The consumption of aquaculture products in non-Mediterranean Europe

Young J.A.

Marketing of aquaculture products

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 17

1996
pages 55-65

The consumption of aquaculture products in non-Mediterranean Europe

J.A. YOUNG
DEPARTMENT OF MARKETING
STIRLING AQUATIC RESOURCES
UNIVERSITY OF STIRLING
SCOTLAND
UNITED KINGDOM

SUMMARY - The paper presents an overview of fish consumption in non-Mediterranean Europe with particular emphasis upon the EU component of the region. The single EU market embraces a tremendous diversity of consumption trends in aquaculture products, both within and between constituent countries. Consumption data is reviewed in terms of its emphasis upon aggregate market volumes and contemporary product prices; but this tends not to reveal important sub-regional variations and more importantly, does little to identify consumer behaviours in the component markets. For the purposes of this seminar, these are best considered by reference to the principal contemporary themes in fish consumption in Europe. Food products from the aquaculture sector must compete alongside the much larger range of alternatives from both the fish capture and other food sectors. Generally, aquaculture products have enjoyed a favourable consumer perception, like fish as a healthy foodstuff. However aquaculture products increasingly must accommodate demands for additional product attributes, especially in the more Northern EU markets. Whereas in the past, the whole fish or related concepts have been acceptable, market saturation has encouraged diversification into more added value products. Value may be added in a variety of different guises, incorporating different stages of product transformation and delivery through various organisational structures. Aspects of these evolutionary influences on fish consumption are reviewed. It is contended that hitherto the aquaculture sector has been comparatively slow to respond to the contemporary changes sought by consumers, a situation which is likely to change in the future as consumption incorporates new aquaculture species.

Key words: Aquaculture, consumption.

RESUME *- "La consommation de produits aquacoles dans l'Europe non Méditerranéenne". Cet article passe en revue la consommation de poisson dans l'Europe non Méditerranéenne en insistant particulièrement sur les membres de l'Union Européenne de cette région. Le marché unique de l'Union Européenne recouvre une très grande diversité de tendances de consommation pour les produits aquacoles, tant au sein qu'entre pays membres. Les données de la consommation sont étudiées en termes de leurs effets sur les volumes agrégés de marché et les prix des produits à la période correspondante ; mais ceci ne permet pas de révéler d'importantes variations sub-régionales et, plus important, n'apporte pas grand-chose quant à l'identification des*

comportements des consommateurs dans les marchés des pays membres. Dans le cadre des objectifs du séminaire, ceux-ci sont mieux mis en relief en se référant aux grands thèmes contemporains de la consommation de poisson en Europe. Les produits alimentaires du secteur aquacole doivent concurrencer l'éventail bien plus large d'alternatives offertes par les produits de la pêche et les autres secteurs alimentaires. En général, les produits aquacoles ont bénéficié d'une perception favorable du consommateur, de même que les autres produits de la pêche, comme un produit bon pour la santé. Cependant les produits de l'aquaculture doivent répondre, chaque fois plus, à l'exigence de qualités additionnelles du produit, spécialement dans les marchés les plus au Nord de l'UE. Tandis que par le passé tout le poisson ou ce qui y était rattaché était accepté, la saturation du marché a encouragé la diversification en produits à plus haute valeur ajoutée. Cette valeur peut être ajoutée sous un grand nombre de formes, faisant appel à différents stades de transformation du produit et d'acheminement à travers différentes structures d'organisation. Les aspects de ces influences évolutives sur la consommation de poisson sont étudiées. On estime que jusqu'à présent le secteur aquacole a été comparativement lent à répondre aux changements contemporains recherchés par les consommateurs, une situation qui changera certainement dans le futur au fur et à mesure que de nouvelles espèces aquacoles feront leur apparition pour la consommation.

Mots-clés : *Aquaculture, consommation.*

INTRODUCTION

This paper aims to review the consumption of aquaculture products in the non-Mediterranean countries of Europe. This task immediately encounters constraints related to the scale and heterogeneity of the markets concerned. In an attempt to lessen these, the primary focus of analysis will be upon established EU member states with only limited incorporation of Norway and more recent Scandinavian members and the former centrally planned economies (CPEs). However even within this more confined geographical area considerable variations remain evident: the EU may be properly regarded as a single market in name only, the reality is somewhat different. Because a detailed profile of the nuances of individual markets is beyond the space limitations of the paper, a synthesis of trends in consumption will be emphasised rather than attempt what at best might amount to potted anatomical atlas of the belly of aquaculture product consumers.

The analysis is begun by a brief overview of some characteristic consumption data. However no attempt is made to duplicate the statistical detail made available to this seminar through the earlier papers, notably from the FAO contributions. Rather than reiterate the aggregate volumes of individual species constituting the varied market segments within countries' borders, and the less frequently mentioned prices of the products concerned, the focus of this paper will be upon the phenomena which have resulted in these aggregate volumes being consumed in the past and which will influence the quantities eaten in the future. Nonetheless some perspective on the nature of the non-Mediterranean European markets is appropriate, if only to substantiate the case for the approach adopted.

MARKET SIZES

In most of the non-Mediterranean European markets consumption of fishery products generally has grown steadily, with estimates suggesting around a 20% increase over the past 20 years and an average consumption of some 17.7 kg/yr in 1990 (Young & Muir, 1994). The composition of this demand is varied and quite substantive differences exist both between countries and within their borders. For example in Germany fish consumption in the northern regions is estimated at up to 30kg/yr whereas in the interior it is only 10kg/yr - some two-thirds of the country's average. Whereas in France and the Scandinavian countries consumption averages around 32kg/yr, this is much less than, for example, the 58 kg/yr found in Portugal (Norwegian Seafood Export Council, 1995; Instituto Nacional de Estatistica, 1995). The exception to this general trend of increased consumption would seem to be in the former CPEs where infrastructural change in supplies and relative buying power have resulted in diminished consumption (Westland, 1995).

In assessing consumption it must also be remembered that in comparison to captured fish product, cultured product is still comparatively minor; however over the past decade the share of farmed product has generally increased within the region. For example, in both Ireland and the UK farmed product has doubled its share of total fish products produced and in Germany this has increased by 50% (Eurostat, 1995). Despite the sizeable variations found to exist within the markets for fish, rather more extreme differences might be expected in the case of aquaculture products because of their general tendency to be targeted at niche rather than mass markets. The retention of focus upon selected market segments for high unit value (HUV) products rather than more mainstream fish products will tend to narrow the consumption base and thus the extremes of quantities eaten. Clearly this will tend to make generalisations at the larger scale all the more prone to misinterpretation, however some consideration of the market for particular species is required.

SELECTED SPECIES PERSPECTIVES

Not surprisingly, given the volume increases and decline in real prices, consumption of salmon has evidenced substantial growth over the past 10 years. This has been estimated to have increased from a per capita average 0.04 - 0.33kg/yr between 1980 and 1990 with an increase of more than 20-fold in France to 0.93kg/yr (FitzGerald, 1995). However, despite this growth French consumption still trails that of Norway and Sweden where 1.1 - 1.0kg is consumed (Norwegian Seafood Export Council, 1995). More recent and projected increases in the production of Atlantic salmon, especially from Norway, are likely to ensure that consumption will extend further still. In particular falling prices and more emphasis upon added value products should attract further market segments that hitherto have not featured in the data.

Despite the longer presence of farmed trout in the market, demand for the product is generally regarded as having reached a plateau in the late 1980s. Estimates suggest the market to be around 150,000t and as a mature product it is likely that any further growth will tend to result from new product development rather than expansion on the

basis of the traditional product concepts (Monfort, 1994). Elsewhere within the non-Mediterranean countries the markets are comparatively limited in size. As noted by Hough, with the exceptions of trout, carp and eels the European markets for freshwater species tend to be measured in thousands of tonnes rather than in tens of thousands (Hough, 1994). Within the marine species consumption of bass and bream has yet to reflect the full scale of expansion which has occurred within the Mediterranean. Hitherto output has focused upon the traditional wholesale markets within the area (Stephanis, 1994), but this may be expected to change as rising production seeks more northerly distribution channels. Apart from growth in mollusc, consumption of other marine species is relatively modest due to the early stages in production technology and existing market preferences. Undoubtedly consumption of new aquaculture species such as turbot, halibut and others will expand but this is unlikely in the immediate future (Jones, 1994).

Notwithstanding the evident importance of having some idea of the size of particular markets, and relative price movements, arguably it is more important for the fish producer, and others in the fish marketing chain, to have a clear understanding of the marketing forces which are shaping future demand patterns. For these reasons rather more emphasis is placed upon trends in the behaviour of fish consumers. Although the primary concern of the paper is with aquaculture products, any concern with the market must also embrace other fish species if not other close substitute foods such as poultry. Having outlined something of the straight statistical profile of the non-Mediterranean markets for aquaculture products, a number of themes are considered as key determinants of the consumption patterns observed so far and those which might be expected to follow.

EATING HEALTH AND CONSUMERS' FISH CONCERNS

A consistent trend over the past decade for the majority of European consumers has been the increased concern with healthy eating. Fish generally has fared well under this trend, being perceived as a foodstuff which confers benefits increasingly recognised to be desirable. One of the more frequently cited points is the low level of fat contained in fish, and that even when present its concentration of omega-3 polyunsaturates confers further benefits against cardiovascular diseases (Marshall & Currall, 1992). However, despite some gains especially at the expense of red meat it must also be remembered that this more favourable disposition to the fish product has not eliminated many of the traditional negative perceptions harboured by the potential and actual fish consumer. Although negative perceptions necessarily vary between countries, reflecting the diversity of social and cultural influences which have shaped the wider pattern of food consumption, their existence and retention demands some consideration.

Especially in the non-Mediterranean parts of Europe consumers are less tolerant of the whole fish concept. In some respects this aversion may be regarded as quite consistent with the presentation practices generally adopted for other similar protein sources such as carcase meats and poultry. However, quite apart from the tendency of some to dislike being presented with heads, eyes and other species-confirmatory anatatomical detail the presence of bones in the flesh presents a further disincentive for many to

consume. Such consumer aversion may be particularly significant to aquaculture products given that so far their main emphasis has been upon retention of the whole fish concept. Whilst this presentation may be entirely in keeping with the demands of the HUV species markets targeted so far, it arguably will present an increasing challenge as outlets for increased volume are sought in wider mass markets.

Fish is also fraught with concerns over pre-purchase selection and post-purchase storage. In many cases buyers seemingly lack the self-confidence to determine acceptable quality characteristics in displayed products and thus opt for alternatives instead. Although many have contended that this suggests the need to educate the consumer, the more fundamental concern is that the consumer perceives it necessary to have such skills in the first place before entering into the buying decision. It is debatable whether commensurate quality inspection capabilities are held or indeed are perceived at all necessary in other food sectors. Similarly it is perhaps indicative of some deficiency that buyers seem to remain highly uncertain about the storage of fish but remain rather less concerned about potentially higher risk products such as poultry. Farmed fish products should be able to capitalise upon uncertainty of quality because the greater control afforded throughout the marketing chain. However hitherto their minor role within the wider market for fish has not been able to overcome existing consumer concerns; a situation not helped by the marketing of less than ideal product within some sectors of the industry.

Even assuming that the courage can be summoned to select a fish product and bring it into the home, further obstacles in the mindset of the consumer are commonly encountered in preparation. Somewhat perversely these tend to increase in indirect proportion to the naturalness of the product. Although the simplicity of fish cookery is widely recognised by the cognoscente, many commonly perceive fish to present an unwelcome challenge to the cook's preparational skills. Because of these perceived demands, disinclination to serve fish will tend to increase in households where time is more constrained, often where the adults work and/ or children are present. Fish purchase and preparation has also been discouraged by its associated smells especially where, post-cooking, these permeate smaller more densely occupied housing. Again this has tended to discourage fish consumption from poorer households and those where children are present. The combination of these factors will thus tend to age the profile of the fish consumer and, importantly, may tend to lower fish in the priority meal rankings of subsequent generations.

VALUE-ADDED SOLUTIONS

Solutions to concerns such as those outlined above, and others, have been sought by a substantial and growing section of fish consumers. These solutions have been delivered by varying degrees of product transformation which at the same time add value to both the product purchased and, more importantly, the consumer's perception of its worth. At the more elementary levels product transformation may constitute only comparatively minor physical changes such as headless, gutted, filleted, skinless or boneless products but, at the other extreme may extend to incorporate fully prepared dishes in which the fish is served with a number of other ingredients. Such modifications

to the core product concept are important since they can provide an opportunity to lower raw material costs by incorporation of less expensive non-fish raw materials at the same time as extending the product range.

Less tangible values may also be added. Increasingly, product transformation seeks to satisfy the non-Mediterranean European consumers' preferences for products which incorporate further convenience through extra storage and preparation attributes. For example products may be stored pre-packed in chilled or frozen form and be prepared using a selection of cooking methods, thereby obviating concerns over pre-purchase selection and post-purchase storage and preparation. These trends have also been encouraged by the growth in household penetration of domestic appliances such as freezers and microwaves which range from 47% in the Netherlands to 96% in the UK and 28% in Denmark to 58% in Sweden respectively (Monfort, 1994). In addition to enabling the more technical functions, packaging may be used to communicate quality and freshness through labels and date stamps, whilst also permitting some form of brand identity and product differentiation less feasible with the unpackaged product. With some notable exceptions the farmed fish product tended to retain its original emphasis upon the trade channel standard of whole fish packed bulk in ice in polystyrene boxes. This has tended to ensure that much of the product which passes through to the retail chain loses out in packaging presentation when set against competing alternatives. Even in cases where some attempt at retail packaging is made the simplest overwrapped polystyrene tray tends not to convey the best impression to the prospective consumer.

VALUE-ADDED RETAIL CHANNELS

Throughout Europe product transformation solutions have increasingly been promoted through the growth of supermarkets in the food retail sector. Indeed it should be recognised that fish, particularly in its fresh/ chilled form, has been one of the last major product sectors to be incorporated within this evolutionary environment. Since the 1970s the multiple chains have become increasingly dominant within the packaged grocery market. For example, in 1973 only half of UK packaged grocery sales was through the multiples whereas in 1994 this was typically over 80% (Retail Intelligence, 1995). In the early 1990s the three leading multiples in the UK, Germany, the Netherlands and Belgium all held packaged grocery market shares of over 40% (Gentles & Skeldon, 1994).

Traditionally the multiples have been the dominant sector within the frozen and canned fish sectors, accounting for 60%-80% of the market, simply because these products were much more suited to the longer storage requirements of a customer base which shops less frequently than previously (Young, Burt & Muir, 1993). Especially prior to the wider adoption of packaging innovations such as modified atmosphere packs (MAP) and vacuum skin packs (VSP), the fresh product's shelf-life was too short for the shopper's buying cycle. More recently the involvement of supermarkets with fresh product has also been increased through the incorporation of traditional specialist outlets within their layout. These displays contribute to the atmospherics and supposed attractions of the supermarkets and reinforce their specialisation in the mind of the

consumers. In Germany, Ireland, the UK and France the multiples now account for between 30% and 50% of the fresh fish market (SFIA, 1995; Euromonitor, 1995). This growth has afforded the multiples considerable power and influence in the marketing of fish products and has been matched by a commensurate decline in the independent specialist retailer. This trend has also impacted upon the wholesale sector. Inland markets such as Rungis and Billingsgate have experienced downturn in product throughput, although this has also been accompanied by an increase in both the value and range of species traded, many of which are farmed (Young, Burt & Muir, 1993).

The importance of the supermarkets within the market for fish is significant, not least for their ability to reach the fish-averse younger consumer and to present a fish product range within the context of the contemporary food market. At the same time many marketing channel members, especially the smaller scale found within both capture and culture sectors, are unable to meet the more demanding procurement specifications of the supermarkets. As noted by one leading purchaser "The traditional fish industry....is becoming outdated. It is in danger of becoming increasingly marginalised, unless it takes on board the consumer-led values, the standards and the requirements of the mainstream food industry." (Pepper, 1994). Notwithstanding this, the multiples have become much more involved in relationship marketing providing opportunities to co-develop new products with processors and producers.

VALUE-ADDED CATERING CHANNELS

As with the retail sector in the non-Mediterranean European countries there appears to be considerable diversity in the consumption patterns within the fish catering sector. In the case of France, Germany and Holland expenditure on food eaten away from home accounts for 30% of the household food spend whereas in the UK this amounts to only 20% which is only half that of the USA(Keynote, 1994). However, in terms of the market for fish the UK is estimated to account for just under half the total sold whereas in France, Germany and the Netherlands the share remains at around 30% (Young & Maddock, 1993). The catering market consists of both profit and cost sectors within each of which there is a large number of individual players with many more outlets. This structure is important since the lower barriers to entry can provide access to fish consumers which may otherwise be denied through conventional retail channels.

Catering channels can also generate the opportunity to overcome many of the fish consumers' concerns about the product and to experience new alternatives. Especially where there are likely to be negative perceptions about selection and preparation the out-of-home setting is likely to favour new species and product trials, considerations which may be deemed increasingly important to the aquaculture sector. However as was found in one survey by the British Trout Association, the delivery of catering solutions is not always to be found. The research showed that whereas 80% of consumers preferred to be served trout fillets rather than a whole fish as they did not want to be bothered with "the head, skin and bones", 80% of restaurants served their trout whole (Gledhill, 1994). Clearly the marketers' tenet of 80:20 has yet to gain full market penetration !

THE CULTURED RESPONSE ?

Having identified some of the key forces which have determined the consumption of fish as food within the non-Mediterranean countries of Europe, it remains to consider the response of the aquaculture sector to these trends and to consider the implications for the future. On the basis of evidence to date it may be contended that aquaculture producers have been comparatively slow to respond to many of the trends identified. For example, added value through product transformation is a comparatively recent phenomenon within most aquaculture product sectors. Yet by the time that aquaculture production began to expand dramatically in the early 1980s, notably with salmon, the basic product concepts now used had already been launched by fish processing firms and were accepted by consumers as an integral part of the wider food products market.

Hitherto the aquaculture sector has invariably attempted to skim the market as each new species has been introduced by targeting the traditional fresh whole market segments which command higher prices, albeit for more limited volumes. This strategy has thus tended to encourage retention of focus upon more traditional product concepts rather than the more innovative added value substitutes to compete with other contemporary food products. Only when the initial honeymoon period of higher profitability has dissipated have producers then moved into either product or species diversification (Young & Muir, 1994a). Indeed where new species have been selected this has tended to revert to the whole fish, high unit value concept once more. However as the number of new species introduced onto the market expands, and given the comparatively narrow range eaten by most individual consumers, it must be questioned whether this strategy adopted hitherto is sustainable.

Evidence from elsewhere within the market does suggest that some alternative positioning stances may worthy of adoption. As the quantity of aquaculture products increases and the supplies of species from the traditional capture sector declines, due to continued failure of resource management, expanding opportunities for substitute farmed products can be expected. In part this may come from the wider introduction of species currently caught, such as turbot (*Scophthalmus maximus*), halibut (*Hippoglossus hippoglossus*), cod (*Gadus morhua*), and wolffish (*Anarhichas lupus*) but more immediately through the adoption of species to provide raw material for fish products rather than be "wholefish products" in themselves. The rapid acceptance of Channel catfish (*Ictalurus punctatus*) within the German market as a forerunner to the rest of Europe is a good example; a situation suggested by evidence elsewhere to be capable of repetition with African catfish (*Clarias gariepinus*), tilapia (*Sarotherodon niloticus*) and other species (Seafood Leader, 1995; Neubacher, 1995, Dixon *et al*, 1993).

Further diversity in aquaculture products consumed may also be anticipated as integration between the various sectors of the European food fish industry continues. Hitherto there has been a tendency for the stakeholders to retain their historical distance, but evidence within the past five years suggests that this demarcation is increasingly less inviolate (Seafood Business, 1995, Seafood International, 1995). Not surprisingly, processors have identified the opportunities to broaden their raw material base and spread their fixed costs of process plant over a wider product range just as

farmers have recognised the need to compete within the current offerings of captured fish and food products. Further incentives to promote this co-operation should result from the basic characteristics of the farmed product, especially when compared to the traditional captured alternative. Aquaculture products hold distinct comparative advantages in their potential regularity of supply and ability to deliver just when the retailer orders. Moreover with the wider adoption of HACCP systems, the farmed product is again in a more favourable position. Such advantages can be expected to be important as penetration of wider markets is sought.

EMERGENT DETERMINANTS OF CONSUMPTION

Having considered some of the key forces shaping the current pattern of consumption of aquaculture products in non-Mediterranean Europe, some mention is also warranted on green marketing issues which seem set to play a greater role within the food marketing environment. In keeping with the more general greater awareness of environmental issues, and the increasing concerns with agricultural production methods, the fish farming sector will need to accommodate the more contentious aspects of its products and their production such as additives, environmental degradation, animal welfare etc. Hitherto in Europe, like capture fisheries, aquaculture has escaped relatively lightly but there are increasing signs of interest by even the more established environmental agencies (WWF, 1995). Aquaculture is potentially in a favourable position to demonstrate delivery of a sustainable activity to areas typically lacking alternative socio-economic support systems. But it is important to ensure that this is done whilst producing products acceptable to green consumers and that this is communicated along the food marketing chain.

CONCLUSION

The consumption of aquaculture products with the non-Mediterranean countries of Europe has been shown to be diverse and reflective of a wide range of socio-cultural factors which have shaped the historical evolution of regional and national diets. The pattern of consumption of farmed products hitherto has been heavily influenced by the comparatively recent introduction of many of the products available. In most cases these have been marketed to appeal to the higher priced niche markets in order to increase returns to the producers who have concentrated on HUV species. Consistent with this target market, the products have emphasised the whole fish product concept rather than being based upon transformations of the raw material. This concentration hitherto is significant because if farmed fish products are to move into the wider mass markets, a likely move because of increased production volumes, rather closer attention will need to be paid to contemporary trends within the fish and related foods markets.

The diversity of forces within these markets suggest that aquaculture products must increasingly incorporate the product concepts of added value and deliver these through changing channel structures, especially supermarkets. Whilst other retail channels can be expected to remain, it is likely that these will tend to cater for niche products with comparatively much smaller volumes. Outlets within the catering sector are likely to

remain significant target markets, especially as options for more novel products and those more demanding of consumers preparational skills. As the aquaculture sector becomes more diverse in terms of its species base, and the range of products available, greater integration of the established skills in the fish and food processing sectors can be anticipated. Although this has been comparatively slow in happening so far, it is difficult to foresee how else the rapidly increasing volumes of aquaculture product are going to be consumed.

REFERENCES

Dixon, M; Haylor, G & Young, J A (1993) *An investigation of the market potential for African Catfish cultured in Scotland.* Scottish Enterprise. 28p.

Euromonitor (1995) "European markets - seafood and fish" *Market Research Europe* August.

Eurostat (various) Brussels.

FitzGerald, G (1995) *Overview and analysis of the production trends of, and challenges facing, the European finfish industry to the year 2010* (Draft) UCC.

Gentles, P & Skeldon, S (1994) Consumer trends in European fish consumption" Paper presented to the *Fisch '94 International aquaculture and marketing seminar* Bremen. June.

Gledhill, B. (1994) "Swimming Against the Tide" *Caterer and Hotelkeeper* 14 April pp 56-57.

Haugh, C A M (1994) "Exotic species from aquaculture - marketing tilapia and catfish." Paper presented to the *Fisch '94 International aquaculture and marketing seminar* Bremen. June.

Instituto Nacional de Estatistica (1995) *Estatisticas da Pesca* Portugal

Jones, A (1994) "Producing turbot and halibut for the EC market" Paper presented to the *Fisch '94 International aquaculture and marketing seminar* Bremen. June.

Keynote, (1994) *Keynote Market Review: UK Catering Market* Keynote Publications Ltd.

Marshall, D W & Currall, J (1992) "Consumer attitudes towards pelagic fish" pp260-266 In Burt J R; Hardy, R & Whittle, K J (Eds) *Pelagic Fish - the resource and its exploitation.* FNB.

Monfort, M C (1994) *The status of fishery products as food, hypotheses for fish consumption in 2010 and related policy options and development support requirements.* 64pp FAO.

Neubacher, H (1995) *Seafood International* February pp 24-27.

Norwegian Seafood Export Council (1995) *Fisk & Marked*

Retail Intelligence (1995) "Food retailing" *Retail Intelligence* Vol 1. January

Pepper, A (1994) "The multiple retailer's view" Paper presented to *Catching for the market seminar*. SFIA Edinburgh April

Seafood Business (1995) Vol 14 No 2 March/ April p22.

Seafood International (1995) April p 63.

Seafood Leader (1995) Vol 15 No 5 September/October pp 24-28.

SFIA (1995) *Seafish Annual Report 1994/95*.

Stephanis, J (1994) " Farming of Mediterranean finish species -present status and potentials" Paper presented to the *Fisch '94 International aquaculture and marketing seminar* Bremen. June.

Westland,L (1995) *Apparent historical consumption and future demand for fish and fishery products - exploratory calculations* (Draft) FAO.

WWF (1995) *WWF News* Autumn pp2-4.

Young, J A, Burt, S L & Muir (1993) *Study of the Marketing of Fisheries and Aquaculture Products in the European Community.* EC DG XIV. 428p.

Young, J A & Maddock, S (1993) "Waiter - there's no fish in my soup! - hotel and restaurant demands for variety and novelty in seafood" In Horner, B & Rodriguez (Eds) *New Markets for Seafood*. Hull October

Young, J A & Muir J F (1994) "UK fish processing industry strategies: from the CFP decade to the single market." in Antona, M, Catanzano, J & Sutinen, J G (Eds) Proceedings of the *Sixth International Conference of the International Institute of Fisheries Economics and Trade.* IFREMER, Paris, France.

Young, J A & Muir J F (1994a) "Diversity in Adversity: the case of the UK aquaculture sector." Paper presented to *International Cooperation for Fisheries and Aquaculture Development*. The International Institute of Fisheries Economics and Trade 7th Biennial Conference,Taipei, Taiwan ROC, 18-21 July.