Agriculture and Food Development Authority

FINAL REPORT

Project Armis No. 4331

Food Market Studies in
– meat packaging
– nutritional meat products
– speciality cheeses
– extruded meats

The National Food Centre

RESEARCH & TRAINING FOR THE FOOD INDUSTRY

RESEARCH REPORT NO 39

Contents

FOOD MARKET STUDIES

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SUMMARY

This project provided market information to researchers on the likely market success of their innovations in the following four areas: anoxic (oxygen free) packaging, developing new meat products with enhanced nutritional properties & consumer acceptability, speciality cheeses, and convenience meat products.

Anoxic packaging of retail meat cuts

- The system has potential. However, trade reaction was mixed and it was not seen as suitable for mainstream retail marketing. There are opportunities for particular market needs including holding additional product for promotions, meeting seasonal demand increases and sales to smaller stores with no butchers and low turnover.
- Issues of colour, shelf life and ways of keeping oxygen levels down in consumer packs were seen as needing further technical investigation.

Development of nutritionally enhanced processed meat products

- Irish meat processing companies are committed to meeting retailer demand for a reduction in additives and preservatives in processed meats.
- The industry needs assistance in developing processes that can lead to additive-free and preservative-free products.
- There are market growth opportunities for novel, nutritionally-enhanced meat products among the adolescent market.
- Research on processing alternatives to the use of additives and preservatives reflects industry needs.

Speciality cheeses

- There is a growing market for speciality cheeses in both the retail and foodservice sectors. The main drivers are the consumers' search for a variety of flavours coupled with the increased utility of cheese.
- An analysis of a number of New Zealand cheese companies concluded that no one model would provide the basis for diversification. However, elements of each would have an application in the development and growth of the Irish speciality cheese market. One company, Kapiti Cheese, illustrates how a sophisticated marketing operation and modest production capacity can achieve success by supplying customised products and targeting niche markets. Another, Marlborough, provides the example of how a small co-op can compete with larger co-ops by concentrating on high quality premium products for niche markets. A third, Mainland, highlights the benefits that a larger dairy co-op can bring to a specialist subsidiary company.
- Work on developing novel cheeses in Teagasc should continue, with a market focus so that it will meet the needs of the industry in a sector with considerable growth potential. An Irish company has taken up some of the ideas from New Zealand to develop its cheese business.

Extruded meats and meat in convenience foods

- There is little potential for extruded meat as retailers find it difficult to position an extruded meat product. A mixture of meat and soya targets neither meat eaters nor meat avoiders. It would be a source of confusion as a component in meat based convenience foods.
- There is great potential for convenience foods, particularly for high quality chilled meat products. Extruded meat does not easily fit to meet this demand.
- Extrusion was not well understood by consumers and even after careful explanation consumer reaction to the concept was negative.

- Full time workers eat out more and buy more takeaway but do not buy more convenience foods for in-home consumption than other groups. Home-consumed convenience foods may be relatively more important in their diet.
- The potential demand for convenience foods for in-home usage is being reduced by frequent use of restaurant and takeaway foods
- Perceived time pressures and perceived stress are most often related to higher consumption of all types of convenience foods; this is particularly so for meal centres and takeaways

MARKET FOR ANOXIC PACKED MEAT

Objective

The aim was to examine the market opportunity for anoxic (oxygen free) consumer packs of fresh meat from Ireland. This information was needed to guide technical research on a packaging system with sufficient storage life and subsequent display life for Irish factories to supply retail cuts, in consumer-ready packs, direct to European retail outlets.

What is anoxic packaging?

Individual trays of the meat, usually 12 in number, are placed in a mother or bulk pack which is impermeable to oxygen. Bulk packs are filled with carbon

dioxide, a preservative, and nitrogen, an inert gas. Oxygen scavengers are used to absorb any residual oxygen in the package headspace. The scavengers are small sachets of iron powder. An oxygen level of less than 0.1% is needed to prevent browning of the meat. Current research has enabled the low oxygen concentration to be maintained for up to four weeks.

Anoxic packed meat has a purple colour. Once the mother pack is opened the consumer packs are exposed to oxygen from the air and the red colour is quickly regenerated (30 minutes). The appearance is as good as that of freshly cut meat for at least four days at chill temperatures before use by the consumer.

Trade views

Twenty two interviews were carried out with retail buyers, meat cutting and distribution firms, and catering suppliers in France, UK, Spain and Ireland. The initial intention was to deal with beef only but industry discussions quickly established an interest in anoxic systems for lamb and pork and they were therefore considered in all further discussions.

Current system

Irish meat is sold vacuum packed as primals and sub primals, or fresh (carcasses or quarters on the hook) to supermarkets in the EU or supplied to customers in EU meat plants for further processing and later delivery to retailers and caterers. This suits many meat plants and retailers.

In France, the system of vac packed primals and cuts, with cutting to consumer requirements at local meat plants or at retail outlets, works well for large multiples. The power of the supermarket buyers was stressed and suppliers will do whatever the retailer requires. That means daily delivery of prepacked consumer cuts in overwrap trays.

In Spain, carcasses and vac packed primals and sub primals, including half carcasses, forequarters and hindquarters, are bought from meat companies. Generally, the multiples buy a mix of carcasses and vacuum packed meat as well as some MAP (modified atmosphere packaged) meat. Most of the cutting and packing is done at store level.

UK retailers buy primals and consumer packs. Both MAP and tray wraps are used. Very often the consumer meat packs are from UK based plants, so meat from Ireland comes via UK plants as consumer packs or from Ireland as primals. Where tray wraps are prepared at retail stores, most of the meat (including some lamb) is bought in in vacuum packs. Meat can be packed and delivered to retailer depots today and to branches tomorrow. They want daily deliveries to their stores and are not in favour of having product on display too long, despite looking for at least four days shelf life. Packaging is in traditional overwrap trays in high oxygen mother packs (CVP packs). There is some packing using other systems (e.g. Starflex). This uses a heat seal rather than overwrap, otherwise it is similar.

Flexibility, promotions, cuts, seasonality

Anoxic packaging was not seen as a mainstream technology for most fresh meat consumer packs. However, advantages include flexibility which would allow companies to prepare meat for promotions, to take advantage of markets for high value cuts e.g. striploins and alternative uses for offcuts and to reduce the impact of seasonality. It would also allow the trade to take advantage of a rising market or conversely oversupply problems, due to the longer storage life. It could be particularly important for new product lines and slower selling lines.

Other buyers questioned its value for promotions, as the extra packaging costs would be incurred on products sold at lower prices coinciding with the promotion. Suppliers organise promotions, so holding meat for this need is up to the supplier to arrange.

Anoxic packaging could be useful for caterers, as they often want to hold meat for some time before use.

Retail display shelf life

Although four days would be adequate for all those interviewed in France, a longer shelf life is required in Spain and the UK. In Spain, retailers want 5-6 days shelf life. The mother pack system does not give the additional shelf life. Furthermore, if the product was rejected by the supermarket it could not be sold elsewhere.

In-store butchers

Some retailers see in-store butcheries as essential to meet customer needs and the current system of vac packs supplied to cutting plants near the retail outlets gives more flexibility. The need for a butchery counter at retail level was one of the main reasons for not being interested in an anoxic system.

Labelling

There is a concern that the anoxic packaging system faces labelling problems, if date stamps had to be put on the individual consumer packs at the time of packaging. Thus, the flexibility of the anoxic mother pack system would be lost. On the other hand, some felt having to put on a “display until” label at retail level was not a problem.

Date stamping at the retail outlet could also raise a legal problem. The question of due diligence was raised.

Oxygen scavenger in meat pack

The trade was not in favour of the presence of a scavenger sachet in the meat pack and, if used, a way acceptable to consumers would be needed. One retailer thought that this would not be feasible as consumers would immediately associate scavengers with “chemicals”. For the catering trade, this is not an issue. However, there was concern about the safety aspects. While a less obtrusive scavenger is essential, the real solution is consumer packs without scavengers.

Colour stability is not as good for some cuts as for others and this may be a handicap for market development.

Costs

The anoxic packaging system is likely to be too expensive in the opinion of some of those interviewed. The need to undertake a costing exercise was stressed. It is difficult to see why suppliers should commit themselves to selling the product four weeks in advance. This may only be feasible for the big hypermarkets that have central cutting facilities and want to sell 100% prepacks.

Most said they would be prepared to help in providing cost data for making an economic assessment of various options. Discussions should be with logistics people as well as buyers in this regard.

Commercialisation

If the system works in the laboratory it is essential that it is properly tested in Ireland before doing a commercial test run with continental businesses. From experience, transferring technology successfully from the laboratory to industry in a commercial situation is difficult and companies generally find technologies do not work as well as the laboratories suggest.

Future interest

Some Irish, French & Spanish retailers and meat companies could be approached later depending on developments, while others would not be interested in an anoxic packaging system. Although some of those interested intend to maintain a butcher presence in their larger stores and the system would probably not suit their operation, they would be interested in a trial if costs were acceptable. Although the system does not fit in with current arrangements, some companies would like to see a sample of the packaging system when it got to commercial trial and are willing to be contacted again as the project progresses. They would like to see trial shipments and would be pleased to participate in any such trial.

Conclusion

- Irish meat companies did not have experience of this type of packaging. They were generally supportive of the concept and all felt Ireland should be exporting meat in consumer-ready packs. Reaction was favourable and some companies were very interested in knowing more about the system. However, others felt it is unlikely to be of interest to them.
- The main role for an anoxic system is probably not a mainstream one but it may have a place in meeting particular market needs. The system was more suited to smaller retail outlets that don't want to maintain a retail butchery counter.

- Some companies felt it is a good idea but were not interested due to the amount of new plant and retail investment in cutting facilities in recent years.
- Despite the fact that an anoxic packaging system did not fit in with the present cutting and distribution policies, some were still interested and would welcome a trial shipment but they expect the system to be well developed before such a trial is undertaken.

Technical developments in anoxic packaging

The laboratory trials have found it possible to store product for 6 weeks using a shrunk bag rather than overwrap film so that a scavenger is not needed. Once opened, steaks on retail display were as red as fresh ones for 7 days. The system also worked well for lamb loin chops and pork boneless loin chops (Reference: NFC Final Report No. 15 'Development of a novel bulk packaging system for retail cuts of meat').

Recommendation for industry

This technology offers potential for Irish meat exporters.

DEVELOPING NEW MEAT PRODUCTS WITH ENHANCED NUTRITIONAL PROPERTIES AND CONSUMER ACCEPTABILITY

Objective

The aim was to guide the development of nutritionally enhanced processed meat products. While meat is a highly nutritious food, there is a perception that processed meat products are associated with various diseases related to fat content (obesity, cardiovascular disease), salt (hypertension) and nitrite (carcinogenesis). The National Food Centre is evaluating the use of high pressure processing as a means of tenderising meat and improving shelf life, thus reducing the use of additives.

To match consumer needs with industry's competencies and technologies, the market study was therefore divided into two sections, on industrial research and consumer research.

Industrial research

To ascertain if the technical research objective of developing nutritionally enhanced processed meat products was correctly focussed on the requirements of industry, a qualitative analysis of the needs of the processed meat sector was carried out with five Irish companies considered to be potential users of high pressure processing.

Approach to new product development by meat processors

Companies use a multi-disciplinary approach to new product development (NPD). Technical, finance, sales and marketing personnel are either full-time members of the NPD team or are co-opted to the team as required. Ideas for new products are generated from visits abroad to trade fairs, supermarket visits, retailers, ingredient manufacturers, equipment suppliers, consumers and staff.

Companies adopted a strategic approach to business and have grown their product portfolio to include multi-species products, particularly beef, pork and poultry. This led companies to re-define their businesses from beef or pork processing to meat processing companies.

Each company expressed the importance of servicing a number of segments in the processed meat market. The UK market was the main export market focus. British and Irish consumer tastes were considered to be similar.

Low-fat

While food industry forecasters flagged low fat as an opportunity for exploitation, the low-fat theme has not achieved the same market success for meat products as has been achieved for dairy products.

The sector assumed that a low-fat burger could only be achieved by increasing lean content or by change of ingredients. Both of these approaches would lead to higher input costs and many processors concluded that a competitively priced low-fat beef burger is unachievable.

Chicken burgers were viewed as the low-fat alternative to beef burgers. Poultry products were developed to address the low-fat segment of the market.

Ham and bacon processors reduced the amount of visible fat on products in response to consumer demand for low-fat products.

Use of additives and preservatives

The need to reduce the number of additives used in process meats was considered to be an important objective. UK retailers are the most active group in requesting the removal of additives.

Manufacturers using nitrites have received requests from customers for their removal. Companies have minimised their use but have been unable to eliminate them totally from processing.

Processors use phosphates as a means of reducing salt. Ham processors supply a traditional product without phosphates; however phosphates are considered necessary in the production of sliced meats.

Use of flavour enhancers

Salt is used for its flavour enhancing properties rather than for its preservative or nutritional values. Processors stated that consumers, while having reduced their demand for salt, still require salt flavour.

Processors using monosodium glutamate (MSG) were actively working on reducing or, ideally, removing MSG at the request of retailers. The MSG alternatives currently available on the market were considered inferior to the original product.

High pressure processing

There was a high level of awareness of high pressure processing (HPP). It was associated with processing of fruit preserves and jams. None of the companies had considered the potential of HPP in meat processing.

Processors' reservations on the potential viability of HPP included high capital costs and the poor return on investment.

Conclusions

- The development of low-fat products is considered to be achievable but not economically viable for low-margin meat products. All the companies agreed that low fat is an issue that requires continual monitoring.
- To meet the demands of both Irish and UK retailers, processors were actively working on reducing or in some cases removing nitrites, phosphates and MSG from processed meat products.
- Processors were experiencing difficulties both in finding suitable alternatives to nitrites, MSG and phosphates and making the resulting adjustments to the production process.
- Salt is viewed as a flavour enhancer and is no longer used as a preservative. Processors believe that salt flavour is a necessary consumer requirement.

Consumer Research - adolescent survey

A review of market research highlighted opportunities in the adolescent market. Changes in adolescent behaviour are often expressed through a change in eating habits where traditional foods and eating patterns are rejected. The increase in 'snacking' and 'fast food' consumption reflects a diet of poor nutritional quality, tending to be high in fat, salt and sugar and low in important nutrients and fibre. This change in behaviour signals an opportunity in the adolescent market for new meat products with enhanced nutritional properties. Markets for other age groups need analysis to see if similar opportunities exist.

Pre-Leaving Certificate students (1276) in 59 schools participated in a national survey of adolescents. Current meat consumption behaviour and alternatives to meat were measured. Changes in meat consumption in the past year were also recorded. The importance of 'fast food' consumption in the adolescent lifestyle was determined and changes in this behaviour over the past year were recorded. Adolescents' attitudes to meat and health were assessed with particular reference to low-fat, salt, artificial additives and preservatives. The findings were as follows:

- One of two adolescents eat beef at least once a week. Consumption is significantly associated with gender. Young females tend to eat beef less frequently than young males and are four times more likely not to eat beef at all.
- Burgers continue to form part of an adolescent's diet with almost 50% of adolescent males eating beefburgers at least once a week. Twice as many males as females eat beefburgers at least once a week.
- Chicken is by far the most popular meat with adolescents with three out of four adolescents eating chicken a minimum of once a week. Both groups expressed a preference for the taste of chicken rather than beef.

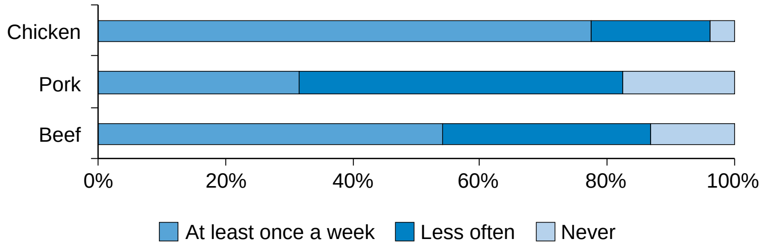

Figure 1: Frequency of eating beef, pork and chicken.

- The consumption of deli-meats among adolescents is low with six out of ten stating that they never eat salami or pepperoni.
- Fast food and take-away restaurants remain popular with almost 95% of adolescents using these restaurants. More than 50% eat in a fast-food restaurant at least once a fortnight.
- Almost one out of three adolescents consume low-fat products at least once a week and more than 45% report that they try to use low fat products whenever they are available.
- The use of added salt in food products is not a concern for more than 70% of adolescents.

– More than two out of five adolescents check labels to determine whether the foods they eat contain artificial additives and preservatives. More than one in five expressed concern about the use of preservatives in ham, bacon and sausages.

Conclusions

- The low level of consumption among adolescents of deli meats, such as salami and pepperoni, offers the processed meat sector significant market growth potential.
- While significant numbers of adolescents appear to be reducing their fat intake by eating low-fat versions of products, the research suggests that adolescents may be making more fundamental changes to their meat dietary habits by choosing to eat chicken due to an absence of low-fat beef products.
- While additive-free and preservative-free attributes may be a unique selling proposition (USP) for processed meat products, they also represent significant secondary benefits.
- The significance of the fast food sector in adolescents' consumption of meat products is an important consideration in developing pricing and distribution strategies for a new meat product.
- The level of salt in food products does not appear to be a concern for the majority of adolescents.

Technical development of high quality minimally processed, convenience-type meat products

The use of high pressure in the manufacture of frankfurters allowed reduced salt and reduced phosphate concentrations without adversely affecting the colour or flavour intensity.

The phosphate content of breakfast sausage was successfully reduced to 0.25% using high pressure without compromising the stability of the sausage emulsion. A sensory panel perceived the pressure treated low-phosphate sausages to have similar firmness, texture and acceptability as non pressure treated control sausages containing higher phosphate concentrations.

The salt content of breakfast sausages was decreased to 1.5% with the use of high pressure processing without negatively affecting the quality characteristics or safety of the product. However, salt reduction to less than 1.5% can have detrimental effects on sensory and textural aspects. Flavour and texture enhancers, added to sausages formulated with 1% salt, were beneficial in improving the stability and water holding capacity.

Consumer testing and laboratory quality measurements of high pressure treated fresh sausages prepared with some commercial seasoning found that the product was as acceptable as a typical commercial product.

Pressure-treated beefburgers had improved cook yields, increased water holding capacity and enhanced tenderness and juiciness. Fat level could also be reduced in beefburgers in the presence of tapiocaline as an added functional ingredient.

(Reference: NFC Final Report 'High pressure technology in the manufacture of minimally processed meat products').

Recommendation to industry

There is a market need for minimally processed, additive and preservative-free products and there are technologies available to the industry to produce low salt and reduced phosphate meat products.

SPECIALITY CHEESE

Objective

With increasing demand being predicted for speciality cheese over the coming years, the market studies aimed to provide information on speciality cheese to assist in their technical development. The objective was to investigate the market for speciality cheeses for the hotel and catering industry in Ireland and to assess if there is a niche market for the provision of a speciality cheese service to this sector.

Market analysis

A literature review revealed the following:

- In 1995, Ireland produced over 77,000 tonnes of cheese of which approximately 58,000 tonnes was cheddar. Despite the dominance of

cheddar, there is a growing demand for non-cheddar varieties or speciality cheeses, including mould and smear ripened cheeses, semi hard and hard cheeses with eyes.

- Many involved in the Irish cheese market agree that the consumption trend in Ireland is upwards with low consumption providing a good base for future growth. Steady growth rather than an overnight boom is anticipated. The market is set to grow by 6% per annum, driven partially by new varieties.
- The main factors which have encouraged increased consumption and interest in cheese include travel abroad, which has resulted in more adventurous eating. Having experienced new cheese flavours and textures, consumers wish to repeat the experience on their return home. Another factor is the promotion of cheese by celebrities and chefs on popular television programmes. Tempting displays and tastings have also acted as a driving force behind increased sales, as has the growth in the pick'n'mix selections, which allow customers to try out small amounts of different varieties.

Interviews with the food service industry
There is a wider usage of cheese in the food service sector; cheese is now being used more frequently and for an increased number of purposes. The quantity of speciality cheese in this sector is small but it is a profitable niche market with premium prices.

The top five cheeses for cheeseplates were Cashel Blue, St Brendan's Brie, Gubbeen, Durrus and Milleens. Other cheeses commonly used include Wexford Mature Cheddar, St Killian, Cooleeney, Blarney, Carragaline, Ardrahan, Coolea, Round Tower and Baylough.

The use of pre-portioned and pre-packed portions is also seen in the foodservice industry. In self-service operations a range is often offered in a basket while in restaurants the cheeses are presented on a cheese plate. The advantage of a cheese plate is primarily cost savings as a result of reduced wastage but the cheese plate also offers the opportunity to customise the product for the consumer.

Wastage appears to be less of a problem now as many foodservice establishments have ceased using a cheeseboard and opt for a cheeseplate. For cheeseplates, the cheeses are cut into individual portions, usually in the kitchen, and arranged on a plate accompanied by fruit and/or biscuits. Excess cheese was often used in sauces or as starters such as deep-fried cheese or as fillings in potato wedges or meat dishes.

The main cheese distributors were not always the most favoured suppliers. Suppliers were chosen for a variety of different reasons including price, quality and frequency of delivery. While the service offered was generally considered good, many of the establishments felt that they would be better served if there was a facility to order and receive deliveries at shorter notice. The majority felt that many suppliers provided only the minimum information on new cheeses, new product introductions or recipes and that individuals had to source this information themselves.

Interviews with cheese distributors

Speciality cheese is seen as a growth area as is the use of cheese both in cooking and on a cheese plate. The provision of cheeses made to specification would be well received providing the quantities involved were small. Irish farmhouse cheeses are enjoying increased growth in both the domestic and UK markets.

Foreign cheeses are being consumed increasingly in Ireland, with French types proving to be the most popular; Feta cheese appears to sell well during the summer months but varieties such as Stilton, Gouda and Edam are still maintaining their popularity. While the volumes of a number of speciality varieties are low, more and more are appearing on the Irish market indicating an increased trend of consumers willing to try alternative products. The number of customers buying buffalo milk mozzarella has increased and further rises are expected in the sale of goat's cheese and varieties of sheep milk and other buffalo milk cheeses.

New Zealand cheese companies

Kapiti Cheese was identified as a potential model of diversification suitable for the Irish market. The Kapiti operation has been extremely successful in

NZ by providing custom-made cheese in a variety of different packaging requirements catering for the food service market.

This type of operation has the potential to be successfully adapted to the Irish market by an innovative company. This model would be of particular benefit in terms of diversification and the identification of new products which would increase a firm's product offering.

The marketing strategies and technological aspects employed by NZ speciality cheese companies were very successful in their particular target market. They were however very different from one another in terms of scale, product range, logistics and marketing strategies. It was concluded that no one model would provide the basis for diversification. However, elements of each would have an application to assist in the development and growth of the Irish speciality cheese market.

The Kapiti Cheese Company manufactured a limited tonnage of cheese. Their competitive advantage lay in the sourcing, re-packing and re-branding of speciality cheese. Their unique selling proposition was based on their ability to supply any quantity of cheese to a client within 24 hours and their marketing and promotional strategy. Kapiti Cheeses is becoming somewhat of a brand name in NZ. This is attributed to the fact that they tailor their products to the needs of their customers, have next day delivery facilities in most markets and are constantly aware of changes in consumer attitudes to cheese. Currently they have a foothold in the Asia Pacific export market and as they operate in a niche market their service can be seen as complementary and not in competition to the service of the NZ Dairy Board.

Marlborough achieve competitive advantage by concentrating on high quality Cheddar and differentiation of cheeses in high value niche markets that have been identified, including the Kosher and Halal markets, where they are market leader.

In terms of scale, Mainland (Ferndale) provides the most suitable model in an Irish context. The total annual production of ~1,200 tonnes includes over 30 varieties of which 15 varieties are produced per day. This includes 250 tonnes of white mould cheese and 450 tonnes of Blue cheese. Havarti, Emmental, Gouda and Edam account for the remainder.

Industry uptake of cheese market study

An Irish industry company has exploited this research.

A shop audit was conducted on four main Irish stores and a database developed providing information on cheese type, supplier, cost per kilogramme and nutritional information

Conclusions

- Irish consumers are continually seeking greater variety, both for fresh cheeses and increasingly for stronger tasting cheeses.
- Speciality cheeses are appealing to a growing number of consumers looking for new flavour combinations.
- The utility of cheese has increased greatly; cheeses are now used as snacks, as an ingredient in conventional cooking, in convenience foods and in value-added processed foods.
- Consumers' preferences are changing from the traditional cheeses to cheeses such as buffalo milk Mozzarella, Feta, Asiago, Gorgonzola and novel cheeses including ethnic type cheeses.
- The three NZ companies profiled have developed their own competitive advantages. Kapiti Cheese illustrates how a sophisticated marketing operation and modest production capacity can achieve success by supplying customised products and targeting niche markets. Marlborough provides the example of how a small co-op can compete with larger co-ops by concentrating on premium products for niche markets. Mainland highlights the benefits that a larger dairy co-op can bring to a specialist subsidiary company i.e. low raw material and production costs, good distribution networks and shared marketing costs.

Technical developments in speciality cheese manufacture in Ireland.

The Dairy Products Research Centre (DPRC) has put a model for diversification in place consisting of the following elements:

- knowledge and skills base for the development and manufacture of speciality and hybrid cheeses;
- assistance for commercial partners to establish a market presence for selected cheese varieties using MTL pilot facilities as the manufacturing base;
- assistance in the transfer and scale up of the manufacturing technology of cheeses from the MTL pilot plant;
- validation of the NZ model for speciality cheese manufacture by provision of a flexible plant producing multiple varieties in response to market demand. (Reference: DPRC Final Report No. 9. Speciality cheese manufacture in Ireland).

Recommendation to industry

A model is in place which offers the Irish dairy industry an opportunity to diversify in speciality cheeses.

POTENTIAL FOR EXTRUDED MEAT IN CONVENIENCE FOODS

Aims
To inform technical research with reliable and useful conclusions on market trends taking into account the views of both trade/industry buyers of food products and consumers. The research was therefore divided into two sections, on industrial research and consumer research.

Irish supplier and UK retailer views

The objective of the interviews was to better understand the issues and trends in the UK ready meals and wider convenience foods sector including reaction to foods containing extruded meat. Representatives from five Irish-based suppliers of ready meals to the UK retail sector, senior buyers from the main UK retail groups and an independent expert from the UK retail sector were interviewed.

Greater convenience
In 1995, the average consumer spent twenty minutes per day preparing and cooking food. This will decrease to less than ten minutes in the near future.

Improvements in reheating of meals, innovations in packaging and improvements in microwaving technology are central to meeting the demand for increased convenience.

Emphasis on quality
A more quality conscious consumer with greater buying power is responsible for the trend to chilled meals. However, the frozen market will remain a huge market and continue to grow.

The quality and grade of raw material in the product is dictated by the price point as set by the retail customer. Thus, low grade meat cuts and processing technology provide an acceptable “reformed” meat ingredient for budget price points.

Innovation and rapidly changing markets

Innovativeness was seen as a very important requirement for suppliers to the UK multiples. This means constant development of new recipes, ethnic and low calorie dishes, finding alternatives to meat as an ingredient and meeting the challenge of new trends towards in-store food service.

Retailer plans for in-store food service offered both opportunity and competition for suppliers. It is a relatively new concept and is currently on trial in most of the large multiples. The restaurant and takeaway trade set the trend for the retail ready meals sector.

Meat as an ingredient

The meat ingredients used by the suppliers interviewed varied from high quality cuts to cheap meat cuts and trimmings.

Meat-based meals will decrease as a proportion of the total convenience meals market in the future. The main reasons are consumer perception of meat as an unhealthy food and the growth in demand for ethnic and pasta based recipes.

Consumers expect to find Quorn and meat substitutes in the meat department rather than in the ready meals section. "Meat reducers", who want the texture and flavour associated with meat but want to reduce meat intake for healthy eating reasons, buy these products.

Strict vegetarians are not the target market as they want to get away from meat-like products. Tofu is used in some ethnic cuisine such as Japanese and Chinese. Tofu and other substitutes will increase in popularity with the growth in ethnic cuisine. However, ready meals with meat substitute bases are not big sellers.

Chicken is the base for 70% of any range of meals with the exception of Italian meals. The consumer perceives chicken as healthy and from a quality point of view chicken can be cooked several times without affecting the texture. Re-cooking causes problems with texture in beef. Many beef-based ready meals are traditional casseroles and pies. The benchmark for quality is home cooking. Hence the cooking process must ensure similar meat texture.

Reformed meat products are not used in the chilled sector where quality is the key factor. The customer expects meat to taste well, be tender and be free from fat or gristle. The general feeling was that an extruded soya and meat mixture has a cheap and low quality image. It would not be acceptable for chilled meals. Retail buyers felt that a product which falls between two markets, meat and non-meat, would confuse the consumer. A meat-avoiding consumer will not want any meat in the product.

Conclusions

- There is a definite trend from frozen to fresh product in the UK retail convenience meals market-driven by changing consumer lifestyle. Retailers are actively supporting and facilitating this trend because of higher margins.
- In-store food service is of strategic importance to many UK retailers. Trials are ongoing in a number of the multiples.
- The meat substitute market continues to grow as the number of meat avoiders increases. However, retailers believe that an extruded soya and meat mix would not be a viable meal ingredient, missing meat eaters and also meat avoiders.
- Extrusion was not well understood by consumers and even after careful explanation consumer reaction to the concept was negative
- Meat in convenience meals consists of approximately seventy per cent chicken, with minced beef making up a major part of the remaining meat-based dishes. The reason for this is a combination of consumer attitudes towards healthy eating and difficulties with quality control in meat dishes.

Consumer research

The aim was to examine factors that influence use of convenience foods in Irish households. Some 40% of women are now in the workforce and this study examined the impact of the changing work roles of women on convenience food consumption.

A consumer survey was undertaken with three groups of females; those working full time outside the home, part time workers and those full time at home. In all 500 female consumers took part.

Convenience food usage was measured in the following forms; prepared dinners, meal centres (main part of meal but not complete meal), prepared food items to assist meal preparation, desserts, home deliveries, retailer "food to go" foods (manufactured cooked foods, heated at retail outlet, ready to eat), takeaways and restaurant meals.

A Canadian study suggested four types of factors may be influencing consumption. These are work/time related, role orientated, demographic and outcome factors. These four factors were analysed as follows:

- work/time related variables: role overload (perceived time pressure), participation in the work force, and work involvement;
- role-oriented variables: enjoy food preparation, regular cooking and enjoy shopping;
- demographic: education, income and socio-economic status.

– outcome: stress, satisfaction with life.

The findings are based on focus groups, literature and the consumer survey. It is important to distinguish between convenience foods used in the home and convenience foods purchased for consumption outside the home (see Table 1).

Perceived time pressure
Perceived time pressure was positively correlated with the use of prepared dinners, meal centres, takeaways, home deliveries, and "meals to go" from supermarkets. Women working outside the home reported significantly higher levels of perceived time pressures than women working in the home and there were differences between the two groups in their purchases of convenience foods.

Labour force participation
Households where women work outside the home use more convenience foods than where the woman is working full-time in the home. It is not employment

Table 1: Relationships between general lifestyle attitudes of consumers and labour-force participation

Attitudinal profile	Significance of difference between labour force participation group
Perceived time pressure	**
Work involvement	***
Perceived stress	*
Satisfaction with life	ns
Attitude to food preparation and cooking	*
Attitude to food shopping	ns

Note: *, ** and *** = statistically significant at 95%, 99%, and 99.9%, respectively.
ns = not significant.

per se but rather the perception of time pressure and stress resulting from a busy lifestyle which are the main influences on consumption patterns.

Work involvement
Extent of working outside the home is not positively related to increased usage of convenience foods in the household.

Occupational status
Households with career oriented working women do not use more convenience foods than households where the woman works for non-career reasons. Occupation is not a key factor influencing convenience food consumption; it has more to do with other activities having a higher priority than cooking in the household.

Perceived stress and satisfaction with life
Higher perceived level of stress positively influenced the use of prepared dinners and meal centres in the home. Women working full-time outside the home report significantly higher perceived stress which was positively related to increased usage of convenience foods in the household.

Satisfaction with life is negatively related to increased usage of convenience foods in the household only in the case of prepared dinners.

Attitude to food preparation and cooking
Women working full-time in the home are significantly more positive about food preparation than women in the other two groups are. Working women with a positive attitude to food preparation and cooking use significantly less prepared dinners than women with a negative attitude to cooking. Many women feel that routine cooking is an unnecessary task and that convenience foods are a substitute for that task. Spending time with children and in pursuing leisure activities are much more of a priority than spending time in food preparation and cooking.

Attitude to food shopping
Attitude to food shopping had no influence on the use of any convenience food category. However the focus group discussions suggested that women working full-time outside the home have a greater dislike for food shopping.

Convenience foods outside the home

Eating out in restaurants was significantly influenced by participation of women in the work force and occupational status of working women.

Influence of children

The presence of children under the age of six is associated with the purchase of takeaways and home deliveries and with meal centres consumed in the home. Cost and nutritional considerations are combined with an underlying sense of guilt among many mothers about not preparing meals for their families. Semi-prepared convenience foods are a convenient compromise between traditional beliefs & expectations and what is necessary and expedient in the reality of a busy lifestyle.

Education

Working women with higher levels of education eat out in restaurants more frequently but do not use more convenience foods in the home. Women working outside the home have higher levels of education than those working full-time in the home and this may be a mediating factor.

Income

Income is not influential on the use of convenience food categories in the home but is correlated with the use of convenience foods purchased outside the home.

Conclusions

The implications for the various sectors of the food industry are outlined below:

- Retailers: Many women do not enjoy the shopping experience and find it stressful. Retailers who make the experience more enjoyable will benefit.
- Manufacturers: There is a need for even greater convenience in packaging and cooking.

Concerns expressed about the nutritional value of convenience foods for children can be, in part, alleviated by fortification with vitamins and minerals.

Successfully combining convenience with a perceived feeling of involvement in preparing convenience meals will satisfy the mothers' desire to have some input into meal preparation.

The incorporation of herbal and other natural components into convenience foods will further the market for functional convenience foods associated with stress reduction.

- Advertisers: Promoting convenience of use and time saving is the main priority for any convenience food. Approaches likely to reflect positively on the product/company include; incorporation of male shoppers in advertisements; promoting the positive health aspects of convenience foods; portraying a stress free experience and environment surrounding the use of convenience foods.
- The food service sector: There will be a growing market for high quality, ready-to-eat food purchased outside the home but for consumption in the household. Restaurateurs, food retailers and food manufacturers should target this market for both gains in market share and overall market growth.

Technical developments in the production of food ingredients by extrusion cooking

A novel method for the manufacture of sausages and frankfurters by cold extrusion was devised.

Frankfurters and sausages produced by extrusion were of comparable quality to those produced by bowl chopping. A consumer pre-test study revealed no significant difference in preference for bowl chopped and extruded sausages and frankfurters.

Meat extenders were developed using cooker extrusion and incorporated into beefburgers. A consumer pre-test study revealed that over 50% rated burgers containing 20% liver/soya extender moderately acceptable or better. However, inclusion in beefburgers of meat extenders containing 40% beef/soya or 40% liver/soya may adversely affect burger flavour and texture.

Expanded semolina and maize snack products containing 10% dried beef and flavoured with beef flavouring were favourably received in consumer pre-tests, the maize snack being significantly more acceptable.

(Reference: NFC Final Report 'Producing food ingredients by extrusion cooking')

Recommendation to industry

Although some food manufacturers expressed interest in the extrusion-cooked ingredients developed in this project and in the cold extrusion process for making sausages, the result of the trade and consumer market analysis suggests that it would be difficult to develop a market for extruded meat products because of poor perception of the quality of such products by manufacturers & consumers and difficulty in identifying a target market.

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