meat products	379
	12.6.3 General Considerations	380
12.7	Discussion on Q-Factor Analysis	381
12.8	Conclusions	382
	12.8.1 Q-Factor Analysis	382
	12.8.2 Meat Cuts	382
13	ATTITUDES TOWARDS MEAT CUTS OF LOW, MEDIUM AND HIGH MEAT CONSUMERS AND DIFFERENT SOCIO-ECONOMIC GROUPS	384
13.1	Introduction	384
13.2	Survey Procedure	386
	13.2.1 Analytical Procedure	386
13.3	Results	387
	13.3.1 High, Medium and Low Total Meat Consumers' Attitudes to 7 Beef Cuts	387
	13.3.2 High, Medium and Low Total Meat Consumers' Attitudes to 4 Lamb Cuts	390
	13.3.3 High, Medium and Low Total Meat Consumers' Attitudes to 4 Hogget Cuts	392
	13.3.4 High, Medium and Low Total Meat Consumers' Attitudes to 4 Mutton Cuts	394
	13.3.5 High, Medium and Low Total Meat Consumers' Attitudes to 4 Selected Pig Meat Products	394
	13.3.6 High, Medium and Low Total Meat Consumers' Attitudes to fish, Shellfish and Chicken	398

CONTENTS (continued)

Page

13.3.7 High, Medium and Low Total Meat Consumers' Attitudes to Beef Tongue, Beef Tripe, Lambs' Kidney and Lambs' Liver 401

13.3.8 High, Medium and Low Total Meat Consumers' Attitudes to 4 Sausage Products 404

13.4 Beef, Sheep and Pig Meat Eating Attidues to All the 45 Meat Cuts 406

13.4.1 High, Medium and Low Beef Consumers' Attitudes to all the 45 Meat Cuts 406

13.4.2 High, Medium and Low Sheep Meat Consumers' Attitudes to all the 45 Meat Cuts 407

13.4.3 High, Medium and Low Pig Meat Consumers' Attitudes to all the 45 Meat Cuts 407

13.5 Attitudes to meat cuts of Socio-Economic Groups 407

13.5.1 Attitudes of High, Medium and Low Income Groups to all the 45 Meat Cuts 407

13.5.2 Attitudes of the Under-30's and Over-30's to all the 45 Meat Cuts 408

13.6 Discussion of Results 408

13.6.1 Indicator Group 410

13.6.2 Market Success of New Products 411

13.7 Conclusions 413

PART FIVE: 415

14 CONSUMER BEHAVIOUR MODELS FOR MEAT CONSUMPTION AND PREFEREMCE AND PROPORTION OF HOUSEHOLDS CONSUMING MEAT IN PALMERSTON NORTH 416

14.1 Consumer Demand Models 417

14.1.1 The Economic Demand Model 417

14.1.2 The product Characteristics Demand Model 418

14.1.3 Expectancy-Value Demand Models 419

14.1.4 Choice Alternative Model 420

14.2 Relevance of Consumer Behaviour Models to Meat Consumption 421

CONTENTS (continued)

		Page
14.3	Selection of Procedure for Model Building in Present Study	422
	14.3.1 Choice of Variables	422
	14.3.2 Method of Modelling	423
14.4	Experimental Procedure	425
	14.4.1 Data Used	425
	14.4.2 Multiple Regression Method	425
	14.4.3 Statistical Criteria for Selection of Variables to be Entered into the Regression Equation	426
14.5	Model to Predict Per Capita Consumption of the Meat Cuts	427
	14.5.1 Model	427
	14.5.2 Discussion	428
14.6	Model to Predict the Proportion of Households that will Consume Each Meat Cut	430
	14.6.1 Model	430
	14.6.2 Discussion	431
14.7	Model to Predict Consumers' Meat Cut Preferences in Palmerston North	432
	14.7.1 Model	432
	14.7.2 Discussion	434
14.8	Characterisation of the Three Dimensions Obtained from the MDS Analysis of the 41 Meat Cut Substitutability Space	436
	14.8.1 Characterisation of Dimension 1	436
	14.8.2 Characterisation of Dimension 2	437
	14.8.3 Characterisation of Dimension 3	439
	14.8.4 Discussion of Axis Identification	440
14.9	Discussion	442
	14.9.1 The Importance of Price	442
	14.9.2 The Importance of Prestige	444
	14.9.3 The Importance of Flavour	445
	14.9.4 The Importance of Juiciness	446
	14.9.5 The Importance of Bone	446
	14.9.6 The Importance of Tenderness	447
	14.9.7 The Importance of Expense and Value for Money	447

CONTENTS (continued)

		Page
14.10	Relevance of Models to High, Medium and Low Consumers of Meat	448
14.11	Meat Product Development	450
	14.11.1 Improvement of an Existing Product	451
	14.11.2 New Meat Product from Mutton	453
14.12	Conclusions	454
	14.12.1 Techniques	454
	14.12.2 Meat Product Concepts	456
15	THE STUDY IN PERSPECTIVE	458
15.1	Factors Affecting Consumption of Meat	458
	15.1.1 Income	458
	15.1.2 Age of Respondent	459
	15.1.3 Household Composition	459
	15.1.4 Price	461
	15.1.5 Attitudes to Meat Cuts	461
	15.1.6 Preference	462
	15.1.7 Other Factors	462
15.2	Factors Affecting Meat Preferences	463
15.3	Factors Affecting the Number of Households that Would Consume Each Cut of Meat	464
15.4	Comparison of Methods to Measure Preference	464
15.5	Multidimensional Scaling	465
	15.5.1 Preference Measurements	465
	15.5.2 Substitutability (Similarity) Measurements	466
	15.5.3 Ideal Point Methods	467
15.6	Factor Analysis	469
	15.6.1 Q-Factor Analysis	470
15.7	The Models	471
15.8	Recommended Method for Conducting Future Meat Product Development Consumer Studies	473
15.9	Conclusions	476
Appendices		478
Bibliography		616

LIST OF TABLES

		Page
1.1	Comparison of Danish and New Zealand Export Meat Industries	8
2.1	Trends in Retail Outlet Patronage In Palmerston North for Fresh Meat, 1974-1985	26
2.2	Trends in Retail Outlet Patronage in Palmerston North for Processed Meats, 1974-1985	28
2.3	Trends in Retail Outlet Patronage in Palmerston North for Consumer Purchases of Ham, Bacon and Smallgoods in 1979	29
3.1	Consumption of Meats over the years 1950-1979 in New Zealand	33
3.2	Meat Consumption Per Capita Per Annum in Palmerston North in 1979	36
3.3	Consumption of Sausages in Palmerston North in 1979	37
3.4	Percentage of Respondents Eating Various Meats in Palmerston North in 1979	39
3.5	Consumption of Beef Cuts by the Whole Sample and those Actually Eating the Beef Cuts in Palmerston North in 1979	40
3.6	Percentage of Respondents Eating Beef Cuts in Palmerston North in 1979	42
3.7	Consumption of Sheep Meat Cuts by the Whole Sample and those Actually Eating the Cuts in Palmerston North in 1979	43
3.8	Percentage of Respondents Eating Sheep Meat Cuts in Palmerston North in 1979	45
3.9	Consumption of Pork Cuts by the Whole Sample and those Actually Eating Pork Cuts in Palmerston North in 1979	46
3.10	Percentage of Respondents Eating Pig Meat Cuts in Palmerston North in 1979	47
3.11	Consumption of Offal Products by the Whole Sample and those Actually Eating each Type of Offal in Palmerston North in 1979	49
3.12	Percentage of Respondents Eating Offal Products in Palmerston North in 1979	50

LIST OF TABLES (continued)

		Page
3.13	Consumption of Sausage Products by the Whole Sample and those Actually Eating Sausage Products in Palmerston North in 1979	51
3.14	Percentage of Respondents Eating Sausage Products in Palmerston North in 1979	52
3.15	Consumption of Chicken, Shellfish and Fish by the Whole Sample and by those Actually Eating Chicken, Shellfish and Fish in Palmerston North in 1979	53
3.16	Percentage of Respondents Eating Chicken, Shellfish and Fish in Palmerston North in 1979	54
3.17	Percentage of Households Consuming Various Meat Cuts in 1974, 1977 and 1979	55
3.18	Hierarchy of Meats on Palmerston North in 1979	58
3.19	Degree of Change in Meat Consumption Level in Palmerston North over the Period 1979-1985	59
3.20	Percentage of Respondents in Palmerston North Changing their Meat Consumption Levels over the Period 1979-1985	60
3.21	Meat Consumption Per Annum in Palmerston North, 1979-1985	62
3.22	Comparison of Hierarchical Ratings for the Meat Cuts from the 1979-1985 Surveys in Palmerston North	63
4.1	Household Structure of Survey Sample (1979 Survey)	74
4.2	Household Structure of Survey Sample (1985 Survey)	76
5.1	Basis for the Assignment of the Respondents to Various Meat Consumption Groups	94
5.2	Socio-economic Characteristics and Meat Consumption Pattern of Low, Medium and High Meat Consumers	96
5.3	Comparison of Meat Consumption by Low, Medium and High Total Meat, Beef, Sheep Meat and Pig Meat Consumers (kg/capita/annum)	100

LIST OF TABLES (continued)

		Page
6.1	Per Capita Consumption of Red Meats (1978-1982)	104
6.2	Most Important Reason for Changes to Meat Consumption Levels over the Period 1979-1984	107
6.3	Food Consumption Changes by the Respondents Given Increased Disposable Income	109
7.1	Paired Comparison of Preferences - Percentages of Respondents	135
7.2	Paired Comparison of Preferences - Z Values - Thurstone Case V	137
7.3	Paired Comparison of Preferences - Thurstone General Method	141
7.4	Rank Order of Meats Derived from use of Mean and Modal Values of the Thurstone's General Data	143
7.5	Rank, Mean, Mode and Median of the 15 Meats Obtained from the Semi-structured Linear Scale	145
7.6	Rank Order of the 15 Meats Using Different Procedures	148
7.7	Comparison of Scale Values for Three Preference Methods	149
7.8	Adjusted Scale Values for Three Preference Methods	150
7.9	Comparison of Unidimensional Rank Orders of the 15 Meats with Thurstone Case V Interval Scale Rank Order	168
7.10	Consumer Preference Rankings for the 41 Meat Cuts	171
8.1	Some Direct Methods of Collecting Dissimilarities Data	181
9.1	Comparison of 3-Dimensional Configurations using Procrustes Analysis	232
9.2	Comparison of 3-Dimensional Substitutability, Similarity and Preference Dominance Configurations for the 15 Meats	234
9.3	Comparison of 3-Dimensional Substitutabilities and Preference Similarities Configurations by Procrustes Analysis	236

LIST OF TABLES (continued)

		Page
10.1	Scale Values for the 15 Meats and the Population Ideal in the 3-Dimensional Space - Fenker's Method (1972)	258
10.2	Scale Values for the 41 Meat Cuts and the Population Ideal in the 3-Dimensional Space - Fenker's Method	266
10.3	Scale Values for the 15 Meats and the Population Ideal in the 3-Dimensional Space - Author's Method	275
10.4	Scale Values for the 41 Meat Cuts and Population Ideal in the 3-Dimensional Space - Author's Method	279
11.1	Attitude Scales Used by McFadyen *et al*. (1973)	291
11.2	Attitude Scales Used by Baron *et al*. (1981)	292
11.3	Attitude Scales Used in Present Survey	302
11.4	Mean Attitude Scores for Different Meat Groups	306
11.5	Major Factors Defined for Meat in General	309
11.6	Comparison of Rotational Methods for Meat in General	311
11.7	Major Factors Defined for Beef Cuts	313
11.8	Comparison of Rotational Methods for Beef Cuts	315
11.9	Major Factors Defined for Sheep Meat Cuts	316
11.10	Comparison of Rotational Methods for Sheep Meat Cuts	318
11.11	Major Factors Defined for Pig Meat Cuts	320
11.12	Comparison of Rotational Methods for Pig Meat Cuts	322
11.13	Major Factors Defined for Offal Cuts	324
11.14	Comparison of Rotational Methods for Offal Cuts	326
11.15	Varimax Rotated Pattern Matrix of Attitude Data for for Meat in General	330
11.16	Number of Factors Extracted from Each Data Set and Total Variance Accounted for by the Factors	332
11.17	Comparison of Varimax Rotated Factors for Meat Groupings	334
12.1	Varimax Rotated Q-Factor Matrix of 'Meat Quality on Buying' Attitudes	346
12.2	Structure of Varimax Rotated Factor 1 ('Meat Quality on Buying' Attitudes) for the 9 Groupings Identified by Q-Factor Analysis	348

LIST OF TABLES (continued)

		Page
12.3	Varimax Rotated Q-Factor Matrix of 'Meat Quality on Eating' Attitudes	353
12.4	Structure of Varimax Rotated Factor 2 ('Meat Quality on Eating' Attitudes) for the 9 Groupings Identified by Q-Factor Analysis	355
12.5	Varimax Rotated Q-Factor Matrix of 'Meat Quality on Cooking and Serving' Attitudes	361
12.6	Structure of Varimax Rotated Factor 3 ('Meat Quality on Cooking and Serving' Attitudes) for the 9 Groupings Identified by Q-Factor Analysis	364
12.7	Varimax Rotated Q-Factor Matrix of Meats on all 18 Attitudes	369
12.8	Hypothetical Product Groupings Appearing in Successive Q-Factor Analyses of all 18 Attitudes, 'Meat Quality on Buying', 'Meat Quality on Eating' and 'Meat Quality on Cooking and Serving' Attitudes	372
12.9	Products Appearing in Different Hypothetical Product Groupings	377
13.1	Basis for the Assignment of Respondents to Various Meat Consumption Groups	386
13.2	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 7 Beef Cuts	389
13.3	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Lamb Cuts	391
13.4	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Hogget Cuts	393
13.5	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Mutton Cuts	395
13.6	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Pig Meat Cuts	396
13.7	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 3 White Meat Cuts	399
13.8	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Offal Cuts	403

LIST OF TABLES (continued)

		Page
13.9	Significantly Different Attitudes between Low, Medium and High Total Meat Consumers to 4 Sausage Products	405
14.1	Relationship between Consumption (kg/capita/annum) of the Various Meats and Preference, Price and Attitudes	428
14.2	Relationship between Proportion of Households Consuming Each Cut and Attitudes	431
14.3	Relationship between Consumers' Preferences for the Meat Cuts and Attitudes	434
14.4	Relationship between Dimension 1 and Attitudes	436
14.5	Relationship between Dimension 2 and Attitudes	438
14.6	Relationship between Dimension 3 and Per Capita Consumption of the Meats and Attitudes	440
14.7	Comparison between Selected Cuts on Variables Included in the Three Models	443
14.8	Predicted and Actual: Per Capita Consumption; Preferences; and Proportion of Households to Meat for the Whole Population, High, Medium and Low Consumers of Meat in Palmerston North in 1979	449

LIST OF FIGURES

		Page
1.1	Per Capita Consumption of the Different Meats in New Zealand over the Period 1950-1984	4
1.2	Per Capita Consumption of 4 Selected Sausage Products in Palmerston North over the Period 1966-1983	5
1.3	Suggested Activity Flow for Market Development	11
7.1	Control Statements for KYST	133
7.2	Preference Scale for the 15 Meats Obtained from the Thurstone Case V Interval Data	138
7.3	Preference Scale for the 15 Meats Obtained from the Thurstone General Data	140
7.4	Preference Scale for the 15 Meats Obtained from the Semi-structured Linear Scale data	146
7.5a	Comparison of the Stress versus Dimension Plots for the Thurstone Case V, Thurstone General and Semi-structured Linear Scale Dominance Data	155
7.5b	Shepard Plot for the Thurstone Case V Dominance Data	156
7.6	Comparison of the 2-Dimensional Configurations of the Thurstone Case V, Thurstone General and Semi-structured Linear Scale Dominance Data	157
7.7	2-Dimensional Configuration of the 15 Meats using the Thurstone Case V Percentage Data	158
7.8	2-Dimensional Configuration of the 15 Meats with Thurstone Case V Data Re-arranged in Order of Preference	160
7.9	Shepard Plot for the Percentage Data Re-analysed by Linear Regression MDS Function	163
7.10a	Stress versus Dimension Plot for the 15 Meat Percentage Difference Data	164
7.10b	Shepard Plot for the Percentage Difference Data	165
7.11	2-Dimensional Configuration of the 15 Meats Obtained from the Percentage Difference Data	166
7.12a	Stress versus Dimension Plot for the 41 Meat Cuts Preference Data	173
7.12b	Shepard Plot for the 41 Meat Cuts Preference Data	174

LIST OF FIGURES (continued)

		Page
7.13	2-Dimensional Configuration of the 41 Meat Cuts using the Percentage Data	175
8.1a	Stress versus Dimension Plot for the 15 Meats Substitutability Data	189
8.1b	Shepard Plot for the 15 Meats Substitutabilities Data	190
8.2 a,b,c	3-Dimensional Configuration of the 15 Meats in the Substitutability Space	192
8.3a	Stress versus Dimension Plot for the 41 Meat Cut Substitutability Space	195
8.3b	Shepard Plot for the 41 Meat Cuts Substitutability Data	196
8.4 a,b,c	3-Dimensional Configuration of the 41 Meat Cuts in the Substitutability Space	197
8.5	2-Dimensional Comparison of the Positions Occupied by the Anchor Meats in the 15 Meats and 41 Meat Cuts Substitutabilities Spaces	201
8.6a	Comparison of the 2-Dimensional Configurations of the Beef Cuts	204
8.6b	Comparison of the 2-Dimensional Configurations of the Sheep Meat Cuts	205
8.6c	Comparison of the 2-Dimensional Configurations of the Pig Meat Cuts	206
8.6d	Comparison of the 2-Dimensional Configurations of the Sausage Products	207
8.6e	Comparison of the 2-Dimensional Configurations of the Offal Cuts	208
8.6f	Comparison of the 2-Dimensional Configurations of the Roasting Cuts	209
8.6g	Comparison of the 2-Dimensional Configurations of the 11 Convenience Cuts	210
8.7	2-Dimensional Configuration of the New Zealand Inter-City Distances	213
8.8	Johnson's Single Linkage Hierarchical Clustering of the 41 Meat Cuts (Minimum)	215

LIST OF FIGURES (continued)

		Page
8.9	Johnson's Complete Linkage Hierarchical Clustering of the 41 Meat Cuts (Diameter)	216
9.1	Stress versus Dimension Plot for the Thurstone Case V Similarity Preference Data	224
9.2	2-Dimensional Configuration of the 15 Meats using the Thurstone Case V Similarity Preference Data	225
9.3	Stress versus Dimension Plot for the Thurstone General Similarity Preference Data	227
9.4	2-Dimensional Configuration of the 15 Meats using the Thurstone General Similarity Preference Data	228
9.5	Stress versus Dimension Plot for the Semi-structured Linear Scale Similarity Preference Data	229
9.6	2-Dimensional Configuration of the 15 Meats using the Semi-structured Linear Scale Similarity Preference Data	230
10.1	A Taxonomy of Preference Models	242
10.2	Illustration of the Vector Model in 2-Dimensional Space	245
10.3	Illustration of the Ideal Point Model in 2-Dimensional Space	247
10.4	KYST II Control Cards for the Ideal Point Location by Fenker's Method (1972)	252
10.5	KYST II Control Cards for the Ideal Points Location by Kruskal, Young & Seery's Method (1972)	254
10.6	KYST II Control Cards for the Ideal Point Location by the Author	256
10.7a,b,c	Ideal Point Located in the 15 Meats Substitutability Space by Fenker's Method	259
10.8a,b,c	Ideal Point Located in the 41 Meat Cuts Substitutability Space by Fenker's Method	263
10.9a,b.c	Ideal Points Located in the 15 Meats Substitutability Space by Kruskal *et al.*'s Method	268
10.10a,b,c	Ideal Points Located in the 41 Meat Cuts Substitutability Space by Kruskal *et al.*'s Method	270

LIST OF FIGURES (continued)

		Page
10.11	Ideal Point and Vector Located in the 15 Meats Substitutability Space by Author's Method	276
10.12	Ideal Point and Vector Located in the 41 Meat Cuts Substitutability Space by Author's Method	280
11.1	Example of the Semantic Differential Questionnaire Layout	305
11.2	Profile of the 5 Meat Groups on the 18 Attitudes	307
12.1	Profiles for 9 'Hypothetical Product' Representatives of the 'Meat Quality on Buying' Factor	350
12.2	Profiles for 3 Meat Cuts Representing 'Hypothetical Product 2' of the 'Meat Quality on Buying' Factor	351
12.3	Profiles for 9 'Hypothetical Product' Representatives of the 'Meat Quality on Eating' Factor	358
12.4	Profiles for 6 Meat Cuts Representing 'Hypothetical Product 6' on the 'Meat Quality on Buying' Factor	359
12.5	Profiles for 9 'Hypothetical Product' Representatives on the 'Meat Quality on Cooking and Serving' Factor	366
12.6	Profiles for 5 Meat Cuts Representing 'Hypothetical Product 6' on the 'Meat Quality on Cooking and Serving' Factor	367
12.7	Profile for Traditional and Continental Sausages on all 18 Attitudes	374
15.1	Recommended Procedure for New Meat Consumer Studies	475

APPENDICES

		Page
2.1a	1979 Survey Form	478
2.2a	1985 Survey Form	481
3.1	Per Capita Consumption of Meat in New Zealand	492
4.1	Breakdown of 1979 Survey Sample	493
4.2	Breakdown of 1985 Survey Sample	497
4.3	Meat Consumption Per Annum by Household Size	500
4.4	Meat Consumption of Families with Children under 2	501
4.5	Meat Consumption of Families with Children between 2-10 years of age	502
4.6	Meat Consumption of Households with Children over 10	503
4.7	Meat Consumption per annum by Age of Respondent	504
4.8	Meat Consumption per annum by Income of Principal Income Earner	505
4.9	Meat Consumption by Type of Employment of Principal Income Earner	506
5.1	Socio-economic Characteristics and Mean Consumption Pattern of Low, Medium and High Beef Consumers	507
5.2	Socio-economic Characteristics and Meat Consumption Pattern of Low, Medium and High Sheep Meat Consumers	509
5.3	Socio-economic Characteristics and Meat Consumption Pattern of Low, Medium and High Pig Meat Consumers	511
7.1	Kendall's Coefficient of Concordance (W)	513
7.2	Determination of Triads and Coefficient of Consistence	514
7.3a	Thurstone Case V (Modal Values)	518
7.3b	Thurstone Cae V (Mean Values)	519
7.4	Thurstone Case V Lower Half Dominance Matrix	520
7.5	Thurstone General Lower Half Dominance Matrix	521
7.6	Semi-structured Linear Scale Lower Half Dominance Matrix	522
7.7	Number of People in Each Cell as a Percentage of Total Number of Respodents	523
7.8	Percentage Difference Lower Half Matrix	524

APPENDICES (continued)

		Page
7.9	Matrix of Z Values for the 41 Meat Cuts	525
7.10	Lower Half Matrix of Preference Measurements for the 41 Meat Cuts	526
8.1	Substitutability of Meats Questionnaire	527
8.2	Scale Values for the 15 Meats 3-Dimensional Substitutability Space	544
8.3	Lower Half Matrix of Substitutability Measurements for the 41 Meat Cuts	545
8.4	Scale Values for the 41 Meat Cuts in the Meat Substitutability Space	546
8.5	Scale Values for the 8 Beef Cut 3-Dimensional Substitutability Space	547
8.6	Scale Values for the 8 Sheep Meat Cut 3-Dimensional Substitutability Space	549
8.7	Scale Values for the 8 Pork Cuts 3-Dimensional Substitutability Space	551
8.8	Scale Values for the 9 Sausage Products 3-Dimensional Substitutability Space	553
8.9	Scale Values for the 6 Offal Cuts 3-Dimensional Substitutability Space	555
8.10	Scale Values for the 11 Selected Convenience Cuts of Meat 3-Dimensional Substitutability Space	557
8.11	Scale Values for the 10 Roasting Cuts of Meat 3-Dimensional Substitutability Space	559
9.1	Scale Values for the 15 Meats Thurstone Case V Preference Similarity Space	561
11.1	Significance Levels for Pearson Product-moment Correlation Coefficients	562
11.2	Significance Levels for Burt Bank's Formula with n=50 and n=100	563

APPENDICES (continued)

		Page
11.3	Rotated Factor Pattern Matrices of Attitudes Data for All Meats	564
11.4	Rotated Factor Pattern Matrices of Attitude Data for 7 Beef Cuts	565
11.5	Rotated Factor Pattern Matrices of Attitude Data for 12 Sheep Meat Cuts	566
11.6	Rotated Factor Pattern Matrices of Attitude Data for 8 Pig Meat Cuts	567
11.7	Rotated Factor Pattern Matrices of Attitude Data for 5 Offal Cuts	568
12.1	Mean 'Meat Quality on Buying' Attitude Scores for 9 'Hypothetical Product' Representatives	569
12.2	Mean 'Meat Quality on Eating' Attitude Scores for 9 'Hypothetical Product' Representatives	570
12.3	Mean 'Meat Quality on Cooking and Serving' Attitude Scores for 9 'Hypothetical Product' Representatives	571
13.1	Attitudes of Low, Medium and High Meat Consumers to 7 Beef Cuts	572
13.2	Attitudes of High, Medium and Low Total Meat Consumers to 4 Lamb Cuts	573
13.3	Attitudes of High, Medium and Low Total Meat Consumers to 4 Hogget Cuts	574
13.4	Attitudes of High, Medium and Low Total Meat Consumers to 4 Mutton Cuts	575
13.5	Attitudes of High, Medium and Low Total Meat Consumers to 4 Pig Meat Cuts	576
13.6	Attitudes of High, Medium and Low Total Meat Consumers to Fish, Shellfish and Chicken	577
13.7	Attitudes of High, Medium and Low Total Meat Consumers to 4 Offal Cuts	579
13.8	Attitudes of High, Medium and Low Total Meat Consumers to 4 Sausage Products	580