

# **Focus! it's the consumer that counts :new perspectives on the role of consumers in aquaculture decision making**

**James A Young<sup>1</sup>[1], James F Muir<sup>2</sup>[2] and Andrew P Smith<sup>3</sup>[3]**

## **Abstract**

In developed country markets, the consideration of consumer wants has not been prominent hitherto in aquaculture production decisions. Like capture fisheries aquaculture has been product driven. This supply-side focus reflects an emphasis upon technical solutions to the production and capacity problems of high unit value (HUV) species culture. Whilst this may have appeared to be a rational strategy, longer-term consequences of consumer neglect soon emerged: production booms met with price collapse. Atlantic salmon in Northern Europe and now Mediterranean bass and bream are cases in point. Producers have normally responded to this cycle by industry exit or diversification into other HUV species. Surprisingly, far fewer have taken a marketing perspective and identified what the consumer actually wants in cultured products. Were this information known, producers might be better placed to forestall adverse trends. This paper considers the adoption of a consumer-orientated approach using African (*Chinas*) catfish, a species which though far less valued than HUV species, has favorable production characteristics. The research was based on in-home product placement tests of *the product* were combined with face-to-face interviews of consumers. Consumer perceptions of the product were analyzed using Multiple Correspondence Analysis (MCA), which identifies patterns of association hidden by more conventional techniques. Results suggest that for the UK consumer, *Clarias* products might fit into a number of market segments which, in contrast to most conventional HUV species, are not niche markets. Such findings have significant implications for producers' subsequent marketing strategies, and also suggest opportunities for a more generally proactive role for fish producers.

## **Introduction**

### **The HUV Honeymoon**

Aquaculture is poised to exploit the opportunities presented by the continued pressure on many capture-fisheries worldwide. This posture has been encouraged by the increasingly rapid growth of aquaculture developments noted in many countries over the recent past (FAO 1995, Muir *et al*, 1996). Some estimates

---

1[1] Lecture in Marketing, Department of Marketing, University of Stirling. Stirling FK94LA, Scotland.

2[2] Assistant Director. Institute of Aquaculture. University of Stirling. Sliding PK9 4LA, Scotland

3[3]Research Assistant. Department of Marketing/ Institute of Aquaculture, University of Stirling, Stirling FK94LA. Scotland.

suggest that by the year 2010, aquaculture might contribute up to 40% of aquatic food supplies. Though low-intensity artisanal production systems remain important in many developing countries, a significant part of the recent and prospective growth in aquaculture production is associated with the implementation of technical solutions to a variety of commercial production problems, rather than being driven by consumer and market factors.

Within the industry, the principal focus for such technical innovation has been toward traditionally high unit value (HUV) species, the rationale being that the premium market price initially commanded would persist. However, this has often amounted to no more than a post launch honeymoon period of greater profitability. Nonetheless, the corollary of this period of improved profit (higher return on investment, greater risk acceptance and increased propensity to invest in yet further R&D) has engendered diversification into a range of other HUV species. The relatively brief history of each species so far launched has demonstrated a remarkably similar "species-cycle" of development (Jones 1994, Stephanis 1994, Stippl 1994). Technical innovation initially establishes and then accelerates production, initial markets become saturated and so force down real prices. This fall in profitability initiates a restructuring of production through exit from the sector, or diversification into other species.

However, the sustainability of such a strategy of continuous diversification from one HUV species to another is debatable. As more HUV species become introduced through aquaculture, it is more unlikely that consumers will continue to fund initial high profits by paying premium prices in early production phases. This will become increasingly problematic as the range of HUV species marketed expands, and becomes more widely available at lower prices (Young & Muir 1994). Such price resistance is all the more probable given that the majority of fish consumers eat across only a very limited species range. The market for traditional HUV species, whilst capable of some expansion, is thus fast approaching saturation at existing price levels<sup>4</sup>[4]. The need to consider alternative diversification strategies has been noted by other commentators (Muir & Shaw 1988, OECD 1989, Bjorndal 1990, Shaw & Gabbott 1990) and has latterly been demonstrated by new product development (NPD) within rising volumes of existing species. However, it is the reflection of the prevalent thinking that such "added-value" processing strategies tend to be adopted only after the whole fish product life cycle has moved into maturity.

### **After the Honeymoon**

If aquaculture is to fulfil its predicted contribution to the aquatic foods market in developed countries, some change in species emphasis will be necessary, as the pattern of sequential diversification in HUV species witnessed so far may not be tenable. Future contributions are likely to be led increasingly by markets experiencing supply shortfalls from demersal capture fisheries. The continued excess of fishing effort, coupled with inability to implement effective fisheries management, should ensure a growing demand for cultured substitutes for

---

<sup>4</sup>[4]Although Atlantic salmon *Salmo salar* L. production has shown a surprising increase in the last two ? driven substantially by improved management and survival rates (SOAFD. 1993) many other sectors are relatively strict. Thus, in the UK, rainbow Trout *Oncorhynchus mykiss* (Walbaum) output is declining, as rising site and water supply cost constrain opportunities for expansion.

demersal species<sup>5</sup>[5]. Substitution within markets for demersal products may come either from the culture of those species primarily caught at present (e.g. cod, halibut), which are often technically complex and relatively expensive to produce, or through the introduction of products based on species such as tilapia, channel catfish and African (*Clarias*) catfish which may have a lower production cost, but may have product attributes perceived to be similar and acceptable to consumers<sup>6</sup>[6].

This paper aims to show how through making the consumer the focus rather than the product, new market opportunities can be uncovered, in this case for African catfish. More specifically, the aim of the research was to identify those characteristics typically sought by the consumer of such demersal species and then to appraise reaction to one such cultured product substitute, using Multiple Correspondence Analysis (MCA<sup>7</sup>[7]) to identify associations which may be hidden in more conventional survey analysis (and certainly if only anecdotal market information) is employed. Techniques such as MCA and other more conventional marketing research techniques may become increasingly necessary as aquaculture producers seek to refine their production to target markets.

All markets exhibit their own individual characteristics, and therefore this research is primarily focused on a single case study within the EU, based on the UK fish consumer. The fish consumer is a diverse being, influenced by a wealth of factory, utilitarian, geographic, demographic, cultural or symbolic, and so it is wise to approach market studies by implementing a considered process of segmentation (by applying appropriate criteria). Nonetheless, the concepts behind this attempt to identify alternative substitutes is equally applicable within other markets, albeit with different identifier variables.

## **The UK market in the EU context**

### **Supply and demand**

Up to now, the EU has derived its principal supply of fish from capture fisheries in the North Sea, the North Atlantic and the Mediterranean, all of which have experienced declines in yield over the past 20 years. In the UK for example, early 1990s landings of cod, the most popular fish species, were less than 15% of those in the early 1970s (MAFF various). Throughout the EU, similar trends are evident and result from the retention of excess fishing effort applied to a declining biomass. Evidence suggests that the EU will continue in a state of supply shortfall for the foreseeable future, possibility one of even greater magnitude as membership expands. Currently, the EU exports almost 60% of its indigenous production of 5.1m tonnes and imports 5.3m tonnes to satisfy total consumption of around 7m

---

<sup>5</sup>[5] Since low unit value (LUV) small pelagic species remain in excess supply internationally, they can for the present be dismissed as a much more distant target for aquaculture substitution.

<sup>6</sup>[6] Some such species are already framed under present market conditions are at the margins of viability. Species such as turbot *Scophthalmus maximus* (L) being traditionally HUV are already at a more advanced stage of market entry. In addition to species such as African catfish considered in this paper there is considerable speculation as to future contribution of tilapia. For contemporary review of this market see Seafood Leader (1995) 15 (2) pp 111-114

<sup>7</sup>[7] MCA (Benzecri 1973) is multivariate statistical analysis method which simultaneously produces variable and subject (sample) mode analyses. It quantifies categorized data in order to produce a spatial representation (in this case in two dimensions) of the association between variable response categories and between subjects (in this case, consumer respondent). Respondents which are associated will remain hidden and enables the construction of working typology of respondents in the target market.

tonnes (Young & Muir 1994). Whilst cultured production has expanded considerably over the past decade, it remains modest in its contribution to the EU balance of trade in fish. Of the total EU production of 5.1m tonnes, less than 250,000 tonnes result from finfish aquaculture, although substantially more than this is produced from shellfish farms (*Ibid*). In the UK, salmon and trout effectively dominate farmed finfish production and are supplemented by mussels, oysters and relatively insignificant output of other species.

Despite its single status, the EU market retains distinctive national and regional market identities, which display considerable diversity in fish preferences (Young, Bun & Muir 1993). For example in 1993, the market for fish in France, although having roughly the same number of consumers as the UK, had a total fish market value of 3,018m ECUs, more than twice the UK's 1,384m ECUs (Gentles & Skeldon 1994). Given such variation, and to focus on a single market case, subsequent discussion is confined to the characteristics of the UK market.

### Marketing channels

Fifty-six percent by volume of the UK market for fish is sold through the retail sector, the rest being directed to catering. The fish retailing sector is of particular interest as it is one of the last major product sectors to embrace the wider changes which have occurred within the UK food retail market. As one major supermarket buyer noted "The traditional fish industry is becoming outdated. It is in danger of becoming increasingly marginalised, unless it takes on board the consumer noted values, the standards and the requirements of the mainstream food industry." (Pepper 1994). Multiple retailers have captured the dominant share of the market for foods. In the 20 years from 1973, the multiples' share of packaged grocery sales rose from under 50% to over 80% and in the early 1990s, 45% of the market was accounted for by just three supermarket chains (Gentles et al. 1994). This growth has given the multiples a seemingly impregnable base for power and influence in the marketing of fish products.

Although the supermarket chains have historically had a high share of the UK frozen fish market, over 80% in 1993, their growth in fresh and chilled fish products, to around 40% and 55% respectively is a more recent phenomenon (Fish Trader Yearbook 1994). This tardy presence of the fresh and chilled fish product have been attributed to a number of reasons: lower levels of profitability than surrounding shelf-space, the need for higher stall skills and the classic problems of rapid perishability of an uncertain supply (Young, Burt & Muir 1993). Fish products, especially fresh, are often perceived to have a generally lower level of compatibility with the supermarket environment, and this, has contributed to the relative absence of product. Moreover fish producers, within both capture and culture sectors, have often been unable to meet the increasingly more demanding procurement specifications of the supermarkets. However, more recent trends suggest a strengthening view on the vital need to present a fish product range within the context of the contemporary food market<sup>8[8]</sup>. Presence in the multiples

---

<sup>8[8]</sup> For example, in addition to their standard policy of central purchase, some supermarket buyers have effectively devolved control to selected firms within the traditional wholesale sector. These intermediaries then co-ordinate supplies, and any ?

<sup>[9]</sup> For example , in the UK it took over a decade for farmed salmon to appear commonly in even the most basic of added-value forms, despite the fact that for other materials, most of these product concepts had already been introduced and were well established in the market at the time of farmed salmon's launch processing and packaging-possibility with a third processors-before delivery to the stores.

<sup>[10]</sup> From a production perspective, the African catfish holds a number of established comparative advantages: fast growth rate, disease resistance, high stocking density, aerial respiration, nutritional efficiency and feeding habit coupled with good reproductive strategy and behavior (Dixon Haylor & Young 1993). This combination of features should enable production of high quality fish protein at relative low cost.

not only gives access to the mainstream food buyer but also to other target markets such as fish-averse younger consumers. The multiples have also assisted this process through co-development of new products with processors and producers.

### **Consumer Preference**

Demersal species account for 80% of the quantity of fish consumed in the UK, while shellfish constitute a further 10%, with pelagic and freshwater species equally sharing the remainder. The narrowness of UK fish preferences is evident in the fact that just three species, cod, haddock and plaice constitute some 70% of consumption (Mogan 1994). Products based on these species are characterized by offering white flesh, firm texture, and mild if not bland taste. Paradoxically, this conservative profile, which has created problems in promoting more diverse species, may suggest a ready market for less distinctive substitute products which can mimic the attributes of these species. A full explanation of the consumer profile involves a contexture of social, cultural, economic and psychological factors. Research has identified a lack of knowledge amongst consumers, and hence their lack of confidence in both pre and post-purchase behaviour (Mogan 1994). Even within the catering market, where solutions to the problems of acceptance are an integral part of the product purchased, fish has been noted to under-perform (Young & Maddock, 1993). Such market characteristics present considerable problems for the individual producer, since clearly the costs of wider market education are liable to be prohibitive and beyond all but the largest of branding strategies.

Despite the underlying conservative taste of the UK fish consumer, product innovations have arisen and become more diverse. Convenience attributes have increasingly been incorporated to provide proportional and storage solutions to problems long since recognized to be negatives in the minds of prospective fish consumers. Similarly, adverse perceptions of skin and bones are readily resolved within prepared products, many of which have extended the disassociation by the additional incorporation of non-fish ingredients. The attractions of these attributes have been further stimulated by the perception of fish as a healthy food, coupled with increasingly adverse reaction to traditional substitutes, notably red meat, accentuated in the UK and elsewhere by the recent BSE scare.

Despite these wider trends in the market for fish, the profile of the consumer of farmed fish is somewhat atypical, most obviously because of the restricted product range concerned. Restriction of supply to the HUV species has tended to involve a preference for whole round product, often due to this having prime quality and price connotations. Naturally, producers have not been anxious to change this view held by existing consumers; not least because yield losses in filleting, skinning and

---

[11] in itself, the embryonic entry of the American catfish industry to the EU illustrates recognition of the market potential. As has been done in the US, the fish is marketed in an added value processed product.

[12] In 1994 the ethnic market for live product typically paid around \$ 2.2-3/Hg for the whole fish, with fillets at about \$7-9/kg. Further processing of the fillets will give a smoked price about \$15/Kg.

8[13] Fillet yields, at around 45% for 1.5-2Kg fish, are broadly comparable with those from demersal substitutes and would again infer cost effectiveness.

8[14] To allay any possible fears as to the safety of the product, and any consequent impact on consumer responses, full reassurance of product quality was provide.

staking etc usually require a longer-term drop in production costs. Thus, the majority of cultured product innovations have been launched within conventional market sectors, only latterly filtering down to the wider range of added value product lines to compete with products based on capture species. However, if aquaculture is to supply a significant substitution to the existing demersal species market, certain attributes must be sought in candidate species<sup>9</sup>[9]. The most likely candidates would be either strong or fishy in taste, would have a firm texture and a white flesh. Similarly, the production cost structure must be capable of incorporating yield and other input costs of processing.

Reviews of the production possibilities elsewhere have identified, amongst others, the potential in the UK for African (*Claris*) catfish (Dixon, Haylor & Young 1993, Haylor, Young, Muir & Scott 1994).

### ***The Consumption of Catfis***

A number of discrete markets exist for the different species of freshwater catfish available within Europe: The European catfish *Siluris glanis* (L.), the American Channel catfish *Ictalurus punctatus* (Mitchell) and the African catfish each lend to be available in specific product forms to suit individual market segments. The present market for freshwater catfish species within the EU is estimated at around 1,500t worth approximately \$4.2m, about 70% of which is generated by the Dutch *Clarias* industry (Hough 1994)<sup>10</sup>[10].

The market for African catfish (and channel catfish) within the EU is quite distinct from that for European catfish. The latter species is mainly sold alive, whilst African and channel catfish tend more often to be filleted. Quite apart from the standard consumer aversion to whole fish, the ugliness of the whole *Clarias* discourages presentation in this mode. Germany currently consumes about 30% of EU consumption, and has been the recent target of an EU market entry strategy from the US channel catfish producers (Neubacher 1995)<sup>11</sup>[11]. The Netherlands and the UK constitute the other major markets, mainly for fillets, but also with a clustered ethnic demand for live product. Whilst the whole fish crosses a number of traditional UK consumer taboos, the fillet can provide a number of favorable attributes. The flesh is virtually free of bones and has a firm texture. Flesh color is responsive to feeds and a white product can be produced, especially after cooking. The product may therefore have the potential to satisfy the wants of many existing fish consumers<sup>12</sup>[12], and might therefore represent one of the best candidates for breaching the HUV cycle of production. In order to make some independent assessment of this view, a survey of fresh fish consumers, using in-home product placement, was undertaken.

---

## Data Collection and Analysis

### Sample frame

A sample of 86 residents in Central Scotland was generated, to be broadly representative of the UK fresh fish consumer. Fresh fish consumers were considered to be amongst the more discerning and product sensitive of fish consumers and would also provide a better indication of reaction to the basic species-based concept being tested. The data was collected during face-to-face interviews based on two discrete structured questionnaires. The first questionnaire of 21 questions explored the respondents' fish consumption characteristics, attitudes to fish farming and fish products.

After completion of the questionnaire, a quantity of packaged skinless and boneless catfish fillets sufficient for a future household meal occasion was left for trial. At the time of preparation and consumption, respondents did not know the identity of the fish species tried<sup>13</sup>[13]. After preparation and consumption by the respondents, a second questionnaire of 14 questions was administered relating to the product sampled and their related perceptions. This approach allowed detailed cross-comparison between the two questionnaires in order to try and provide preliminary indications of the most likely market for the *Clarias* product.

### Multiple Correspondence Analysis (MCA)

Initially, elementary frequency and correlation analysis was undertaken by examining each question as a discrete variable. Respondents' preferences for product form, species, place of purchase as well as their motives for consuming fish were determined. However, the lack of overall correlation between variables demanded the use of an alternative technique to explore any patterns otherwise hidden within the data.

Unlike correlation analysis, which measures the degree of association between two variables across all of their respective responses, MCA enables identification of association in both isolated and compound situations. MCA will thus delineate any association between two or more particular responses to two or more different questions even where the association is otherwise masked across the whole data set. By using MCA, it is therefore possible to recognise that particular responses to different questions are associated or statistically related even if there is limited correlation between the whole range of responses relating to those questions (Greenacre 1984, 1992, Tian Sorooshian & Myers 1993).

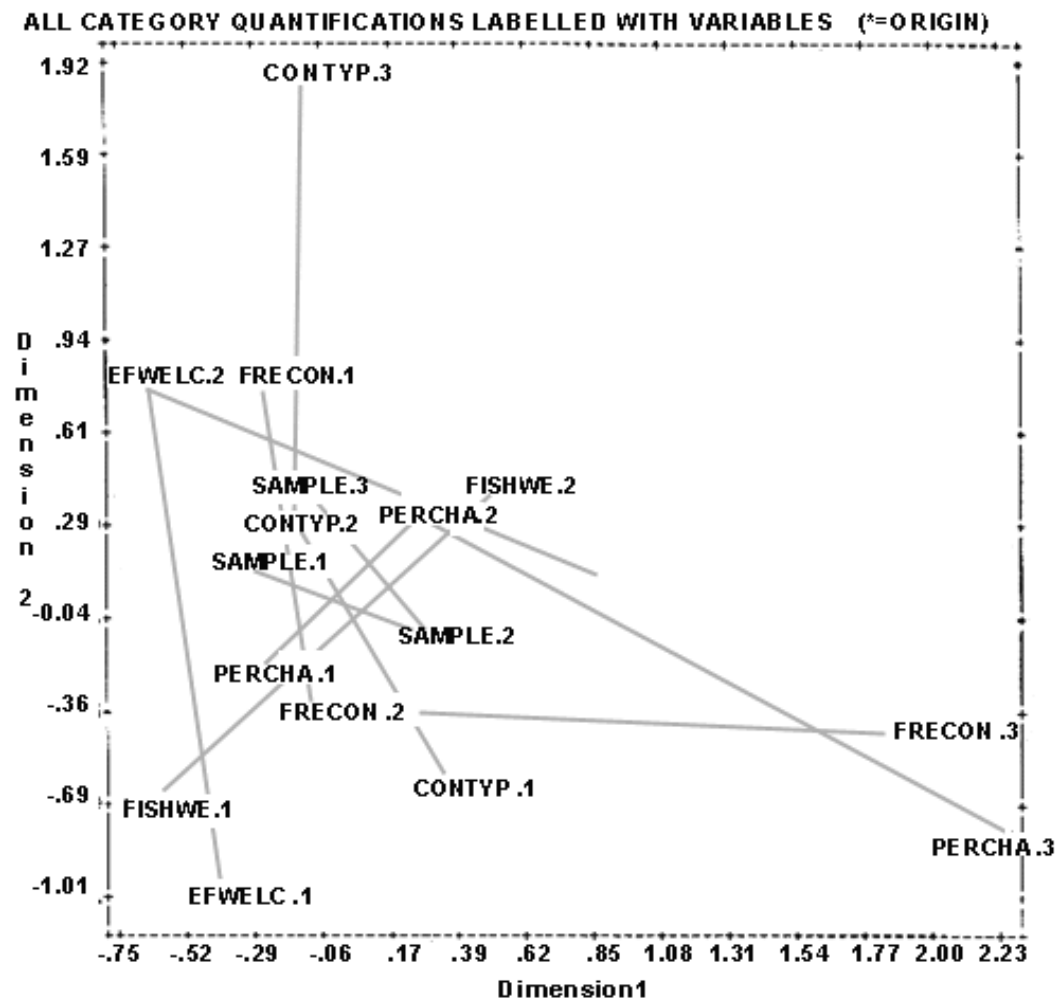
Six variables were selected by iterative use of the MCA technique, as incorporation of more than this renders association less visible on the plot. As all variables carry equal weight *a priori*, overloading the analysis with variables relating to any one particular factor, e.g. attitude to the catfish sample, would provide biased results. Consequently, the six variables chosen relate to three distinct factors with two variables corresponding to each factor. The three factors are: i) Fish consumption characteristics in terms of a) (FRECON) frequency of consumption & b) (CONTYP) self-perception of themselves as a fish consumer, ii) Attitudes to animal welfare in terms of c) (FISHWE) farmed fish & d) (EFWELC) any consequent effect on their fish buying behaviour, iii) Attitudes to the catfish sample provided in terms of e)

---

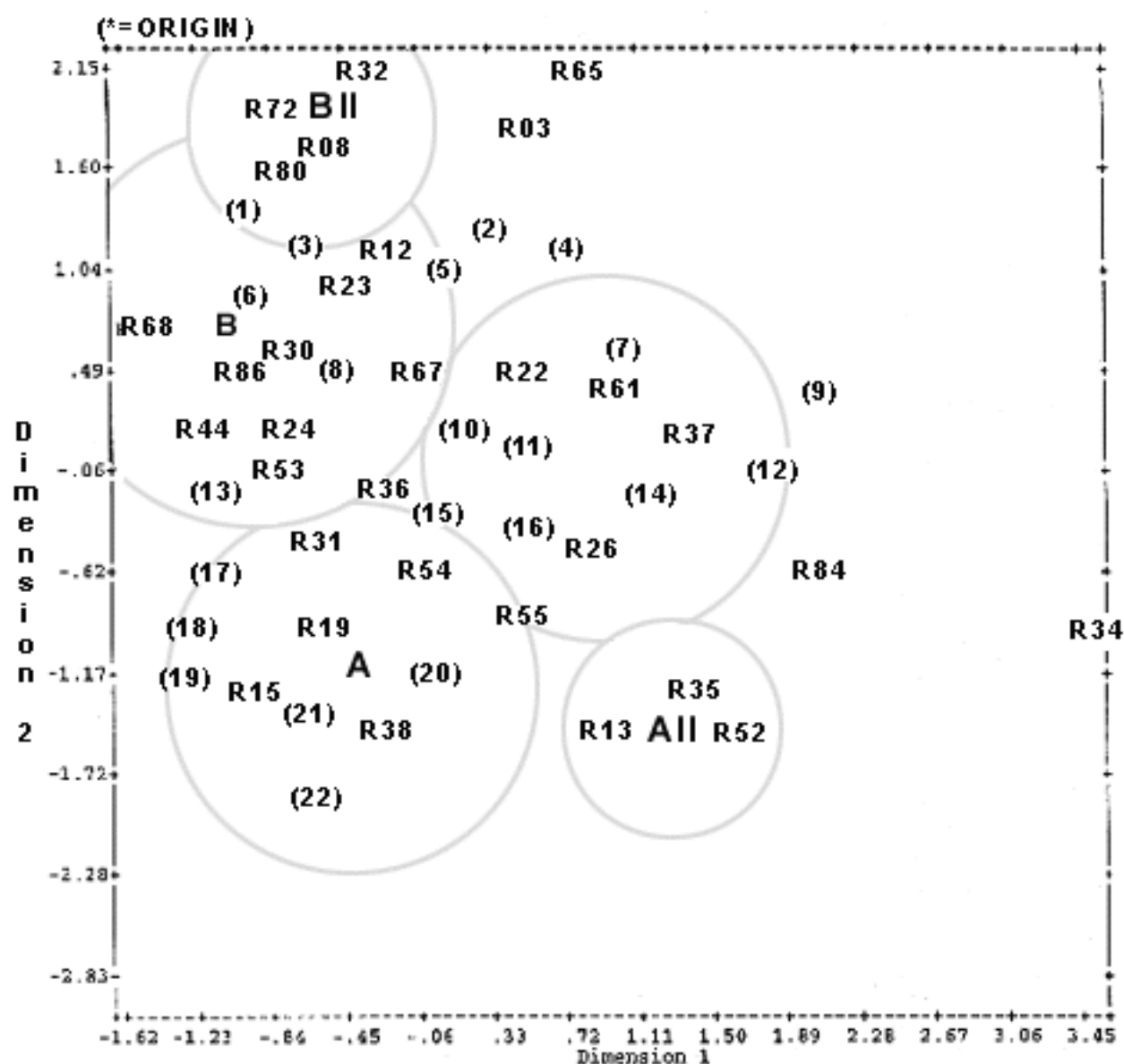
(SAMPPE) product sample reaction & f) (PERCHA) any post-consumption change in perception.

Figure 1 illustrates the inter-relationship between the categories within each response and between the variables themselves. The most salient outlier categories are the very conservative consumer type, the infrequent fish consumer and those whose perception of catfish changed negatively after eating the sample provided, the latter two being somewhat associated. Interestingly five out of the six response categories of the two variables used to explore attitudes to the catfish sample (SAMPPE & PERCHA), are in close proximity in the middle of the plot near the origin. This would seem to suggest they are not strongly allied to the other four variables and associated categories, which characterize the respondent as a type of fish consumer; and also that they do not provide clear-cut delineation of consumers. The implications of this for potential targeting of catfish at particular types of consumer is interesting, and is explored after an examination of the respondent MCA plot in Figure 214[14].

**Figure 1 : MCA PLOT - RELATIONSHIPS BETWEEN VARIABLE CATEGORIES.**







(\*Numbers with an 'R' prefix denote respondent number, numbers in brackets signify respondents with identical responses listed as the multiple points below.)

Figure 2 above reveals the degree of association between respondents in terms of the variable response categories outlined above. Perhaps the most salient feature is the quite uniform distribution around the origin. This distribution suggests there to be considerable variety in terms of attitude: an assertion borne out by the small number of respondents with any one combination of six identical responses (shown by those on multiple points). Nonetheless, a useful descriptive typology can be inferred from a closer examination despite modest variation within the three groups, and subsets, outlined.

Zone 'A' - consists of the more adventurous and frequent fish consumer who are concerned about welfare issues to the extent of influencing their consumption. The expressed attitude to catfish varies A subset. Zone 'All', contains those differing through being less concerned about welfare and being less enamoured with catfish.

Zone 'B' - respondents within this group are very frequent but cautious consumers. They have a more ambiguous attitude to welfare issues and vary in their attitude to catfish. Again a subset, Zone 'BII', may be identified by having the most conservative consumers.

Zone 'C' - constitutes the less frequent, more cautious fish consumers who are unlikely to care about welfare issues and tend to have the most negative view of catfish.

The MCA reinforces the tentative inferences made from the correlation and frequency analysis that consumer attitudes to *Clarias* tended not to be polarized. This would infer that acceptance is certainly no less, and probably more, likely to be gained as a middle-market offering rather than one which is more restricted to a niche. The MCA establishes that whilst there is considerable variation in consumption habits and concern for welfare within the sample, attitudes to the product provided and perception of catfish generally are largely independent of these consumption habits and concerns. Whilst further, more extensive surveys elsewhere (using different identifier variables more appropriate to the market being investigated are clearly needed to verify this, it is worth considering the prospective incentive to do so.

## Conclusions

As a rather paradoxical virtue, the greatest strength of the *Clarias* fillet product would seem to be the absence of a unique affinity with any particular consumer group or market. The optimistic, but perhaps not unrealistic, interpretation of this situation might be the opportunity to market the product on a more universal appeal. This observation would have remained hidden were it not for the consumer orientated research described, *Clarias* might then be positioned more as a basic building block within the fish processing sector rather than as a discrete and distinctive product. This role would be consistent with the need for a greater contribution to the international shortfall in fish supplies. As with the channel catfish, there would also appear to be scope for various product modifications incorporating convenience and added-value options. The product is also quite cost competitive due to the production characteristics identified above; this too would heighten its amenity to processing, and the flexibility of product options available. Moreover, it is quite possible that this technique may reveal characteristics about other species (tilapia for example) which might otherwise remain obscured.

To date the aquaculture sector has usually been driven by technical considerations

and a heavy emphasis upon traditionally HUV species. However, if the growth rates of the past are to continue, or indeed accelerate, as will be needed to offset declining capture supplies, more fundamental changes in species diversification strategy will be necessary. Unlike the HUV, based 'honeymoons' of the past, the tighter margins of future diversification will require incorporation of much more refined market considerations than hitherto. To this end market analysis incorporating techniques such as MCA should become both common and vital in the international aquaculture sector. All the aquaculture industry needs to do is cast its eyes beyond its own industry and take account of what other food producers are doing. It is not just the market for fish products, which the aquaculture industry operates in, it is in the food industry after all.

## References

Benzecri J.P- (1973) *L'Analyse des données, Tome II, L'Analyse des correspondances* Dunod Paris-

Bjorndal T (1990) *The Economics of Salmon Aqua culture* Blackwell Scientific Publications. Oxford 118pp.

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

FAO. (1995). Aquaculture production 1984-1993. FAO Fisheries Circular No, 815 Revision 7. FIDI/C815 (Rev, 7), Rome.

Fish Trader (1994) *Fish Trader Yearbook 1994* Argus Press Ltd ppl60 Gentles P.& Skeldon S. (1994) "Consumer Trends in European Fish Consumer." Paper presented at *Marketing Aquaculture Products Seminar Fish '94*, Bremen. AGB.

Greenacre M. (1984) *Theory and Application of Correspondence Analysis* Academic Press London 364pp.

Greenacre M. (1992) 'Correspondence Analysis in Medical Research' *Statistical Methods in Medical Research* 1 pp97-117.

Haylor G, Young J.A, Muir J.F.& Scott D.C.B. (1994) *Commercial Aquaculture in Africa* CDC London August 150pp.

Hough C. (1994) "Exotic Species from Aquaculture. Marketing Tilapia and Catfish" Paper presented at *Marketing Aqua culture Products Seminar Fish '94*, Bremen.

Jones A. (1994) "Producing turbot and halibut for the EC market." Paper presented at *Marketing Aquaculture Products Seminar Fish '94*. Bremen.

MAFF (Various) *Sea Fisheries Statistical Tables* HMSO London.

Mogan T, (1994) "The market for demersal fish in the UK: An overview." *Catching for the Market Conference*. SFIA. Edinburgh p3-18.

Muir J.F, & Shaw S, (1987) *Salmon Economics and Marketing* Chapman & Hall Publications Ltd, New York 272pp.

Muir, J F Young, J A & Smith A P 1996, *Aquaculture, economics and development: a European perspective*. Proceedings of the VIIth Annual Conference of the European Association of Fisheries Economists, Portsmouth, UK 10-12 April 1995 CEMARE :195-210.

Neubacher H- (1995) "Catfish Heading into Europe" *Seafood International* 10(2),24-27. OECD (1989) *aquaculture: Developing a New Industry* OECD, Washington 126pp.

Pepper A. (1994) "The Multiple Retailer's View." *Catching for the Market Conference*. SFfA, Edinburgh pp 9-24.

*Seafood Leader* (1995) 15(2) p 111-114

SF1A (1994) *Annual report-Statistic* Sea Fish Industry Authority, Edinburgh p4-5.

Shaw S.& Gabbott M- (1990) *An International Study of the Marketing of Salmon* Senter for anvendt forskning Rapport nr 5 University of Oslo 223pp.

SOAFD (Scottish Office Agriculture and Fisheries Department) (1993) *Scottish Fish Farms. Annual production survey, 1993*.

Stephanis D.& Divanach P. (1994) "Farming of Mediterranean finfish species - present status and potentials." Article reprinted from *Fishing News*, Greece, in *Aquaculture Europe*, 18(4) p32-33.

Stippl S. (1994) "World salmon production and marketing - marriage, divorce or separation?" Paper presented at *Marketing Products Seminar Fish '94*, Bremen.

Tian D. Sorooshian S.& Myers D.E. (1993) "Correspondence Analysis with Matlab" *Computers and Geosciences* 19(7) p1007-1022.

Young J.A. & Maddock S. (1993) "Waiter-there's no Fish in my soup! - Hotel and restaurant demands for novelty and variety in seafood." Paper presented to *New Markets for Seafood Conference*, University of Hull, September.

Young J.A.. Burt S.L.& Muir J.F. (1993) *Study of the Marketing of Fisheries and Aquaculture Products in the European Community* Report to CEC DG XIV 331pp.

Young J.A. & Muir J.F. (1994) "Diversity in Adversity? The case of the UK aquaculture sector" Paper presented to *7th International Institute of Fisheries Economics and Trade*. Taiwan ROC, July.