MARKET POTENTIAL OF PROCESSED TASMANIAN JACK MACKEREL (*TRACHURUS DECLIVIS*) FOR HUMAN CONSUMPTION

by

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ABSTRACT

In response to declining world fish stocks, a study of the market potential for developing a product for human consumption using the underutilized species, Tasmanian jack mackerel (*Trachurus declivis*), was undertaken.

A review of seafood consumption, the changing racial composition in Australia and the importance of market intelligence was performed, along with a market survey to determine current consumption of similar products.

Results of the survey indicate that products such as smoked fish, satay fish and fish pates are being consumed and that a further study of the financial and economic benefits and constraints of setting up full-scale commercial production would be worthwhile.

INTRODUCTION

The consumption of seafood and fish products has generally increased. In developed countries, due to a variety of reasons, but in no small part to increased awareness of health benefits, greater disposable incomes, greater promotion of seafood and new product innovation. By the same token, fisheries within the developed world have reached the limits of their capacity. World demand for seafood products is increasing but currently demand exceeds supply (Homer *et. al* 1994). The only likely improvement will come from better fisheries management, increased use of underutilized species and aquaculture.

No longer is the value of Australia's fin fisheries able to be increased by increasing just the volume of catch as was possible in the age of technological advancement like that of the seventies. Instead, one step that should be taken is to enhance the value of landed catch by further processing. With the status of most Australian fin fisheries at full capacity, it makes sense for manufacturers to broaden their production into value adding particularly of those species recognised as underutilized or currently used for purposes other than for human consumption.

In Australia the domestic market consists mainly of low-value finfish supplied by small owner operators and importers. Very little value adding to products occurs on a domestic basis (National Seafood Study, 1993). Underutilized species or those that are processed adding further value, have the ability to dramatically increase the value of the Australian catch.

Historically, Australians typically consumed white boneless fish fillets cooked by grilling or frying, but Australian society is changing, larger percentages of Asians and Europeans are migrating to Australia bringing with them different tastes and traditional foodstuffs. The influence on the diets of Westerners that this has had is yet to be accurately determined but coupled with increased awareness of health issues, and the benefit of

consuming fish, the shift in the type and amount of seafood demanded could be partly accredited to these reasons.

LITERATURE REVIEW

POTENTIAL OF JACK MACKEREL

Jack mackerel are available in large quantities off the South East Coast of Tasmania. As they appear in large schools, they are ideally caught by purse seine. Because of the ease of capture, they are of interest to fishermen. The current annual catch is approximately 20,000t based mainly at Triabunna on the East Coast of Tasmania. The fishing season at Triabunna lasts from October to May. Smaller fisheries also exist in South Australia, Victoria and New South Wales.

The species is well studied and understood with figures of the maximum sustainable yield in Australia estimated to be at 30 000 to 50 000 t a year.

Currently, less than 1% of the total catch of jack mackerel is processed for human consumption. Mainly the catch is processed for fishmeal and frozen bait. Jack mackerel is ideally suited to further processing due to the flesh composition. As it is not a true mackerel but belongs to the jacks or trevally family, it is related to many species currently used for human consumption. Jack mackerel is a popular fish, eaten particularly in Japan and Korea.

Jack mackerel shows high potential as a species for post harvest processing, particularly in areas such as smoke preserving. As some of the components of smoke are fat and water soluble, fatty fish smoke better than lean ones. Jack mackerel shows seasonally high fat contents and has been reported by Hookway (1994) to produce a good quality smoked product.

Smoking is the oldest method for preservation of protein food stuffs but due to changes in taste preferences, smoking is now more concerned with presenting alternative and distinctive tastes to the consumer (Kow, 1995). Colour is shown to be the most important factor, since vision is the first sense consumers use in evaluation of the products, this is followed by aroma, flavour and texture. One benefit to be gained from smoking jack mackerel is disguising the darker flesh that has been shown to be disagreeable to consumers

The main interest in value adding in Australia is to improve the value of low value products like jack mackerel. The majority of the Australian catch is low volume, high value species like prawns or rock lobster which are exported either whole or live. This is because the value of the species is high enough without the requirement or desire for further processing. Value adding for fishermen is synonymous with profit adding when dealing with what is commonly referred to as low grade or value fish. The main impediment to value adding in Australia is its cost. Weighing up the cost to benefit is the most important consideration when deciding whether to start processing seafood. There are instances where deciding to implement the required technology needed to process seafood will give little return for the money out laid, but there are instances, when transforming a low value product into a gourmet item pays off (ASTEC, 1989).

INDICATIONS OF CHANGING DEMOGRAPHICS

In 1947, 97.4 % of the population was born in Australia, New Zealand or the United Kingdom and Ireland. The abandonment of the Australian government's " White Australia" policy saw a large decrease in the proportion of anglo-saxon arrivals. Data from the latest national census (1991) indicates the numbers of Asian immigrants has greatly increased. In 1992, 13.0 % of settler arrivals were from the United Kingdom, 18.3 % from Asia and 26.3 % from Europe. Overall, in the last decade, migration from south east Asian countries like

Malaysia and Singapore has risen by 131%, migration from north east Asian countries has risen by 267 % and migration from southern Asian countries such as India and Pakistan has risen by 97 % (ABS 1994).

Australia's population growth was 1.02% in 1993, the lowest since 1976. This growth of 178,900 comprised of 143,800 from natural increases and 35,100 from overseas migration (ABS 1994). The population is projected to rise to 19.0 million in the year 2000 and up to 21.0 million sometime between 2009 and 2011.

The demand for seafood is influenced by income and its distribution, the population size, tastes and eating habits of the population as well as the price of seafood and its substitutes. The relationship between demand of seafood and its price is negative. The substitutes for seafood are usually recognised to be chicken and pork products, but in the case of smoked or pate seafood they may be products such as vegetable pates, preserved meats and other similar delicatessen lines. Increases in population size also display positive effects on the demand for seafood. ABARE (1992) states that Australia displays a positive increase in seafood demand with increases in income. Due to the decreased economic growth in this country, this is likely to slow the demand for certain luxury items of seafood. Attitudes to health and the ageing society in Australia will have a positive effect on the amount of seafood purchased and consumed in home (ABARE 1992)

Australia, though having a large exclusive economic zone, has relatively unproductive waters and little production of processed fish products such as smoked fish and smoked fish pates. For this reason the majority of Australian seafood products are sourced by imports. The total value of Australian seafood imports rose by 12% to $ 666 million dollars in 1994. These imports were mainly sourced through Thailand (25%), New Zealand (18%) and America (7.2 %) (ABARE 1995). As most Australians are currently aware there is much talk about the balance between the value of Australia's imports and exports. Seafood imports could be decreased by domestic production of many of the products demanded and currently sourced offshore.

MARKETING INTELLIGENCE

Understanding consumer attitudes is paramount in seafood marketing. The first step in producing a successful new seafood product, or any new product for that matter, is to understand the needs and desires of the consumers as well as the size and location of this demand (Wood 1987). Usually this information is obtained through market analysis. There are many different methods in use to analyse a market but probably the simplest to understand and most useful is the standard consumer survey. A survey allows information to be gathered on a specific market, the present and future needs and how to best meet these needs (Barker et al 1994).

Many previous studies have discussed the matter of promotion of seafood products, and find is sadly lacking. The Senate Standing Committee on Trade and Commerce (1992) found that "The industry as a whole must engage increased national promotion of products and educate its consumers in its use before benefit from increased domestic seafood consumption can be obtained". The main objective of promotion is to increase awareness of products and hence demand. Activities like trade fairs, retail promotions and packaging and labelling are good methods of seafood promotion (Wood 1987).

General market characteristics which provide good opportunities for promotion include the existence of a favourable demand trend, the presence of potential consumers and a situation where quantity demanded of a product is very responsive to price change (Battaglene 1990).

The eating habits of this generation are very different to those of previous ones. Many different environmental factors interact to influence a consumer's purchasing decision. Healthy low fat meals are in demand while at the same time the average Australian is working longer and harder, not to mention the decrease in "stay at home mothers". Hence it leaves little time for leisure without having to spend more than absolutely necessary on domestic chores like meal preparation. Convenience is the buzzword of the nineties in the seafood industry. Obtaining this type of information before introducing new food products is vital to produce a product that not only obtains initial consumer interest but a continuing interest that results in repeat sales (Wood 1987).

METHODS

A stratified survey was performed in Melbourne between July 30th and August 6th 1996. A sample questionnaire shown is in Figure 1. Four areas in Melbourne were chosen because of historical ethnic settlement in the areas. To enable selection of the survey areas Australian Bureau of Statistics information was obtained. The statistical racial breakdown by labour force as zoned by the ABS, included information on the population in the main statistical regions of Melbourne, the racial breakdown by region, country of birth and the birth place of Mother by birth place of Father.

SURVEY SHEET FOR MARKET ANALYSIS OF JACK MACKEREL POTENTIAL

AREA NAME

SURVEY NO#

		YES	NO
QUESTION 1a	DO YOU EAT SMOKED FISH?	......	......
QUESTION 1b	DO YOU EAT SATAY FISH	......	......
QUESTION 1c	DO YOU EAT FISH PATES	......	......

QUESTION 2   HOW OFTEN DO YOU CONSUME THESE PRODUCTS?

tick the correct box   1   2   3   4

QUESTION 3   DO YOU PREFER TO PURCHASE IMPORTED OR AUSTRALIAN PRODUCED PRODUCTS OF THIS TYPE   YES   NO

QUESTION 4   WHAT, IN ONE WORD, IS THE MAIN FACTOR THAT INFLUENCES THIS CHOICE TO PURCHASE IMPORTED OR AUSTRALIAN PRODUCED PRODUCTS

QUESTION 5   ARE YOU INTERESTED IN TRYING A NEW AUSTRALIAN PRODUCED
                                                                       YES   NO

AGE GROUP: <18   18-30   30-40   40+

MAIN LANGUAGE SPOKEN AT HOME OR PARENTS BIRTHPLACE

Figure 1.   Sample questionnaire.   For question 2. 1= once a week or more 2= once a month or more, 3= at least once a year and 4= rarely or special occasions.

The surveys were analysed by proportion of respondents and their responses to each question. The answers to the questions hence needed to be put into a code to be useable. Responses to question 4 needed to be categorized. Because this question was open ended, there was a large variety of answers. Seven categories were chosen these being; price differential between imported and domestically produced products, quality differential, perception of healthiness, perception of freshness/safety, advertising programs particularly "Buy Australia" campaign, habit and taste. All responses were able to fit into these categories. The coded responses were then analysed by ethnicity and product type. Further proportional analysis would have been performed if results from an evoked response set showed that other factors such as age were significant. To determine the significant factors affecting the purchasing behaviour of consumers an evoked response set analysis was performed to enable a logit model to be run. This model is in the form of:

$$PF = a_0 \ a_1EX \ a_2P \ a_3Q \ a_4HLTH \ a_5F \ a_6CMP \ a_7H \ a_8T \ a_9A \ a_{10}LA \ N$$

Where PF = preference, EX = experience, P = price, Q = quality, HLTH = healthiness,
        F = freshness, CMP = campaigns, H = habit, T = taste, A = age, and
        LAN = language spoken.

To be able to perform an evoked response set analysis the data needed to be put into binary code. For this purpose a positive answer was assigned a value of 1 and a negative answer assigned a value of 0 (Table 1). Because some of the questions had more than two possible answers it was necessary to decide what level was relevant and what would be discarded. To perform a logit analysis a measurable variable is necessary, therefore each age group was averaged, and the respondents assigned the median age. This data was analysed using the statistical program Shazam 7.0, which generates the T ratio, to enable determination of each variable significance. The data was analysed three times by language group, to determine significant factors that influence the purchasing decision of consumers by ethnicity.

The data for English speaking respondents was shown to suffer from multicollinearity, this is due to the models independent variables being strongly correlated. This is overcome by dropping insignificant variables out of the model, as was performed with the data set for English speaking respondents. All variables except price differential and quality perception were dropped. As no multicollinearity was shown in the data sets for Europeans and Asians this was not required.

Table 1.   Binary code for each question in the survey.

QUESTION NUMBER	RESPONSE AND CODE ASSIGNED
1a, b & c	yes = 1, no=0
2	once a week or more & once a month or more = 1 once a year at least & rarely or special occasions = 0
3	yes = 1, no = 0
4	because each respondent only chose one factor of significance if that factor was chosen = 1 all other responses for that respondent = 0
5	yes = 1, no = 0
6	each respondent was assigned the mean age for the age group they came under
7	data analysed three times, DATA SET 1; if Asian =1 all others = 0. DATA SET 2; if European = 1 all others = 0 DATA SET 3; if English =1 all others =0

RESULTS AND DISCUSSION

Of the surveys performed, 106 respondents were obtained. Of these respondents, 24% were European, 34% were Asian and 41% were English speaking. Three different product forms that are currently available in retail outlets throughout Australia were investigated. These were smoked fish types, satay fish on a stick products and fish pate type products.

The survey was designed to determine five factors that were considered important in analysing the buying behaviour of consumers. Firstly, the consumption of similar products and the frequency of that consumption, secondly if loyalty to Australian produced products existed and the consumers main consideration

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in the purchasing decision. Demographic data that was considered important was also analysed and this included ethnic background or language spoken at home and the age of the respondent.

CONSUMPTION

The results from the survey show that overall processed fish products are currently being consumed and that there may be room for new types of product without excessive competition. Overall, 61.3 % of all respondents questioned ate smoked fish of some kind, 33% ate satay fish and 50% ate fish pates, mousses and terrines. This is a fairly significant result, showing that processed fish products are a popular form of seafood consumption. The perception of these types of products differed between each ethnic category. For example English speaking respondents perceptions of what was considered a smoked fish product differed from that of European respondents. Most English-speaking respondents perceived smoked fish as smoked salmon, cod, or haddock as used in breakfast dishes such as kippers. Europeans referred to smoked mackerel and haddock. Unfortunately the questions in the survey were not specific enough to determine whether consumption of hard smoked products is different from soft smoked products.

The survey did not ask respondents if the products were eaten in home or out of home. A large percentage of the consumption of products such as these may well be consumed in restaurants. The National Seafood Consumption Study (ARDC 1992) found that many respondents though liking fish, did not know many ways to prepare it or disliked the mess involved with it's preparation, therefore pre-packed dishes of this type could appeal to these people. The lifestyles of Australians nowadays are very different to that of previous years. With more women entering the workforce and all of us working longer hours, convenience is a big selling point. Therefore, a heat and eat meal would also appeal to those looking for convenience and ease of preparation.

Hookway (1994) found that ethnic taste testers of a pate prototype utilising jack mackerel, mainly did not differentiate between a commercially available mackerel pate and the jack mackerel prototype. She postulated that a market for a jack mackerel product might exist without trying to replace existing products.

CONSUMPTION FREQUENCY

The frequency of purchase or consumption of these products can be termed as the consumers' experience. A large percentage of respondents purchased similar products at least once a month or more showing that significant consumption of similar products, particularly smoked fish and smoked fish pate are occurring in all ethnic groups. The structure of Australian society has changed quite dramatically in a short period of time, influencing the demand for type and amount of seafood products.

The measurement of preference of Australian products over imported ones was of the utmost importance to this project. Of the English- speaking respondents 51.3% preferred to buy Australian, showing the highest preference followed by Europeans at 40% and Asians at 33.3%. This data was used to determine if an Australian produced product had. The number of respondents that preferred to buy Australian over imported goods show that an Australian produced product containing jack mackerel may not need to compete with already established products but fit neatly into its own market niche. Packaging and labelling may therefore become a major factor in the success of a new product. Consumers could choose the product solely on the fact that it is Australian produced. Fish that is sold fresh or frozen without any identifying marks makes brand promotion and loyalty very difficult. (Bose 1996 pers comm.). In this case loyalty is likely to be concentrated through the retailer rather than the final consumer.

Actual sample products that have been trialed previously have obtained a good reception in Victoria, NSW and Tasmania despite the perception of the eating properties being poor (Hookway 1994). Overall 93.4 % of all respondents to the surveys performed in this investigation were interested in trying a new Australian produced fish pate, satay or smoked fish product.

Generally, consumers know very little about the fish they buy. The purchase is made of species that are familiar to them. Promotion of a more diverse range of fish could cause greater consumption of less known species. There is very little fish caught which cannot find a market somewhere or which cannot be considered as suitable for further processing. I am convinced that there is a market for virtually all seafoods. (Townsend, 1984)

PURCHASING DECISION

To enable analysis of the factors influencing the purchasing decision by consumers a logit analysis was performed on the survey results. The outcome has been determination of the principal influences concerned with consumer's decision making process where food products are concerned. These results are important for determining the correct strategies for marketing new products on the market. Large percentages of new products introduced fail within the first twelve months and this is particularly true in respect to food products in a country where choice is virtually unlimited. The factors of significance were found to be taste of product by Asians, while Europeans were influenced by advertising campaigns such as "Buy Australia". Quality was found to be the most important influence by English-speaking respondents. Price, of course should have shown significant influence in all ethnic groups, and during analysis the usually negative relationship between demand and price was displayed. It is interesting to note that in none of the ethnic groups was price the determinative factor in the purchasing decision. The interesting results to this analysis give an insight into marketing techniques for different demographic market segments. It is important that marketing is directed towards the consumer most likely to be interested in the product and that it informs them that this product is capable of fulfilling their needs. The best way of doing this is to understand what drives that person's behaviour and their decision on whether to purchase or not. It is very important that consumer preferences are known so that the correct marketing strategies may be employed.

CONCLUSIONS AND RECOMMENDATIONS

The proportion of respondents that consumed smoked fish and fish pates were significant, over 50% in both cases. Of these respondents, a high percentage consumed them more than once a month. The result for satay fish was hardly significant, but encouraging none the less. Other ready-made meal type products produced from jack mackerel could be investigated. A large number of the respondents preferred to purchase Australian produced goods offering an avenue for promotion. As well the main reasons for the consumers purchasing decisions are relatively easily met.

When this project was first undertaken, part of the aim was to find if the reason why speciality type seafood products produced in Australia were not doing well was because of language barriers in packaging or habit and loyalty to imported brands. It is encouraging to see that this is not the case. The main considerations are quality, taste and promotion, which need to be focused on when marketing. Taste is probably the most difficult to deal with, as each ethnic group has their own preferences. During the surveys, it became quite clear that Asians do not think that Australian products are spicy enough. Making the product spicy may not appeal to the majority of Caucasians.

One of the main impediments to the marketing of these products may be the consumers association of the name jack mackerel with a fish not possessing good eating properties. If at all possible it may be advantageous to market under another commonly used name, such as cowanyoung as the jack mackerel is known in NSW or herring scad as it is known in New Zealand.

The main limitation of this study was the small numbers of respondents in the surveys performed. Additional information would have greatly enhanced the analysis of this project, such as income data.

It is recommended that value added products be developed and study be made to investigate the market potential of these products.

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