

# Determining Consumer Requirements for Lamb Loin Chops —a Preliminary Study

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There is little published information about what influences individual lamb consumers in Australia, and the factors uppermost in their mind as they make their purchases. Gross consumption and price relationships are available from statistical studies, whilst taste panel responses relating to organoleptic properties are limited to material from technical experiments.

It is contended that the gross approach to identifying consumer habits masks the individual needs of consumers. Furthermore, it is suggested that consumers have specific requirements for lamb cuts and joints, but these are compromised at the shop-counter by other factors such as price and the price of alternatives.

A survey was conducted amongst 479 people to identify whether people were as discerning as the hypothesis suggested. A Chi-square analysis showed ( $P < .005$ ) that most consumers required 3 mm fat cover over the eye muscle of lamb loin chops, and that an eye muscle area of about 17.5 cm<sup>2</sup> was favoured.

It was concluded that consumers appeared to have specific requirements which were masked by current marketing arrangements. This suggested that detailed study of domestic consumer behaviour and habits was warranted.

## 1. Introduction

The meat industry in Australia went through major changes during the 1970's. Large fluctuations in production, together with major changes in export markets led to rapid changes in meat consumption in Australia. Mutton was the major component of sheep meat consumption in the mid-1960's, and as recently as 1971–72 mutton consumption was 20.4 kg/head. In the same year lamb consumption peaked at 24.4 kg/head. Since that time mutton consumption has declined to very low levels, whilst lamb consumption fell to 16.6 kg/head in 1980–81 (A.B.S. 1981).

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Bureau of Agricultural Economics (B.A.E. 1967, 1970) surveys showed that meat consumption was affected by income, price, household size, religion and nationality. Analysis of economic statistics by Main, Reynolds and White (1976) confirmed own-price and cross-price effects of beef, pork and chicken on lamb consumption. However, Main, Reynolds and White (1976) found insignificant estimates of income elasticity for lamb.

The nature of the meat production process results in a number of problems specific to the industry. Harris (1982) particularly highlighted the lack of an objective system of description to help relay detail about consumer requirements to the primary producer, resulting in a range of products which may not be the most desirable.

The complexity of the meat industry suggests that whilst analyses of economic statistics can provide some broad generalisations about consumer behaviour, there is insufficient detail to provide a definitive approach to reversing the trends to declining lamb production.

A similar trend to declining consumption in the United Kingdom led to detailed study of the market. Wilson, Lesser and Prescott (1974) showed consumer dissatisfaction with the product was a major cause of the decline with less emphasis by consumers on price. The retail sector in general showed scant regard for these needs as Carpenter, Lesser and Prescott (1972) lamented that consumers received whatever was "conveniently available at the particular time they make their purchase".

It is hypothesised in this study that consumers do have some knowledge of which features of cuts and joints they are seeking at the point of purchase. They evaluate the available material in relation to their ideals and then determine whether they will pay the asking price. Therefore, price acts to compromise the purchase of what consumers are really seeking. This is an important distinction as it provides a basis for influencing the decision about purchase by manipulating the attractiveness of the product to a degree that higher prices might be paid without altering level of supply.

This paper reports a preliminary study into factors which Australian consumers consider important, and provides some insight into the variability of the requirements between consumers.

## **2. Carcass Traits Affecting Appeal**

There is little Australian work available from which to identify domestic consumer requirements for lamb. Most studies have used taste panels, thus, the question has rarely related to what people would most like, but rather to determine the most appealing from material which had undergone some experimental treatment.

The non-visual properties of lamb probably determine whether or not a consumer will consider purchasing lamb. There is some evidence from the United Kingdom that the most important attribute of lamb is tenderness (Baron, Cowie, Hughes and Lesser 1973). Flavour, it was suggested by Ford

and Park (1980), determines acceptance or rejection of meat, irrespective of other attributes. These non-visible factors are not included in this study. There are however a number of factors which can clearly be evaluated for desirability. These include fatness, size of cuts and joints, yield of lean meat, and colour of fat and muscle.

Kempster (1979) suggested that *fatness* was the most important feature influencing demand for lamb, with failure to meet specifications being an important factor in declining consumption in the United Kingdom. He quoted Meat Research Institute data indicating that 45–50 per cent of adults and 65 per cent children remove all lamb fat before consumption. The importance of fatness was supported by Wilson, Lesser and Prescott (1974) who found that consumers required the least possible fat on joints, and by Carpenter, Lesser and Prescott (1972) who identified leanness of lamb chops as the most important factor.

*Size* of lamb cuts was shown by Wilson, Lesser and Prescott (1974) to be important in consumer choice, especially for joints. Southam and Field (1969) showed consumers preferred chops from a 30 kg lamb carcass and joints from 23 kg carcasses when asked to differentiate requirements on the basis of size. In Australia, Furnival, Corbett and Shorthose (1977) found that a taste panel preferred eye muscles in loin chops to be as large as possible.

*Meat colour* is a factor considered important throughout the meat trade, including the retail level. It is screened in many abattoirs though no objective data are available about the degree of discolouration resulting in rejection. Furnival, Corbett and Shorthose (1977) measured attractiveness to a panel and found that not only was dark colouration unacceptable, but so was light colouration.

*Fat colour* is often said to be important by retailers but no objective data are available. Yellow fat is generally unacceptable, though it does not appear to be associated with any nutritional deficiency for the consumer (Cuthbertson and Kempster 1978).

### 3. Consumer Survey

In this study the demonstration material was lamb loin chops. The demarcation between muscle and fat is more clearly defined than other cuts and joints allowing more objective responses; and the loin area is where condition scoring for overall estimation of lamb fatness occurs for reporting prices in the Livestock Market Reporting Service. Furthermore, Carpenter, Lesser and Prescott (1972) suggested that lamb chops are used as an indicator by consumers of price and quality of all meat in the retail outlet.

The features under study were eye muscle area (EMA) and fatness. The EMA is the cross-sectional area of the *Longissimus dorsi* muscle (the eye muscle) which was measured using a planimeter. The fat depth was measured 45 mm from the midline of the lamb (the C measurement), which approximates to the point of maximum width of the eye muscle.

Loin chops were prepared commercially and displayed in a refrigerated cabinet as part of the Department of Agriculture exhibit at the Royal Melbourne Show in 1979. Interviewers identified themselves to people who approached the exhibit and described the nature of the study. Interest in the study was intense and there were few refusals amongst people asked to take part. The questionnaire was in two parts; a series of questions which identified a number of socio-economic features, such as household income, age, family size, and ethnic background; and questions about the material on display.

The chops were laid out in rows of three in meat trays, each row represented one treatment. Within each row the chops were identical in terms of EMA and fat thickness. The factor under study (each treatment) was varied between rows in the tray.

Four replicates were undertaken during the twelve day Show period. In replicate I the chops were placed in the tray and maintained there throughout the interview period. Replicate II was the same chops rearranged in the tray, again maintained in its position throughout the duration of interviews relating to that replicate. This was to examine any bias which may have arisen due to an aesthetic view of the experimental arrangement. For example, people may have consistently chosen the top or bottom group in the tray.

In reach of replicates III and IV fresh chops were placed in the trays, with the rows of chops being rearranged frequently during the period of interviews to minimise the likelihood of bias.

Ideally the choices available within each replicate should have had the same EMA and fat depth. Unfortunately since commercially prepared material was being used there was little control beyond exact specifications of requirements for fat depth and EMA. Nevertheless, within replicates, the chops in each group of three were similar.

#### **4. Consumer Responses**

Interviews were sought throughout the twelve day Show period and a total of 479 people were interviewed. Chi-square analyses were conducted on the data, and for all values of Chi-square, Yates' correction for continuity was applied.

The division of respondents over 20 years of age into age group classifications is shown in Table 1. A Chi-square test showed that the proportions of people in the age group differed significantly ( $P < .005$ ) from the Victorian population. This difference was primarily in two classes. The number of people interviewed was greater than expected in 30-39 years and fewer amongst people over 60 years.

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Table 1: Age Distribution of Respondents Compared to Victorian Statistics

| Age     | Victorian population <sup>a</sup>                    | Number interviewed | Expected number |
|---------|--|--------------------|-----------------|
| 20-29   | 664 066  | 114                | 117.3           |
| 30-39   | 579 338  | 135                | 102.5           |
| 40-49   | 418 131  | 76                 | 73.8            |
| 50-59   | 408 530  | 74                 | 72.3            |
| Over 60 | 553 747  | 65                 | 97.9            |
|         | 2 623 812  | 464                |                 |
|         | $\chi^2 = 20.82$<br>$P(\chi^2_{(4)} > 20.82) < .005$ |                    |                 |

<sup>a</sup> Source: A.B.S. (1982) Catalogue No. 3201.0.

Data were collected on the sex of the respondents and whether they did the shopping (see Table 2). Many more women had been interviewed than would be expected assuming they make up about 50 per cent of the population (Chi-square value significant  $P < .005$ ). The Chi-square analysis showed that the proportion of respondents who did the shopping varied significantly between the sexes, with a much higher proportion of women taking the responsibility (Table 2).

Table 2: Contingency Tables for Sex of Respondents and Responsibility for Shopping

| Replicate | Responsible for shopping | Male | Female | Sample size      | $\chi^2$ | Significance |
|-----------|--------------------------|------|--------|------------------|----------|--------------|
| I         | Yes                      | 10   | 57     | 78               | 26.91    | $P < .005$   |
|           | No                       | 10   | 1      |                  |          |              |
| II        | Yes                      | 8    | 31     | 50               | 8.48     | $P < .005$   |
|           | No                       | 8    | 3      |                  |          |              |
| III       | Yes                      | 11   | 117    | 147              | 33.17    | $P < .005$   |
|           | No                       | 11   | 8      |                  |          |              |
| IV        | Yes                      | 22   | 149    | 200 <sup>a</sup> | 18.73    | $P < .005$   |
|           | No                       | 14   | 15     |                  |          |              |

<sup>a</sup> Excludes 4 missing observations.

#### 4.1 Fat Depth

In replicates I and II there was a clear preference for fat cover of 3 mm (Table 3). This was reinforced in III and IV, though it was unfortunate that 3 mm was the leanest fat depth presented in those treatments. The requirement for 3 mm was demonstrated in all four treatments. The position of each treatment in the tray did not appear to bias the response as similar results were obtained in I and II.

Table 3: Number of Respondents Selecting for Given Fat Depth on Loin Chops  
Replicate

| I                       |        | II         |        | III        |        | IV         |        |
|-------------------------|--------|------------|--------|------------|--------|------------|--------|
| Fat depth               | Number | Fat depth  | Number | Fat depth  | Number | Fat depth  | Number |
| 2                       | 3      | 2          | 2      | 3          | 91     | 3          | 132    |
| 3                       | 64     | 3          | 45     | 4          | 23     | 8          | 56     |
| 7                       | 4      | 7          | 2      | 5          | 20     | 11         | 0      |
| 8                       | 7      | 8          | 1      | 8          | 10     | 12         | 16     |
|                         |        |            |        | 17         | 3      | 20         | 0      |
| Number Interviewed 78   |        | 50         |        | 147        |        | 204        |        |
| $\chi^2$ 131.33         |        | 107.60     |        | 163.70     |        | 301.01     |        |
| Significance $P < .005$ |        | $P < .005$ |        | $P < .005$ |        | $P < .005$ |        |

Respondents did not necessarily select the leanest chops. Whilst they did so in III and IV, in I and II they showed a preference for 3 mm of fat compared to 2 mm. High levels of fat were offered in III and IV, and 2 per cent of respondents selected fat cover of 17 mm in III, whilst no one selected 20 mm in IV.

Replicate III demonstrated that a clear choice was made even within a fat depth range of 1 mm. About 16 per cent selected 4 mm, 14 per cent chose 5 mm, but 62 per cent chose 3 mm.

#### 4.2 Eye Muscle Area

The most popular choice in I and II where the same material was presented in different arrangements was for an EMA of 17.75 cm<sup>2</sup> (Table 4). In III the most popular was 17.5 cm<sup>2</sup>, and in IV almost equal proportions preferred 17.75 cm<sup>2</sup> and 18.75 cm<sup>2</sup>. Generally, the most popular requirement seemed to be about 17.5 cm<sup>2</sup>, though to expect consumers to discriminate on the small difference demonstrated between 17.5 cm<sup>2</sup> and 18.75 cm<sup>2</sup> is probably fanciful.

Table 4: Consumer Choice for Eye Muscle Area of Lamb Loin Chops  
Replicate

| I                        |        | II              |        | III             |        | IV              |        |
|--------------------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|
| Eye muscle area          | Number | Eye muscle area | Number | Eye muscle area | Number | Eye muscle area | Number |
| 14.00                    | 18     | 14.00           | 10     | 14.00           | 19     | 17.25           | 22     |
| 17.75                    | 43     | 17.75           | 31     | 15.00           | 33     | 17.75           | 87     |
| 18.75                    | 17     | 18.75           | 8      | 17.50           | 95     | 18.75           | 95     |
| Number of respondents 78 |        | 49              |        | 147             |        | 204             |        |
| $\chi^2$ 15.22           |        | 17.77           |        | 64.91           |        | 45.81           |        |
| Significance $P < .005$  |        | $P < .005$      |        | $P < .005$      |        | $P < .005$      |        |

Equally as important to attempting to identify specific requirements for EMA, was a feature of the results showing that in I and II a majority of respondents did not select the largest EMA presented, whilst in IV the largest EMA was most popular with only 46.5 per cent of respondents.

## 5. Discussion

The study discussed in this paper was undertaken to provide a background for future research direction. The sample of consumers obtained from random interviewing at the Royal Melbourne Show is unlikely to be representative of the community. People interested enough to approach the display stand may have a special interest in lamb, and the Agricultural Pavillion at the Show probably attracts more agriculturally oriented visitors.

The two factors which were investigated for bias in the sample were the sex and age of respondents. The Chi-square analysis showed that the age of respondents was significantly different from the Victorian population, though this significance arose in only two of six age groupings. Also, few who were interviewed were less than 20-years-old. It was reasoned that serious responses would not be obtained from people in this age group since they generally moved about the Show in large groups (for example, school groups).

The sample also showed an obvious bias towards women as they represented 80 per cent of the sample. Furthermore, 85 per cent of all respondents were responsible for the shopping. It can therefore be concluded that the bias towards women was because they did the shopping. This was supported by the observation of interviewers that when couples were approached the male generally deferred to his companion on the grounds that she did the shopping.

Kirton and Johnson (1979) suggested that the relative proportions of fat and lean were important. This was an aspect which was not maintained in this study. Hence, the experimental approach of maintaining one feature constant (either fat or lean) whilst varying the other may have led to some confusion of responses.

In this study a major proportion of respondents showed a preference for 3 mm fat. This is supported by the findings of Furnival, Corbett and Shorthose (1977) whose taste panel showed a preference for 2.4 mm, and notably, more or less fat resulted in diminished appeal. The available data suggest that a large proportion of consumers require levels of fatness in lamb loin chops which are unavailable under current marketing arrangements.

An EMA of about 17.5 cm<sup>2</sup> was preferred by most respondents in this study. The inference drawn from the data was that increases in EMA would be less popular. This contrasts with Furnival, Corbett and Shorthose (1977) who found that preference increased linearly with EMA. However, the largest sample of their study was 15 cm<sup>2</sup>.

An important feature of the data was that almost all the material displayed appealed to someone. This suggests that whilst individual needs are specific, when averaged on a community basis they appear less defined, resulting in the impression expressed by retailers that consumers lack strong preferences. Also the range of requirements for leanness and EMA amongst consumers is unrecognised in current meat promotion where a "shot gun" approach is taken (Manwaring 1982) and meat of all types are promoted as a single product.

Price reports from the Livestock Market Reporting Service regularly show premiums for fat score 4 lambs, which would carry between 6 and 8 mm fat over the eye muscle of loin chops. Hence it is unclear whether overfatness of chops on sale is a result of a misunderstanding of consumer requirements, or of other features of lamb thought to be related to fatness.

The quality factor which has been most strongly related to fatness is tenderness. There appears to be two attitudes involved; that tenderness is directly related to fatness, or tenderness is directly related to rising condition and by implication to increasing fatness.

Paul, Torton and Spurlock (1964) in their review highlighted the conflict in the literature on the effects of fat on tenderness. More recently, Lloyd, Slyter and Costello (1981) found heavy-weight fat lambs to be less tender than light-weight lean lambs. However, Smith, Dutson, Hostetler and Carpenter (1976) found fatter lambs to be slightly more tender, though they attributed this to the insulatory effects of fat in preventing the toughness caused by cold-shortening. Perhaps the conclusions of Kempster (1979) are most relevant as he suggested that fatness above fat score 2 (fat trim of about 6 per cent in the United Kingdom) were unlikely to effect carcass quality.<sup>1</sup>

There are no data available to dispute or accept the hypothesis that rising condition results in more tender lambs.

Since price factors were not considered in this study, any effects of prices on the choice of lamb cuts were not determined. The rationale was that all consumers have a distinct preference for particular features of the product and it was this that was being studied rather than a choice compromised by price factors. Whilst price does influence decision-making at the counter, it is contended that often the decision made is a next-best one.

## 6. Future Studies Suggested by the Survey

The objective of identifying future consumer research direction is to raise lamb consumption. This must be done by providing consumers with existing or new products they find desirable, either for reasons of taste or convenience. The identification of these features will aid promotional campaigns.

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<sup>1</sup> It is unreasonable to relate fat trim percentage to fat thickness of Australian breeds as it was developed for the breeds most prolific in the United Kingdom.



Hughes (1976) noted that two ways of promotion were to identify consumer attitudes to cuts and to promote the desirable aspects; or to describe requirements and then tailor production to meet them. The former is common in agricultural marketing, and whilst it may be successful for cuts with desirable features, it is more difficult for less popular cuts. The other approach would appear to require less funds in the long-term. After establishing consumer requirements and developing systems (production and processing) to meet them, an initial promotional campaign would gain a market share, with further promotion being lower key aimed at maintaining the market.

Thatcher (1982) suggested that the most important visible features of lamb are weight and fatness. However, the data presented here do not provide definitive information on the strength of the consumer requirements and how easily they might be diverted from an ideal product. Future consumer research needs to be based on a properly stratified sample of consumers based on all factors likely to influence consumption habits. Furthermore, these panels would need to identify the repeatability of responses through time. Consideration is needed not only of sociological factors, but also consumption habits, which would include types and cuts of meat eaten and attitudes to non-meat substitutes. This approach will isolate different market sectors and provide target audiences for promotional campaigns.

This study did not attempt to identify attitudes to lamb and therefore some of the underlying reasons for consumer behaviour. In the United Kingdom, Baron, Cowie, Hughes and Lesser (1973) found that tenderness was considered to be the most important feature of lamb. It is not known whether Australian consumers would support such a priority, or whether fatness or size rank more important.

A programme of research into attitudes would include consumer panels to identify attractive features in relation to the product, and to various ways of preparing it. There is also a need to identify the relative influence of various factors at the point of sale. The emphasis on lean lamb may be compromised by other factors which either relate to meat quality (such as equating fatness with tenderness) or which directly influence choice (such as, for example, lean meat content, juiciness or meat colour).

The fast food trade does not use lamb to any real extent, whilst only chops lend themselves to fast cooking where all household members work and are looking for easy meals. The development of a fast food market for lamb and the development of new cutting techniques for quick meals are both areas needing research. If successful, these results would influence production systems and thus further research would be needed to develop production systems to tailor lamb to meet any new requirements resulting from the market development programme.

There is little objective data which shows how consumer tastes vary through time. There are apparent seasonal changes, such as a greater demand for barbeque chops in the summer. It is also likely that tastes are changing through time, and the declining use of roasting joints best represents this.

Finally, the effect that price would have on consumer requirements would need to be carefully identified. The premiums consumers would pay for products meeting their exact requirements need to be shown to encourage all sectors of the industry to meet the specified demand.

## **7. Conclusion**

This study was based on the premise that little is known about preferences for lamb in the Australian market place. It explored the hypothesis that consumers do have a special, individual requirement for lamb, and that the current marketing system does not provide for this or enable them to seek out or communicate their needs effectively.

The single factor analysis of consumer requirements for fat depth and EMA suggested that in particular lamb products on the domestic market are overfat. There was no evidence available to support the current industry practice of paying premiums on a c/kg basis for fat score 4 lambs. Whilst preferences for single parameters are evident, choice over a range of parameters are not clear. A number of studies of Australian consumers were identified which would provide the data required to reverse the trend to declining lamb consumption.

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