AGRICULTURAL
ECONOMICS
RESEARCH UNIT

Lincoln College

A SURVEY OF CHRISTCHURCH CONSUMER ATTITUDES TO MEAT

by

C. A. YANDLE

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A SURVEY OF CHRISTCHURCH

CONSUMER ATTITUDES

TO MEAT

by

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P R E F A C E

The future demand for meat, both within New Zealand and overseas, depends on the price of meat and the level of incomes of consumers.   Apart from marketing quotas and tariffs on our exports, these two economic relationships are basic to our understanding of meat marketing.   In this bulletin Mr Yandle explores consumer responses to price and income changes in the local market.   Over 300 families in Christchurch were asked in September 1965 to indicate their basic preferences for different meats and to record actual expenditure on meat along with family income for a given week.

The first part of the report sets out the summary of the replies on preferences, price attitudes and levels of expenditure, while in the second part the data is used to estimate "income coefficients" which measure the rate at which demand will increase for given increases in income.

It should be noted that the results are expressed in £. s. d., and that meat prices quoted in pence per lb. must be converted to a cents per lb. basis.

We would like to acknowledge financial help from The Canterbury Frozen Meat Company and The New Zealand Pig Producers' Council in this work.   We also extend a special word of thanks to the householders of Christchurch who found the time to complete and return the questionnaire.

R.W.M. Johnson
Acting-Director

November 1967

INTRODUCTION

This paper presents the analysis, methods, and results from a survey of meat buying attitudes and consumption patterns in the Christchurch metropolitan area. The project is part of a larger study to determine and measure factors affecting pricing and consumption of meat in New Zealand, but the results were thought sufficiently interesting to warrant advance presentation.

The results are presented in three chapters and an appendix containing the questionnaire and some of the detailed results. Chapter I contains a question-by-question analysis of the results. Two methods of analysis are used in this chapter. Firstly, answers to multiple choice questions are reduced to percentages to facilitate assessment of trends. Secondly, the statistical technique of rank correlation is used in questions where respondents were asked to rank answers. This technique is essentially a method of determining the ranking of the whole community from the rankings given by individuals.

Chapter II is a little more technical in nature, discussing the theory and method of estimating income - expenditure relationships. Estimates of these relationships from the survey data are presented. The third chapter discusses some policy conclusions that can be drawn from the results outlined in the previous chapters.

This survey was carried out by postal questionnaire in September 1965. A thousand questionnaires were posted to addresses drawn by sequence sampling from the electoral rolls of the Christchurch metropolitan area. Three hundred and sixty completed questionnaires were returned. It is the analysis of these returns which follows.

CHAPTER I

THE QUESTIONNAIRES

This chapter presents question-by-question analysis
of the consumer survey questionnaire, a copy of which is
included in the appendix. Consumers were asked to state
their order of preference for different meats, their reaction
to different prices for meat and the amounts of meat purchased
in the week of the survey. The questionnaires thus apply to
one of the four weeks in September 1965.

The objective of the survey was to obtain a broad
cross-section of typical consuming units in the Christchurch
metropolitan area, and from these derive patterns of meat
buying and consumption. In this chapter, we summarise the
answers to the questions on preferences, prices and actual
consumption.

The respondents were first asked to place the seven
most general types of meat in their order of preference.
They were asked to label the meat they liked most as number
one, and so on. There were 322 replies which gave complete
answers to the question.

Table 1 shows the resulting order of preference for
the seven types of meat. Tests used showed that the level
of agreement between consumers regarding the order of pre-
ference were such that this order could not have occurred by
chance. However, it is important to note that respondents
rank the meats in the stated order but do not quantify their
preferences. It is thus not possible to state how much
lamb is rated ahead of beef, or pork or any of the other meats.

Ham and bacon form a special case. These meats are
not really competitors with the five main meats, in the sense
of preferring a meal of bacon to a meal of chicken. Bacon
especially does not usually form the central part of a meal,
and ham is more a seasonal food. It is possible, therefore,
that the low ranking of ham and bacon does not reflect main
meal preferences.

TABLE 1 - Question 1, Section 1

Type of Meat	Order of Preference
Lamb	1
Beef	2
Pork	3
Poultry	4
Mutton	5
Ham	6
Bacon	7

The second question asked consumers to indicate the type of shop at which they purchase meat. The importance of different retail outlets could thus be assessed, as well as the number of consumers who always buy meat at one shop.

351 answers were usable for analysis of this question. The results are shown in Table 2.

TABLE 2 - Question 2, Section 1

Type of Shop	No.of Responses	Per Cent
Suburban Butcher	240	68.38
City Butcher	24	6.84
Supermarket	20	5.70
Meat works retail shop	9	2.56
No regular shop	58	16.52
	351	100.00

The importance of the suburban butcher, and the size of supermarket trade in meat are the most noticeable features. Supermarkets are relatively new innovations to Christchurch, yet this sample shows they do almost as much trade as the city butchers. Over 83% of the sample buy regularly at the type of shop indicated. It follows, therefore, that responses as to the availability of price information (Question 3) is likely to be accurate because each reply deals with a specific shop, rather than several shops - where a variety of price information types might be represented.

As previously indicated, the third question assesses
the availability of price information to the consumer by
asking which method butchers use to display meat prices.

From the 341 usable replies, the percentages in
Table 3 were obtained.

TABLE 3 - Question 3, Section 1

Price display method	No.of Responses	Per Cent
Per lb.	81	23.75
Per piece of meat	104	30.50
Per lb. and/or piece of Meat	132	38.71
Not at all	16	4.70
Other	8	2.34
	341	100.00

Over 92% of consumers are shown as having access to some price
information, of which not less than 23% and possibly up to
62%,have information on a standard quantity (per lb.) basis.
Provided that prices 'per piece of meat' are acceptable as
price information, any lack of response to price changes
cannot be due to lack of information.   It is held here that
this information is adequate, and that it is possible to assess
relative costs in this manner.   However, because 'per piece
of meat' prices comprise up to 69% of the information avail-
able, the view taken is very important.

With price information available, it is possible to
assess how important price is when the consumer buys meat.
This is answered by question four, which uses rank correlation
techniques to find the relative importance of alternative buying
criteria.   For this question there were 273 usable answers.
The resultant rankings are shown in Table 4.

TABLE 4 - Question 4, Section 1

Buying Criteria	Importance
Quality	1
Household Preferences	2
Price	3
Variety of Meat diet	4
Speed of meal preparation	5

In this case, the statistical tests showed a high degree of consistency among the answers.

Price is shown as being only third in importance, and of lesser consideration than household preferences (see question 1), and quality. Under such circumstances price effects on consumption could be quite small.

In Leeds, Marsh[*] has shown that consumers often have a concept of quality which is different from that of the meat trade. Quality to the consumer can be a very individual judgement. Marsh's findings cannot be translated wholly to the N.Z. context but a similar situation could be expected. Retailers must take a view as to what qualities the consumer wants. The retailer's view results in different prices per lb. for different cuts of meat from the same carcase. The retailer wishes to sell the whole carcase, and to do this prices the more popular (or higher quality) cuts higher than the less popular cuts. Even though price is a lesser consideration in meat buying by the consumer, it is reasonable that the butcher will only put high prices on those cuts that his clients deem are of higher quality, rather than on those considered to be lower quality. If this were not so the retailer would be faced with a large number of unsaleable portions of a carcase, and through the normal market processes be forced to accept the judgement of his clients, and adjust his prices accordingly. The only acceptable alternative would be if consumers judged quality according to price, resulting in a perverse demand curve. This is unacceptable in the long run, though not impossible in the short run. A measure of the meat

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[*] Marsh A.A. "Consumer Preferences for Meat",
    Agric. V66 pp. 539-43.

trades' estimate of quality can thus be taken as the price
gradation of different cuts within a carcase, and price
gradation between carcases of the same type of meat.
Between types of meat, price gradation on quality is not
possible; the opinion of consumers here is more in the
realm of preferences or taste. An important general
conclusion does, however, result. Even though an individual
consumer may have an opinion as to the quality of a piece of
meat very different to that of the meat trade, the aggregate
opinion of all consumers as to quality <u>must</u> in the long run
be the same as the trade.

The ranking of price behind quality and preferences
does not therefore mean that price is of minor importance to
the consumer when buying meat. As is shown in the discussion
of results* other questions indicate strongly that price is of
considerable importance to the consumer. For example, the
evidence shows that mutton is largely considered an inferior
meat, but expenditure per person on mutton is much higher than
meats which have markedly higher income - expenditure relation-
ships. This paradox becomes reasonable when there is a lower
price for mutton than other meats, and this in fact was the
case at the time of the survey. Respondents therefore either
ranked price lower than its true position, or quality, pre-
ference, and price are <u>all</u> of high importance to the consumer.

In question five respondents were asked to indicate
meats they regarded as too expensive for everyday eating. In
some cases all meat classes were ticked. Of the 353 replies,
the percentage of replies ticked for each meat are shown in
Table 5.

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See Chapter 3

TABLE 5 - Question 5, Section 1

Type of Meat	No.of Positive Responses	Percent Response
Ham	290	82.15
Poultry	279	79.04
Pork	257	72.80
Bacon	177	50.14
Lamb	106	30.03
Beef	106	30.03
Mutton	34	9.63

At the time of the survey, mutton was the lowest priced of all the meats[*], and in this question was only 'ticked' when all other meats were ticked. An order of 'expensiveness' (in comparison with price[**]) can be inferred from the results of this question. Luxury meats are indicated as being ham, poultry and pork. Lamb, beef and mutton are the everyday meats, with bacon placed between the two.

The high percentage of respondents who thought that pork is too expensive for everyday eating is surprising. A later question shows that consumers think pork is more highly priced than poultry, which at the time of the survey was incorrect. It is possible therefore that consumers wrongly think that pork is both highly priced and expensive. As is mentioned in the discussion of results this is something which could well merit the attention of the producer organisation.

The sixth question asked consumers to list their meat purchases for the week in which they completed the questionnaire. Table 6 shows the average level of expenditure for the 125 replies and satisfactorily completed.

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[*] A separate calculation to determine meat prices was carried out at the time of the survey.

[**] Expensiveness in this sense takes into account price per lb., and the weight of raw meat required for a meal. This can differ between meats due to fat runoff and shrinkage during cooking.

TABLE 6 - Question 6, Section 1
Question 3, Section 2

	Average Expenditure per person per week (shlgs)
Beef	4.377
Mutton	2.014
Lamb	1.792
Pork	0.628
Poultry	0.413
Ham	0.336
Bacon	0.714
Non-carcase-meat	1.018
All meat	11.292
Non-meat-food	24.773*
All food	35.954

The next question was asked to find out if consumers are able to anticipate changes in buying patterns with given price changes, i.e. they were asked what changes in buying of all meats they would make if lamb, say, increased by 1/- per lb. Few respondents attempted this question, and none gave quantitative information. It could be expected therefore that quantitative responses to price changes evolve over a period of time.

The first question of section two in the questionnaire was again analysed by rank correlation. Respondents were asked to rank meats by price per lb. 316 replies were received and the ranking was that set out in Table 7.

TABLE 7 - Question 1, Section 2

Type of Meat	Respondents' Order of Prices	Actual Order of Prices	Actual Prices (pence per lb)
Pork	1	2	(46.73)
Poultry	2	1	(63.00)
Beef	3	3	(44.89)
Lamb	4	4	(37.58)
Mutton	5	5	(31.89)

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* Average Expenditures for All Meat and Non-meat-food do not sum exactly to the average for All Food owing to differences in sample size.

The resultant ranking by consumers of this question
showed a marked consistency over the whole sample. The
actual order of prices was separately determined by collect-
ing data on the price of all cuts of meat at the time of
the survey. These prices were then weighted by the pro-
portion of the saleable part of the carcase each cut formed.
Consumers have, therefore, a reasonably sound knowledge of
price with the exception of the order of pork and poultry,
the implications of which have already been mentioned and
are discussed again in Chapter III.

Because ham and bacon are not direct competitors with
the major meat classes, question two of this section asked
consumers to indicate whether they thought bacon and ham
were expensive, reasonably priced, or relatively low priced
with respect to their (unspecified) substitutes. The
results, shown in Table 8 in percentage form, indicate
that considerable consumer resistance to increased prices
can be expected.

TABLE 8 - Question 2, Section 2

	Thought to be very expensive	Thought to be reasonably Priced	Thought to be Low - priced	Observations
	%	%	%	
Ham	91.28	8.72	-	344
Bacon	69.62	30.09	0.29	339

Question four asked consumers to indicate whether they
would buy more, the same, or less of each meat, given £1
per week more to spend on housekeeping and the price of meat
stayed the same. In general, respondents were only able to
give qualitative and not quantitative estimates. This
indicates that responses to changes in income are likely to
be spread over a period of time. Table 9 summarises the
quantitative results in percentage form.

CHAPTER II

ESTIMATION OF INCOME - EXPENDITURE RELATIONSHIPS

The Basic Relationship

In this chapter the economics of income-expenditure relationships is discussed. All such relationships are called Engel curves. The chapter first of all discusses the theory of consumer demand, and shows how goods can be classified into different classes according to income expenditure patterns. The rest of the chapter is concerned with the estimation of these curves from the survey data and the presentation of the results.

The theory of consumer demand is a theory of choice for a single consumer under fixed (static) conditions. Some of the conditions of this theory are important in the estimation of Engel curves.

These are:-

(a) The preferences (or tastes) of the individual consumer are assumed to be fixed and unchanging over the period of analysis.

(b) Levels of consumption of goods are related to their respective prices and the consumers' income.

(c) The consumer will purchase goods in a manner enabling him to derive maximum satisfaction from his income.

In this study we are interested in the relationship between income and expenditure on different goods. It is thus desirable that price levels be fixed, so that the effect of income on expenditure patterns may be isolated. With this study, prices were fixed by the nature of the data collection, i.e. data was collected at one point of time, using household budgets for successive observations.

For historical reasons the income-expenditure relation-
ships derived from this data source has become known as Engel
curves.   Engel's general law stated, "The poorer the family,
the greater the proportions of total expenditure that must be
devoted to food".   From this statement sprang the idea of
classifying goods in three distinct categories:-

(i) Inferior goods - the consumption of which declines
          both relatively and absolutely to income, as
          income rises, i.e. given a higher level of income,
          the percentage of total income spent on the good
          declines so much that a lesser absolute amount of
          money is spent on the good.

(ii) Necessities - the consumption of which declines only
          relatively as income rises, i.e. with an increase
          in income, the proportion or percentage of total
          income spent on the good may decline, but the
          absolute amount of money spent on the good does
          not decline and may even rise.

(iii) Luxuries - the consumption of which increases both
          relatively and absolutely to income, as income
          rises, i.e. the proportion of income, and total
          amount of money spent on the good rises.

Because of the proportionate (or percentage) relation-
ships outlined above, the three groups can be expressed in
terms of elasticities.   The "income elasticity of expenditure"
expresses the per cent change in expenditure on a good which
will occur when a consumer has a 1 per cent increase in income.

Thus an inferior good is one which has an income
elasticity of expenditure less than zero, because for the
absolute amount of money being spent on the good to decline,
the percent change in expenditure on the good must be
negative.   Similarly a necessity will have an income
elasticity of expenditure taking values between zero and
one, and a luxury will take values greater than one.

For example:

If Y_i = Income elasticity of expenditure for the ith good, then if it is:

an inferior good	$Y_i < 0$
a necessity	$0 < Y_i < 1$
a luxury	$Y_i > 1$

However Engel's general conclusion indicates that these proportionate changes with each 1 per cent increase in income will depend largely on the level of income the consumer has attained.   Thus a good may be a luxury to a consumer earning £100 per year, and an inferior good to the same consumer when he earns £1000 per year.   The income elasticity of expenditure can therefore vary with the level of income, and as a general approximation it is expected the size of the elasticity will decline as income rises.

Put in graphical terms, the Engel curve is of the following kind:

Graph 1
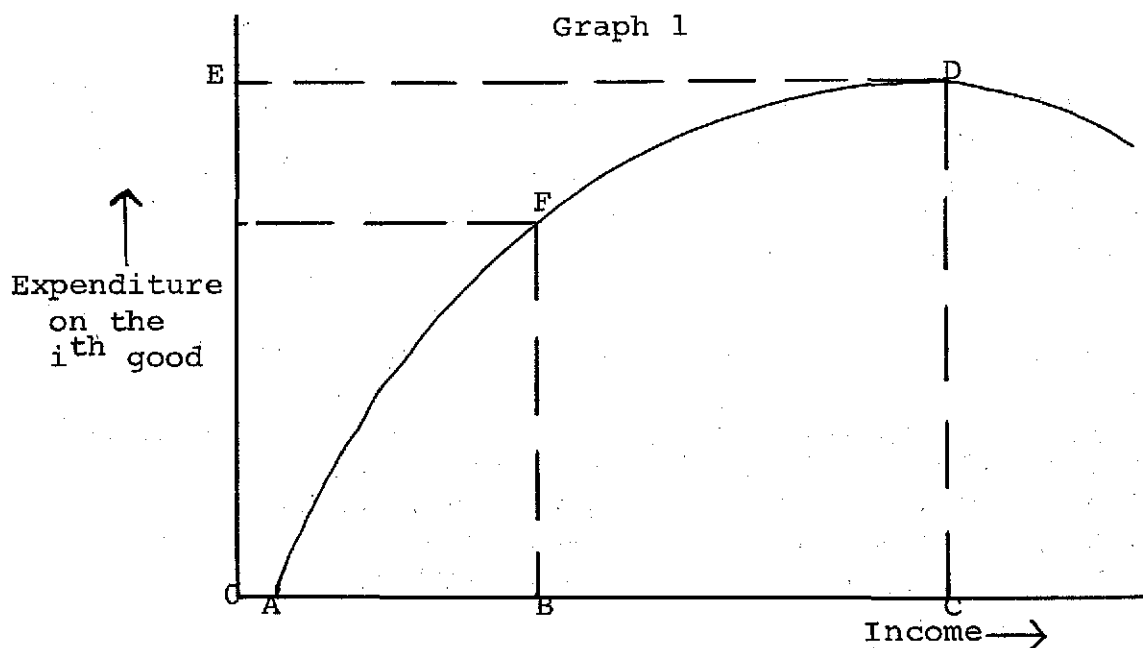
The vertical axis indicates expenditure on the ith
good, starting at zero at point 0 and rising towards E.
The horizontal axis indicates increasing income from
point 0.

A denotes the level of income necessary before the
consumer will purchase good i, and is termed the initial
income.

E indicates that maximum expenditure that a consumer
will spend on this good, as his income rises.

C shows the level of income at which the maximum
expenditure occurs, and may be called the ceiling income.

These are important limits for the product, and
their level will depend upon the nature of the product.
Caviare, for example, may be expected to have a higher
initial income, and ceiling income than (say) potatoes.
It may also be expected to have a higher maximum expenditure.

The importance of the values of A, C, and E for
particular products, and their use in estimating each
product's future market, given the current income level
of the community, will be discussed with the results.

Moving from the point of initial income along the
income axis, the portion of the curve between A and B
shows the income range over which the good is a luxury
good, i.e. $Y_i > 1$.   Over this range, expenditure on the
good increases at a faster rate than income.   Between
B and C the good is a necessity, the consumer feels that
this good is an essential, but new luxury goods will now
be within his income range, and he would prefer to purchase
them.   This corresponds to $0 \leqslant Y_i \leqslant 1$, $Y_i = 1$ at F, and
$Y_i = 0$ at D.   Beyond C the consumer's income is sufficiently
high for him to move to superior substitute goods; thus as

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his income rises he will buy less and less of the ith good,
and more of its superior substitutes. Y_i is now less than
zero.

The above is a resumé of the theory on which the
following analysis depends. In applying the theory to
market data, adjustments need to be made to the data to
put it in a form suitable for applying the theory. These
adjustments will now be briefly discussed.

The major problem is that the theory analyses a
single consumer's behaviour, and for a variety of reasons
all consumers will not behave in the same way. Some of
the reasons for inter-personal differences can be allowed
for, others cannot. Thus in estimating an Engel curve
for the community, some unexplained variation between income
and expenditure must be expected. This can be due to many
reasons, the most important of which is simply different
tastes (or preferences). Thus every consumer has a
different income-expenditure 'curve' for each good, and
in attempting to produce a curve for the community, one
is simply estimating the community's average.

In many respects the single consumer is a myth,
because it is often the 'household' which is the smallest
purchasing unit. This can be allowed for by dividing
income and expenditure for each household by the number of
people in that household, thus reducing the household data
to "income per person" and "expenditure per person" for each
good, thereby allowing for the size of the household.

Age and sex structure of a household will also
affect the household's expenditure pattern. Theoretically
it is possible to allow for this by dividing expenditure
per household on the ith good by the effective number of
purchasers of the ith good in the household. An attempt
at doing this was made for this study, using normative
daily requirements for meat or fish for different age groups.

The information for this was provided by the Otago University Home Science School.[*]   Thus an adult requiring 4 oz. of meat per day may be classed as one "consumer unit", and a child requiring 2 oz. per day as half a "consumer unit".   Two groups of data were therefore available:

(a) Income and expenditure on each good per person.

(b) Income and expenditure on each good per consumer unit.

Both sets of data were tested, each set of data corresponds to a different hypothesis.   A discussion of their respective merits appears in the results of this analysis.

Other factors which can affect expenditure patterns between households have largely been ignored.   These factors include occupation, location and possible price differences paid for the same good by different households. Location and price differences are likely to be slight, as households were chosen from the one metropolitan area, and meat is not charged for according to income level, as some professional services are.   When applying the results to the whole of New Zealand it must be implicitly assumed that the differences over the whole country will also be small. It had been hoped to allow for occupational differences, but this was not possible.

It is important in a budget study to be aware of the effects of different qualities of what is otherwise the same good.   As income increases, consumers' expenditure on a single good may be expected to increase, due to:

(i) buying more of the same good (i.e. the quantity effect);
and/or
(ii) buying a higher quality of the good.

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[*] The author is grateful for the School's help in this matter.

Thus the increase in expenditure on a good is composed of both quantity and quality effects. It can be shown that the income elasticity of expenditure is equal to the income elasticity of demand (the quantity effect) plus the income elasticity of quality, where:

(a) Income elasticity of demand equals per cent change in _quantity_ for a 1 per cent increase in income,

and

(b) Income elasticity of quantity is per cent change in _quality_ purchased when a 1 per cent increase in income occurs.

Thus, in interpreting an expenditure elasticity it must be remembered that it is change in consumer _expenditure_ which is being measured. In relation to the present study this is important. Each meat class is composed of a variety of grades (or qualities) of carcase, and within that carcase are many cuts of meat, each again of different quality. As income rises, the consumer will not only change from one class of meat to another (e.g. mutton to lamb) as shown by successive Engel curves, but will also change to a higher grade of meat within the one class, and to higher quality cuts within the carcase. The expenditure elasticity measures the overall increase in expenditure for a particular class of meat. If the Engel curves were calculated purely as quantity/income effects, they would ignore the substitution occurring within the broad classes considered. Both methods have their uses; it is necessary to be aware whether expenditure or consumption (quantity) data are used. In this study only expenditure data are used, quantity data were not sufficiently accurate to allow complete specification of each quality of meat consumed, or even give accurate quantity figures for each class.

Family size can affect meat consumption other than as a linear progression (i.e. two people eat twice as much as one, etc.). This is a 'scale' effect, resulting from a piece of meat being more efficiently used when the household size increases. In dividing household expenditure by the number of persons (or 'consumer units'), a linear progression

is all that has been allowed for.   To test whether the
scale effects were important further estimates of Engel
curves were made including family size as a separate
variable.

        In summary, four series of Engel curves were
calculated:

  (a) expenditure per head on each meat type in each
        household, dependent on income per head in
        each household;

  (b) expenditure per consumer unit on each meat in each
        household, dependent on income per consumer
        unit in each household;

  (c) expenditure per head on each meat class dependent
        on income per head and number of people, in
        each household;

  (d) as for (c) but in terms of per 'consumer units',
        not number of people.

        The Functional Form

        Earlier in this chapter the general shape of the
Engel curves was defined and illustrated.   The problem
now is to choose a mathematical function which has a
general shape, and properties, as close as possible to
the slope that theory shows the Engel curve should take.

        As an example, a linear (or straight line) function
allows only for a constant rate of increase (or decrease)
in the way expenditure will change as income rises.   It
is not therefore very satisfactory as it does not allow
measurement of the point where the good changes from a
luxury to a necessity, and does not allow a maximum
expenditure level to be attained.

Many different functional forms were examined, and
the one chosen was the 'single-log' function.   The
single log function takes the graphical form:

Graph 2
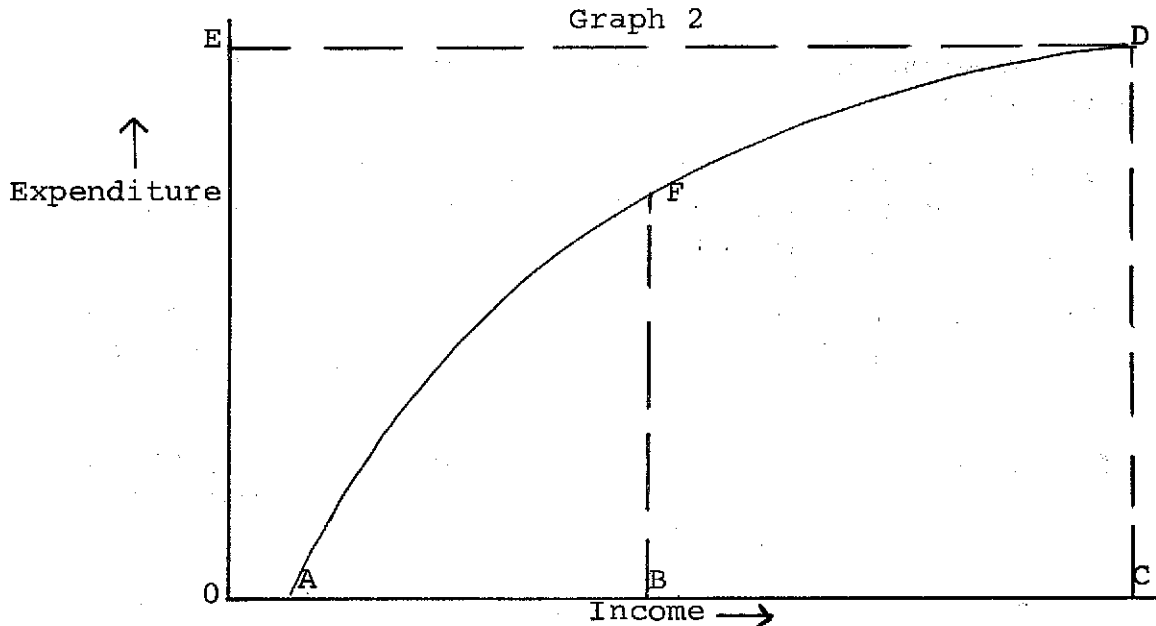
No one functional form is exactly what is required,
but over a large part of the Engel curve the single log
equation has the same general shape.   The single log
equation allows for:

(i)   An 'initial' income level.   (A)

(ii) Changing rate of increase in expenditure
      with each increase in income, thus
      allowing the good to change from being
      a luxury to a necessity.   (B)

Unfortunately it allows for maximum expenditure (E) occurring
only at an infinitely large level of income (C).   Thus it
does not allow for the good changing from a necessity to
an inferior good as income rises.   Care must therefore
be used in extrapolating (extending) past the limits of
the available data.

Where a good is inferior over much of the income range, the curve takes the form:

Graph 3

Expenditure
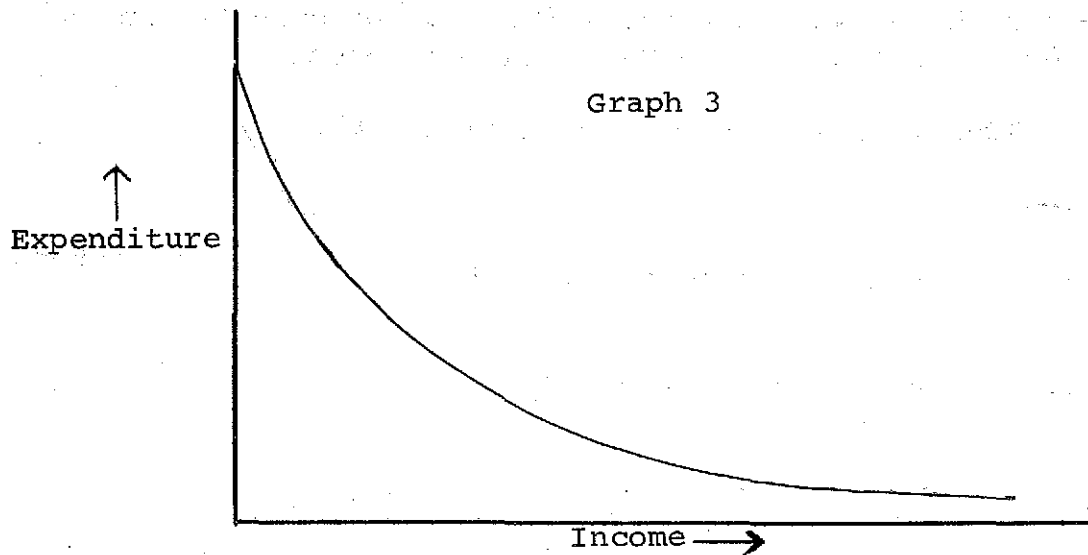
Income ⟶

In this case, no initial income level is allowed for, and the good is calculated as being inferior over all ranges of income. The point where expenditure ceases, occurs at an infinite level of income.

In practices the problem of the single log function not allowing for the transition of a good from a necessity to an inferior good is not very serious. Over the normal range of incomes existing in the community, a good is usually either a luxury-cum-necessity, or it is deemed inferior. Thus as long as care is taken not to extrapolate past the data limits, the function performs satisfactorily.

Because allowance has been made for the value of the income elasticity of expenditure to change as income rises, there is a difficulty in expressing the results in terms of a single useful summary statistic. On the grounds that a change in the average (or mean) level of income will give an average change in expenditure on the good under consideration, the most useful summary statistic

is the elasticity at the geometric mean of income. This
is termed the 'market' elasticity, as it expresses the
average change in expenditure that may be expected in the
market, when a given change in incomes occur.

Equations (or models) calculated were:

Series;

(1) $V_{i/n} = a + b \log_e (V_{o/n})$

(2) $V_{i/c} = a + b \log_e (V_{o/c})$

(3) $V_{i/n} = a + b \log_e (V_{o/n}) + d \log_e n$

(4) $V_{i/c} = a + b \log_e (V_{o/c}) + d \log_e C$

where:

V_o = Household income in £/year

n = Number of people per household

C = Number of consumer units per household

V_i = Expenditure on the ith food in shillings
per household per week.

a, b, d = estimated coefficients, the values of
which would enable complete
specification of each Engel curve.

The Engel curves estimated were for the following
items:

Beef, Lamb, Mutton, Pork, Poultry, Ham, Bacon,
Non-carcase meat (sausages etc.,), All Meat,
Non-Meat-Food, and All Food.

The income elasticity of expenditure can be shown to be:

$$Y_i = b\big/_{(a+blogVo)} \quad \text{for each meat and food group.}$$

Various levels of income (V_o) can therefore be taken, as well as the average income level for the market elasticity.

The method of estimating the curves was 'least-squares-regression'. This is a mathematical technique which estimates the line of best fit to the observed data.

The Data

All the data was derived from the survey. The budget question, the income question, the food expenditure question, and the question on household composition were all used. Data from the budget question was in all cases checked for accuracy; there were surprising few cases where this data gave serious doubts as to its accuracy. Income, given in the form of eight income classes, would be the least accurate. With each class the midpoint was calculated, and the household income taken at this point.

The Results

Table 11 shows the <u>market</u> elasticities of the first and third series of equations. The equations themselves are shown in the appendix.

Statistical tests were applied to the estimated equations (and elasticities). These suggest that little reliance should be placed on some of the results. In particular, in series one (income elasticities of expenditure per person), regression coefficients for mutton, pork and bacon are not significantly different from zero. In series three (per consumer unit) coefficients for mutton, pork, poultry, ham and bacon are not significantly different from zero. This means that the equation calculated gives a poor fit to the data, and is to be distrusted.

24.

TABLE 11

Market Income-Expenditure Elasticities

Dependent Variable	Series 1 - per person	Series 3 - per Consumer Unit
Beef	0.504	0.308
Lamb	1.039	0.915
Mutton	-0.112	-0.248
Pork	0.211	0.076
Poultry	1.423	1.062
Ham	0.813	0.543
Bacon	0.324	0.161
Non-Carcase-Meat	0.755	0.741
All meat	0.517	0.321
Non-Meat-Food	0.381	0.277
All Food	0.427	0.353

The equations in series two and four where $\log_e$ (number of persons or consumer units) was included, resulted in lowered significance of regression coefficients. These series were therefore rejected. The choice between series one and three was more difficult to make. The series one equations gave a better goodness of fit and level of significance of the regression coefficients. However, the decision as to which was the better series must be judged on the grounds of the economic hypothesis involved in each case.

Reasoning outlined earlier resulted in series one (expenditure per person, and income per person) being selected. This implies that income and meat requirements are the same for all persons. While readily recognised that this is not perfect, it was felt more realistic to adopt this method, than apply the consumer unit method. While a combination of 'consumer units' for meat expenditure, and per person for income could have resulted in 'better' explanation in a statistical sense, application to policy would be very difficult, and less meaningful.

Table 12 shows elasticities calculated from series one (per person) for different levels of income, including the geometric mean of income for the market elasticity. Initial income levels are also shown on this table. As before, the results for mutton, pork and bacon are little more than indications of the expenditure elasticity size at each level of income because of low statistical reliability.

Besides showing the market elasticity at present, the table indicates for each meat, changes in expenditure which may be expected as income increases. The table also shows at what level of income each meat changes from being a 'luxury' to a 'necessity'.

Beef, lamb, poultry, ham, non-carcase meat, all meat, non meat food and all food coefficients are all statistically significant. Of these, lamb and poultry are luxury meats at the geometric mean of income (approximately £325). Ham and non-carcase meat show moderately high income elasticities (market). The mutton coefficient, not significantly different from zero in any of the four series, was in each case negative. It appears probable that this meat is, therefore, and 'inferior' good, and supports the qualitative assessment made in Question four, Section two. Results for pork and bacon were disappointing. It is thought that this is in part due to the nature of the way the meat is used. Bacon is used in conjunction with many other foods, and hence a large reaction to income is unlikely. Pork appears to be consumed mainly for a change in meat diet, and in the observations for this study there were few non-zero observations. Hence a non-zero relationship was unlikely to be determined. Of the qualitative assessments referred to above, only lamb appears to be seriously in error when compared with the estimated coefficients. The remainder of the coefficients suggest respondents' estimates of what they would do, if they had more income, and what they are likely to do, are close.

TABLE 12 - Income-Expenditure Elasticities - Series 1

	Elasticity at:-			Market elasticity -approx. £325/hd per year	Elasticity at:-			"Initial Income" at which $V_i = 0$
	£100/hd per year	£200/hd per year	£300/hd per year		£400/hd per year	£500/hd per year	£600/hd per year	
Beef	1.245	0.668	0.526	0.504	0.457	0.453	0.385	44.8
Lamb	-	2.175	1.134	1.039	0.855	0.718	0.635	124.3
Mutton	-0.099	-0.106	-0.111	-0.112	-0.115	-0.118	-0.120	*
Pork	0.279	0.235	0.215	0.211	0.202	0.193	0.186	2.8
Poultry	-	4.661	1.609	1.423	1.015	0.884	0.761	161.1
Ham	19.571	1.343	0.870	0.813	0.695	0.602	0.543	95.1
Bacon	0.525	0.385	0.333	0.324	0.304	0.284	0.270	14.9
Non-carc.Meat	6.875	1.194	0.804	0.755	0.653	0.570	0.516	86.5
All Meat	1.328	0.691	0.540	0.517	0.467	0.423	0.393	47.1
Non-meat Food	0.679	0.462	0.389	0.381	0.350	0.324	0.306	23.0
All Food	0.843	0.532	0.438	0.427	0.389	0.358	0.336	30.5

* Inferior goods have positive levels of expenditure at zero income in single log equations.

Initial income figures calculated show income per person per year necessary before consumption begins on the commodities. Explanation of the elasticities and initial income levels for the 'composite' goods is necessary. These are all meat, non-. meat food, and all food. For example, the initial income of £30.5/person/year does not mean that up to that income no food would be purchased. This initial income indicates a mean figure for a composite basket of all foods. It means that a unit of 'all food' would not be purchased until this income level was reached.

The means in Table 6 show low expenditures per person on both poultry and pigmeat, and the importance of beef and mutton in the diet of New Zealanders. This pattern of expenditure is quite different to most other 'western' countries, where pigmeat consumption is much higher and sheep meats much less.

Graphs 4 and 5 show the calculated Engel curves for selected meats and the aggregate items. Graph 4, besides showing the 'initial income' levels for the individual meats (where the Vertical axis = zero) indicates how expenditure on the meats may be expected to increase as income rises. Ham, pork and bacon all show relatively slight expected increases in expenditure with increased income. Poultry, non-carcase meat, lamb and beef, show much larger expected increases. Mutton indicates a decline in expenditure as income rises.

This graphical presentation of the results from Table 12 shows also the importance of the mean level of expenditures, i.e. the average expenditure per person at the mean income level of £325 per person. Pigmeats all have low average expenditure at present, and they are not expected to rise, whereas poultry, though currently at a low level of expenditure, shows every indication of rising rapidly. Mutton has a mean expenditure level which is relatively high, but can be expected to decline. Beef and lamb have high levels of expenditure, and also expectations of further future increases in expenditure as income rises. This pattern of current
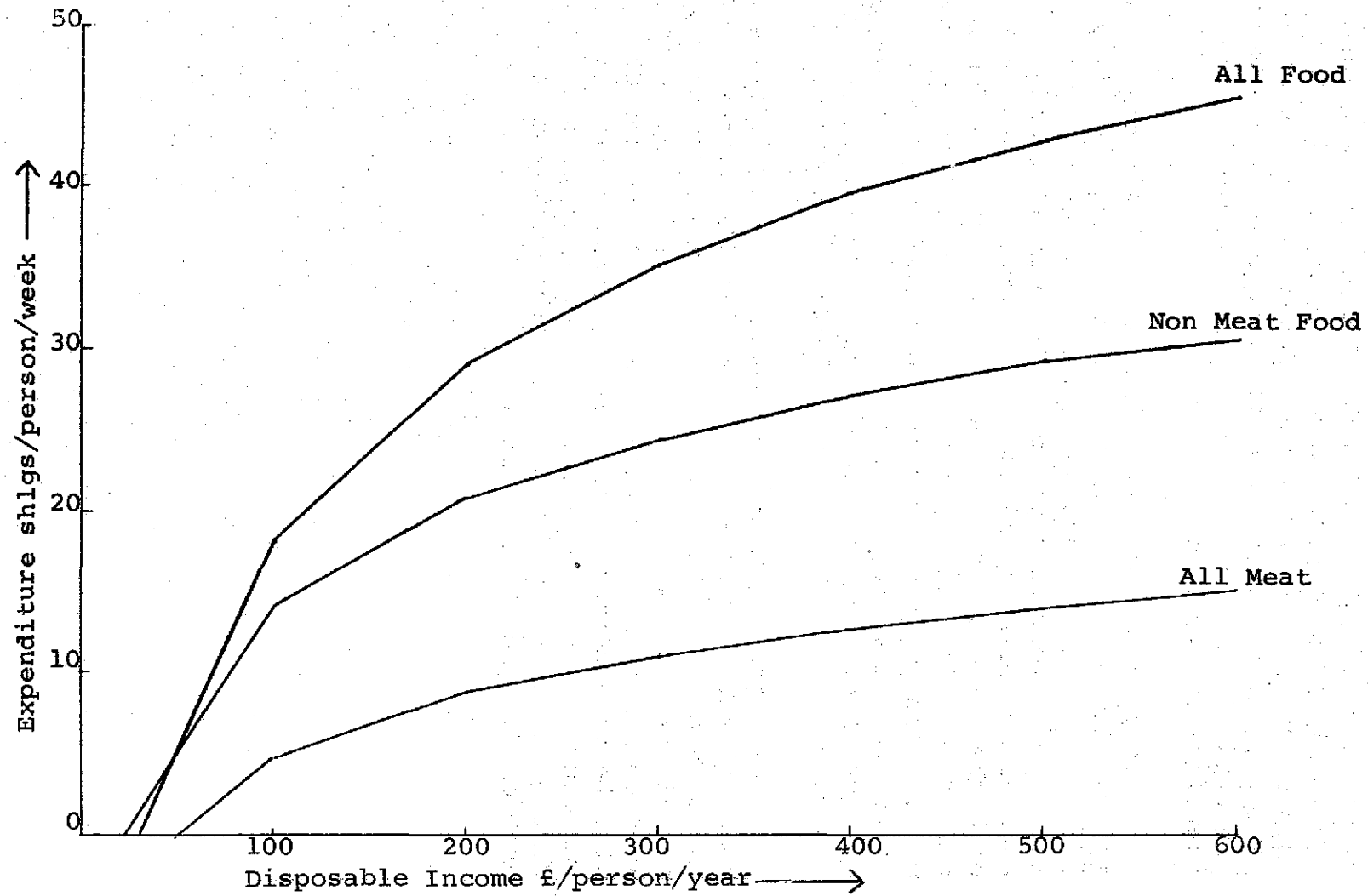
GRAPH 4

Estimated Engel Curves for Meats Shown
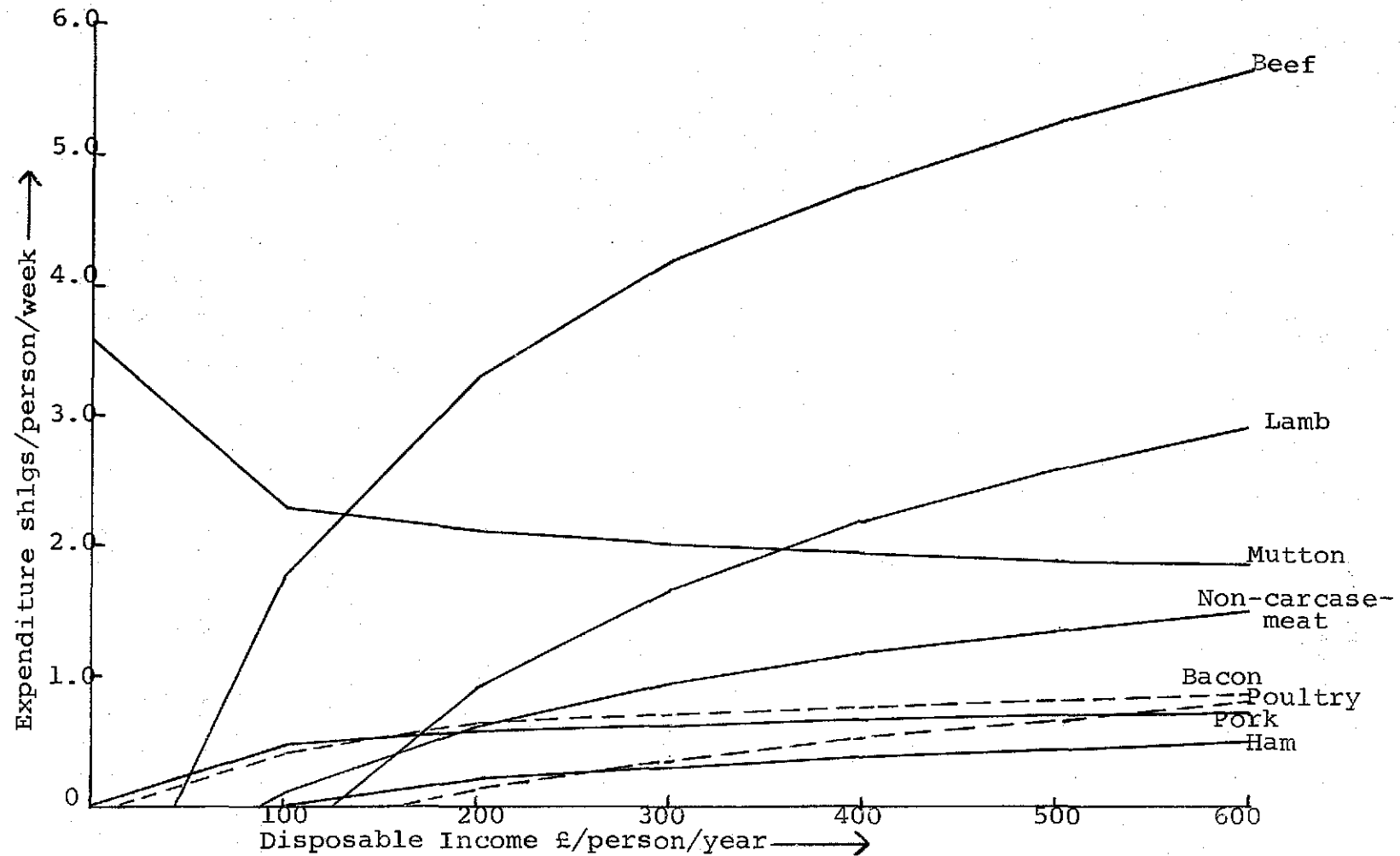
GRAPH 5

<u>Estimated Engel Curves for Aggregate Items Shown</u>

expenditure levels, and likely changes in the future as income rises is of great importance in planning for the future for an industry largely dependent on the home market (e.g. pigmeats or poultry), and for those largely exported, in the estimation of home consumption and therefore export surpluses.

It must be remembered, however, that these curves are calculated in expenditure terms; they therefore include quality as well as quantity effects. Beef, for example, may be expected to have an increased expenditure with income, largely because of substitution of higher priced (and presumably quality) cuts for lower priced. This also could apply to lamb and non-carcase meat. The quantity of mutton purchased may decline faster than the graph indicates, and the rise in quantity of lamb, beef and non-carcase meat slower than the graph indicates because of the possible substitution mentioned.

Ham, pork, poultry and bacon do not have the same possibilities for substitution within themselves. Of these types, pork has the largest range of prices charged for different cuts, but the range of prices is still small when compared with the other meats. Hence quantity changes will be much closer to expenditure changes and thus the curvature of the graphs could be expected to be 'flatter'. Further research currently in process will clarify this problem for projection purposes.

CHAPTER   III

DISCUSSION

Before discussing the results in broad terms, some
of the problems inherent in this form of data collection,
but not discussed in the text, must now be mentioned.
Several aspects of this consumer survey, in common with
other surveys, may be less than adequate.   The first
point is the accuracy of respondents' replies.   Does
the respondent reply accurately to the question, or does
he give an answer which he feels might be the 'right'
answer?   Only a subjective assessment is possible in
many cases, such as the estimate of weekly expenditure
on all food.   It is believed that the greater majority
of the replies were reasonably accurate but this _may_
not be so.

Did the questions mean the same thing to all people?
A pre-test was carried out to eliminate as many double
meanings as possible, but cases of inaccurate information
due to lack of comprehension did occur.   For example, in
several cases respondents filled in the total value of
the week's _meat_ purchases to the question, "How much do
you spend on _food_ each week"?.   One respondent even wrote,
"I presume you mean meat", underneath!

Another problem is that there is no uniform commodity
called 'beef' or 'pork'.   This has the effect that in some
questions (e.g. where respondents are asked to rank meat in
order of price), respondents cannot be expected to have a
really accurate knowledge.   Further, as income rises,
expenditure on beef may rise due to a shift to more expensive
cuts.   This has previously been outlined, but the corollary
has not.   Consumers who buy only lower-priced cuts of beef
may have a different conception of what beef is to those
who purchase the more expensive cuts.   Again, this is a
problem about which little can be done, but it is as well
to be aware that it exists.   It is to some extent lessened
because variation in price of cuts was not very large apart
from beef.

Finally, only 36 per cent of the posted questionnaires were returned. While this is high for postal questionnaires a substantial bias is still possible, and the direction or extent of this possible bias cannot be measured.

The results will now be discussed, but only in broad outline. Specific conclusions have been drawn throughout the paper; it is not intended to repeat those conclusions here.

The results indicate some uncertainty as to the role of price as a decision factor of consumers, when buying meat. Both quality of the meat cut, and household preference were ranked ahead of price in consumers' replies. It could therefore have been expected that changes in price would not greatly affect consumption of meats. There are, however, meats which consumers think are too expensive - ham, poultry, and pork come into this category. Mutton is a meat for which there is a low preference compared to other meats and is low priced, but the mean level of expenditure on mutton is second only to beef. Thus price does have importance in the consumer's decision of what to buy. It is possible that price is more important than consumers think, and this is disguised from them by the passage of time.

Knowledge of price, and adequacy of price information were tested in a series of questions. The results show that in general there is good price information available to consumers, and that consumers have a good knowledge of relative prices. Pork was considered higher priced than poultry, which at the time of the survey was not the case. This was the only incorrect ranking, but it was an important one, as poultry was approximately 16d/lb. dearer than pork. It must be remembered that respondents attitudes are entirely subjective, and the high price ranking of pork might reflect impressions based well in the past.

Pigmeats are not favoured by consumers, even though pork was ranked third in preference, with ham and bacon last. At the same time, pigmeats were considered too expensive for everyday eating (with the exception of bacon), and pork was wrongly thought to be higher priced than poultry. Pigmeat consumption in New Zealand is proportionately much lower than in other countries. With a reasonably high prefereence for pork, but low actual consumption (and expenditure), it becomes evident that the price attitude of consumers is a large factor in depressing demand for pork. Average expenditure per person per week on <u>all</u> pigmeats was lower than for beef, lamb or mutton.

If a successful transformation of the pigmeat industry to grain feeding is to be achieved, a higher volume market will need to be sought. At present a large export market for New Zealand pigmeats is unlikely as the local wholesale price is above world price. Hence a higher volume market will be required within New Zealand. This means that the share of the New Zealand meat market held by pigmeats will need to be increased. The view held by most consumers that pork is a luxury meat will need to be corrected. A strong case can be made for pork over beef and lamb if prices are compared on a quality for quality basis. It would seem that a <u>constructive</u> promotional campaign on the part of the New Zealand Pig Producers' Council, and the marketing industry, aimed at informing the consumer of the price, relative cost, and uses of pigmeats (especially pork),would greatly benefit the industry.

Ham, especially cooked, sliced ham, is certainly highly priced. Holding or reducing the price will require the industry to look critically at processing methods, costs, and optimum size of processing plant. Becon, while still competitive with its substitutes, would be put in a more advantageous position if its relative price could be lowered. Both bacon and ham are processed by the same operators.

Pigmeat smallgoods are one of the few well advertised meat items in New Zealand. However, this advertising mostly takes the form of 'brand' promotion. From other investigation separate from the survey, it appears that consumers are not brand conscious in buying smallgoods, in spite of many years of advertising. It is suggested here that promotion expenditure would yield greater results if diverted into promotion as outlined above, and to increasing the variety of smallgoods available and informing the public accordingly.

The estimated income-expenditure relationships show that lamb and poultry are luxury meats at the mean level of income. Proportional increases in expenditure on these meats will rise faster than proportional increase in income. There seems to be good prospects for the meat-chicken industry in New Zealand, given a continuous upward movement of incomes. Ham and non-carcase-meats (processed smallgoods etc.,), have moderately high income effects. Beef, the major meat purchase, can expect its share of the consumer's pound to decline as income rises. Pork and bacon results were not significant. The cause of the non-significance could be of importance. For pork there were very few purchases shown for the weekly budget, hence it is unlikely that this figure is accurate. Bacon is used in smaller quantities with a meal than other meats, thus it is possible that income effects will not be large, and more likely to be out-weighed by personal preferences.

The mutton coefficient is also not significant, but interpreted in conjunction with answers to specific questions in the questionnaire, it could well be negative, indicating mutton is considered an inferior meat. If this is so, it indicates that price is important to the consumer, because expenditure on mutton is second only to beef.

These general conclusions are by no means the only ones which can be drawn from this analysis. Individual sections of the meat trade, and the consuming public will find information of special application to themselves in this bulletin. This piece of research is part of a larger project which examines the market forces operating in the New Zealand meat market. We hope to report the completed project soon.

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CONSUMER SURVEY QUESTIONNAIRE

SECTION ONE

1) Please number the following 'meat classes' in your
order of preference.   i.e. That meat you like most label
number one, that you like second most, label number two,
and so on.   Give equal preferences the same number.

    Beef .....   Lamb .....   Poultry .....

Mutton .....   Pork .....   Ham .....   Bacon .....

Note: Each 'meat class' includes all meat cuts from the
      animal's carcase. Pork does not include processed
      meats, such as bacon and ham.

      ─────────────────

2) Do you usually buy your meat, other than bacon and
ham at:-

    Suburban butcher ..... City butcher .....

    Supermarket .....   Meatworks retail shop .....

              No regular shop .....

      ─────────────────

3) Does the shop at which you buy your meat, list meat
prices?

    Per lb. .....   Per piece of meat .....

    Not at all .....   Other .....

      ─────────────────

4) When deciding what meat to buy, what are your major
considerations? If possible please list the following
reasons from most important (1) to least important. Give
equal reasons the same number.

    Quality .....   Household Preferences .....

    Price .....   Variety of meat diet .....

              Speed of meal preparation .....

    Other .....   ─────   Please state ....

5) Do you think any of the listed meats are too expensive for everyday eating? If so please 'tick' them.

     Beef .....   Lamb .....   Poultry .....

   Mutton .....   Pork .....   Ham .....

         Bacon .....

---

6) Would you please list the meat purchases of the week ending this Friday?

Item	Approx. quantity (lbs)	and/or	Approx. cost
Mon.			
Tues.			
Wed.			
Thurs.			
Fri.			

7)

a) If the price of lamb (only) were to increase by 1/- per lb, what changes would you make to the above purchases?

_____

b) If it were beef which increased by 1/- per lb, not lamb, what changes would you make? _____

c) If it were pork (only) which increased by 1/- per lb, what changes would you make? _____

d) If mutton (only) increased by 1/- per lb, what changes would you make? _____

e) If poultry (only) increased by 1/- per lb, what changes would you make? _____

f) If ham (only) increased by 1/- per lb, what changes would you make? _____

g) If bacon (only) increased by 1/- per lb, what changes would you make? _____

SECTION TWO

1) Please list the following meat classes in what <u>you</u>
<u>think</u> is their order in <u>price per lb</u>. The class you
consider <u>highest priced</u> please label <u>number one,</u> that you
consider <u>second highest priced, number two</u>, and so on.
Give classes you think are equally priced the same number.

       Lamb .....   Pork .....   Mutton ....

           Beef .....   Poultry .....

---

2) Do you consider:-   (a) Bacon (b) Ham

			(a) Bacon	(b) Ham
(a) Bacon)	is	(i) very expensive	.....	.....
(b) Ham)		(ii) reasonably priced	.....	.....
)		(iii) relatively low priced	.....	.....

---

3) How much money do you spend on <u>food</u> each week?

                                 £ _____

---

4) If prices of meats remained unchanged, but you had £1
per week <u>more</u> to spend on housekeeping, would you buy <u>more</u>
or <u>less</u> of each meat class? How much more or less?

	The same	More	Less	By how much (shgs & pence)
Lamb	.....	.....	.....	....
Mutton	.....	.....	.....	....
Beef	.....	.....	.....	....
Pork	.....	.....	.....	....
Poultry	.....	.....	.....	....
Bacon	.....	.....	.....	....
Ham	.....	.....	.....	....

If you would prefer to express the changes in your own words
please do so _____

SECTION THREE

1) What is the occupation of the <u>major</u> income earner in your household? ....

_____

2) How many people are there in your household?

		Male	Female
a)	65 years and over	.....	.....
b)	12 years & under 65 years	.....	.....
c)	4 years and under 12 years	.....	.....
d)	Under 4 years old	.....	.....

_____

3) What is your household's <u>approximate</u> annual income <u>after</u> taxation has been paid?

a)	less than £500	....
b)	£500 & under £750	....
c)	£750 & under £1000	....
d)	£1000 & under £1250	....
e)	£1250 & under £1500	....
f)	£1500 & under £1750	....
g)	£1750 & under £2000	....
h)	£2000 & over	....

ESTIMATED EQUATIONS - SERIES 1 and 2

NOTE: In Both Series.

Significance levels of r^2 and regression coefficients are
        shown by:

        xxx = significant at the 1% level
        xx = significant at the 5% level
        x   = significant at the 10% level

Series One

Dependent Variable, Expenditure on each food in
            shillings per person per week.

Independent Variable, Logarithm of Disposable
            Income in Pounds per person per year

Equation No.	Dependent Variable V_i	Constant	Coefficient of Independent Variable-Log Income V_o	r^2	No. of Observat-ions
(1)	(2)	(3)	(4)	(5)	(6)
1	Beef	− 8.395	xxx 2.206 (0.480)	xxx 0.147	125
2	Lamb	− 8.969	xxx 1.860 (0.572)	xxx 0.079	125
3	Mutton	3.322	−0.226 (0.451)	0.002	125
4	Pork	− 0.139	0.133 (0.252)	0.002	125
5	Poultry	− 3.009	xxx 0.592 (0.296)	xx 0.031	125
6	Ham	− 1.248	xx 0.274 (0.126)	xx 0.037	125
7	Bacon	− 0.627	0.232 (0.161)	0.016	125
8	Non-Carc. Meat	− 3.434	xxx 0.770 (0.245)	xxx 0.074	125

Cont'd

(1)	(2)	(3)	(4)	(5)	(6)
9	All meat	-22.499	xxx 5.841 (0.733)	xxx 0.340	125
10	Non meat food	-29.543	xxx 9.429 (1.636)	xxx 0.229	114
11	All food	-52.499	xxx 15.355 (1.695)	xxx 0.400	114

Series Two

Dependent Variable, Expenditure on each food, in shillings per 'Consumer Unit' per week.

Independent Variable, Logarithm of Disposable Income in Pounds per 'Consumer Unit' per year.

Equation No.	Dependent Variable V_i	Constant	Coefficient of Independent Variable-Log Income V_o	r^2	No. of Observations
(1)	(2)	(3)	(4)	(5)	(6)
1	Beef	-4.625	xxx 1.614 (0.607)	xxx 0.054	125
2	Lamb	-8.592	xxx 1.779 (0.702)	xxx 0.050	125
3	Mutton	5.771	-0.580 (0.591)	0.008	125
4	Pork	0.396	0.555 (0.336)	0.0002	125
5	Poultry	-2.306	0.463 (0.369)	0.013	125
6	Ham	-0.824	0.202 (0.158)	0.013	125
7	Bacon	0.035	0.132 (0.206)	0.003	125
8	Non-Carc. Meat	-3.943	xxx 0.862 (0.304)	xxx 0.062	125

Cont'd

(1)	(2)	(3)	(4)	(5)	(6)
			xxx	xxx	
9	All meat	-12.062	4.262	0.198	180
			(0.067)		
10	Non-meat		xxx	xxx	
	food	-18.003	7.841	0.110	114
			(2.102)		
			xxx	xxx	
11	All food	- 2.221	0.723	0.291	262
			(0.070)		

———————————

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