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An analysis of the consumer market for carp and carp products in Iran

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Abstract: In Iran, carp is widely sold and used in its fresh, although a range of added value products may also be observed. The common carp and the three Chinese species are often reared in polyculture ponds. Since, the 1970_S carp farming has spread along the Caspian Sea coasts, followed by other provinces, and farmed production reached a peak in 2004 with production of more than 60,000 tonnes. Rapid expansion of carp cultivation has been followed by marketing problems in recent years. Consumer and market-related data to develop effective marketing strategies are essential to the growth of the carp farming industry in Iran. A questionnaire was prepared concerning personal information of respondents and their preferences for carp consumption. A face to face interview was carried out with 357 individuals randomly selected in Tehran province. Due to the comparatively small sample size of interviews, to obtain qualitative data, complementary study was also conducted using an unstructured questionnaire. Results showed younger group preferred ready meal and demanded for a variety of products. It was found, to increase carp consumption a rise in income and decline in price of carp products will affect more older groups, larger family size and educated people. The study also showed a significant difference between locations and consumption behaviour (which related to socioeconomic, different aspects such as income, educational level, job and family status) this difference may be expected to affect seasonality of consumption. It seems increases a variety of product in markets, a rise in income and price decline may increase all year round fish consumption.

Keywords: Cultured carp, production, consumer, market strategy, Iran

Introduction

Iran is a large and rapidly developing country whose pattern of supply and demand may be changed markedly over the coming years. Fisheries Industry is currently the most important sub-sector of agriculture and its rapid development has attracted considerable attention considering protein supply, during last two decades. Iran covers an area of about 1.6 million square kilometres (SCI[1], 2000), and has a population of about 67 million in 2004 (CBI[2], 2004) and the balance was 66% in urban and 34% in rural areas. Key factors contributing to the fisheries policies have been population growth, urbanisation, aquaculture development potentials, as well as the attempt to optimise fisheries management. As noted by FAO (1996) the medium-term global demand of fish food is largely determined by population growth, changes in income and the impact of urbanisation. Market potential analysis aids policy makers in formulating a sound policy for distribution, enabling them to determine the profit potential associated with changes in price and production (Shang, 1981). As a specialized function of management, marketing is generally interpreted as including all activities concerning the development, production, and distribution of products to identifiable market, where they will provide satisfaction to those who buy them (Chisnal, 1992).

Fish consumption in Iran

Per capita fish consumption has increased over the last two decades, as has total demand for fishery products. In addition, trends of urbanisation and increasing interest in the health attraction of fishery products, growth in domestic production and imports, and improved handling and marketing facilities also had their impact on increasing fish consumption over the period. As Salehi (1999), noted it is likely that an increasing variety of fishery products, and the expansion and improvement

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[1] - Statistical Centre of Iran.
[2] - Central Bank of Iran.

of market facilities may positively influence fish demand in the future. Apparent fish consumption has been estimated at around 6.7 kg per head per year, in 2004, of which almost 1 kg per head per year was from cultured carp (Salehi, 2005). The apparent levels of carp consumption increased annually from 150 g per head per year in 1982, to 830 g in 1995, and to 1,000 g in 2004 (PDD[1], 1995, 2004). Closely related to the demand for aquaculture products, profitability for the producer is also an important aspect, as this will determine the potential for investment and further development (Salehi, 2004_a). Consumer preferences, product choice, and shopping behaviour in different groups, which may play significant roles in demand for carp and its products, will be discussed in this paper.

According to Jolly & Clonts (1993) the factors influencing the demand for fishery products may be grouped under five headings:

- Population size and its distribution by age and geographic areas,
- Consumers' income and distribution,
- Consumers' taste and preference,
- Own price (i.e. price of the product concurred), and
- Price and availability of substitutes for the fishery product (s).

It is possible that market demand for aquaculture products can be expanded more easily than that for wild fish, through controlled production fish farmers can guarantee a certain quantity and quality of production and can market their products when natural fishery supplies are low or not available, and in some cases exploit the potential for selective production to meet consumer preference for taste and other market requirements (Hulse *et al.*, 1997). The basic price of fish generally depends on the species, quality, season, competition, availability of marine fish, and consumers demand. The goals and objectives of producers and consumers meet in the marketplace (Allen *et al*, 1984). In aquaculture, farmers seek the highest possible price, but would be prepared to produce wherever there is sufficient

[1] - Planning and Development Department of Fisheries Organisation in Iran.

margin above a cost of production, while consumers wish to satisfy their needs at the lowest possible price and will increase their purchases at lower prices.

Consumption trends

Areas where fishery products are not accepted as a regular item of diet were relatively common, but with increasing education and shortages in food supply such cases becoming rare. At the same time, the trend to urbanisation is creating demand for more varied diets. Other critical factors include competition with other products, competition with natural catches, red meat, and poultry. On the other hand local culture, religion, and tradition also play an important role in demand in some provinces (Jolly & Clonts, 1993 ; Salehi, 1999). According to Salehi (1999 & 2003) the overall characteristics of total meat consumption in Iran can be described as follows:

(1) In both rural and urban areas, red meat consumption is higher than poultry, which in turn is higher than fish,

(2) Total meat, red meat, poultry and fish, consumption is higher in urban areas than that in rural areas,

(3) In urban areas, the highest level of fish consumption was 6.5 kg, compared to only 2 kg in rural areas,

(4) The percent share of fish consumption to total meat consumption was higher in urban areas and this share has generally grown.

According to Salehi (1999 & 2004_b) per capita expenditure on fishery product in urban areas is almost twice as high as that in rural areas, and increasing as income rise. In Iran, contribution of fishery product consumption had increased over the last two decades and this expansion may continue over the next decade, particularly in urban areas and inland provinces. Most of the growth has been in coastal provinces, some large cities such as Shiraz, Esfahan and Tehran. During the last two decades fish supply has rapidly expanded, increasing from 133,425 t in

1976 to 382,300 t in 1995 and 474,000 t by 2004 (PDD, 2005). In 2004, total aquatic production continued to be dominated by catches from the Persian Gulf and Oman Sea (66%), and the Caspian Sea (7%), the balance being from aquaculture and inland waters (27%). The increase has come mainly from aquaculture and southern water fisheries. Southern water fisheries production increased from 110,000 t in 1986 to 265,000 t in 1995, to almost 314,000 t by 2004, aquaculture and inland water fisheries from 12,000 t in 1986 to 52,890 t in 1995, to 125,000 t by 2004. A review by Salehi (2003) concluded that fisheries are relatively well developed, particularly the aquaculture and marine sub-sector, with most of 400,000 t production in 2003 being sold in the domestic market. The FAO review (1992) proposed that for the fisheries sector, this would mainly come from aquaculture, which has the largest potential for further production increase. Shehadeh (1996) has proposed the direction of effort towards the development of freshwater aquaculture and the enhancement of fish stocks (culture-based fisheries) in inland water bodies. According to Forth Development Plan of Fisheries (NFDP, 2005), FAO (1992), Nash (1997) and Salehi (1999 & 2004_b) Iran has tremendous opportunities to increase the products of fisheries through development of aquaculture.

The role of aquaculture in fish consumption

As production and consumption of aquaculture products increases, marketing will become an increasing area of importance. Overall, the contribution of inland fisheries and aquaculture to total fish production had increased from 8% to 14% over the 1982-95 period and to 27% by 2004 (PDD, 2005). In Iran, main fish markets are located in the coastal provinces and the capital city Tehran while the major freshwater fish markets are in the provinces of Guilan, Mazandran and Tehran. Rasht, in the centre of Guilan province, is the main fresh water fish market in the Caspian Sea area, followed by other large cities in the region. The main fish

distributors are in the major cities of these provinces. Some co-operative agents are also active in fish markets; Farmers usually sell their cultivated fish, over December to March. In the Caspian Sea, the fishing season usually starts in the second half of October to the end of March, and the carp harvest also starts in October. In Guilan province, where capture fishery has a very long traditional, marine species, especially kutum (*Rutilus frisii kutum*) have strong consumer preference. Fish sent to the capital Tehran by wholesalers are sold through agents (at 8-12% commission) on the day of arrival at auctioned prices (Salehi, 1999). There are no strong fish transport networks in the country, and as a result, most products are marketed close to the centres of production, excluding Khuzestan, from which more than 75% of the carp production is transported to Tehran (i.e. loads of 2-10 t) (Fig. 1). Typically, fish farmers or wholesalers deliver the fish in trucks or covered pick-up vehicles to urban centres (Salehi, 1999). The maximum distance for transportation is less than 700 km which usually take over a night drive or 10-12 hours.

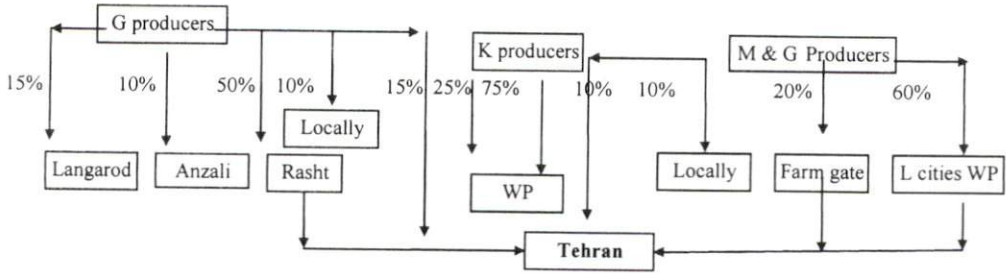


Figure 1: Carp marketing outlets in the main provinces

WP: Within province, L cities WP: Large cities within province
G: Guilan province, M G : Mazandran and Golestan provinces, and K: Khuzestan province
Sources: FAO, 1992; Abzigostar, 1996 and Salehi, 1999 & 2003.

Study structures and Methods

To be able to define a marketing strategy for cultured carp products, a more detailed study was carried out, examining the consumer preferences, seasonal purchasing, consumer purchasing behaviour, and determining the type of carp products in the market.

Key definitions are provided as follows:

SF: Small family (married with less than three offspring) group.

LF: Large family (families with three or more than three offspring).

NC: Married and childless.

S: Single group.

Below diploma: The respondents without higher education {(including students in the secondary and high school, and respondents who did not finish their high school education or/and quit school).

level 1; below diploma, level 2; diploma

level 3; bachelor holders and level 4; postgraduate education.

Employees: Public employee

Free-job: The people who are not working in an office or factory (except farmers) (mainly including shopkeepers, private consultant, private technicians and etc.), however, this group usually classified as middle income groups, though included some of the higher income group as well.

CC: Common carp, GC: Grass carp, BhC: Big head carp, SC: Silver carp.

Survey design

The diverse structure of the markets for carp products throughout the country and its supplies, are such that obtaining extensive primary data would be prohibitively time consuming. The emphasis of the study was, therefore, focused on selected primary investigations together with secondary data analyses. In order to verify and expand the data available from published sources, a series of face to face and

telephone interviews of sellers, consumers and marketing experts was also conducted. Primary data was collected from:

1) carp producers
2) market intermediaries,
3) consumers, and
4) other sources, such as fisheries and marketing experts.

Secondary data was collected from:

1) Fisheries organization and its affiliated departments
2) Central Bank of Iran
3) Statistices Centre of Iran
4) International organisations, such as FAO, World Bank and UNDP.

The consumer survey of cultured carp consumption in Iran was conducted in winter 1997. A questionnaire was prepared concerning personal information of respondents and their preferences for carp consumption. The selection of respondents was based on random sampling. A face to face interview was carried out with 357 persons in Tehran province, selected from its two major cities (Karaj and Tehran), in the province accounting for almost 18% of the national population in 1996. During the last two decades the population of these cities has annually increased by almost 8%, mostly from immigration from other parts of the country. Since the characteristics and lifestyle of people in the north, centre and south of Tehran and Karaj differ[1], a stratified sample was obtained from consumers in these three areas of the cities[2]. Due to the relatively small sample size, interviews and telephone surveys were conducted using an unstructured questionnaire which sought to obtain qualitative, rather than quantitative data. Data were entered into a

[1] - In broad terms may be classified as high income (N), middle income (C) and low income (S) respectively (Shilat, 1997).

[2] - According to Shilat (1997) 23% of population live in the north, 43% in centre and 34% in the south of Tehran, in 1996.

SPSS 6 for Windows spreadsheets and methods for classification, summarising, averaging, and other functions were used for analysis.

Results

1- Consumption behaviour

Results showed that the Caspian Sea fish species, with a long history of consumption in the country, are familiar to most people, followed by fishes from the Persian Gulf and Oman Sea (Table 1). Grass carp is equivalent to kutum[1], so it is more familiar than other carp species. Due to the absence of bighead carp from the market, only 5% were familiar with it. Seventy six percent were familiar with multiple species, indicating that 24% were familiar with only one group. Almost 69% of the sample population consumed multiple species, and 31% consumed only one species.

Table 1: Familiar and served fish species (%) by the sample population

Value	Familiar	Served	Served share as a % of familiarity
CC	50	34	68
GC	56	42	75
SC	44	33	75
BhC	5	1	20
Trout	56	38	68
Caspian fish species	68	58	85
Southern fish species[1]	61	52	85

[1] - The Persian Gulf and Oman Sea species.

[1] - In local markets, grass carp is known Cultured kutum.

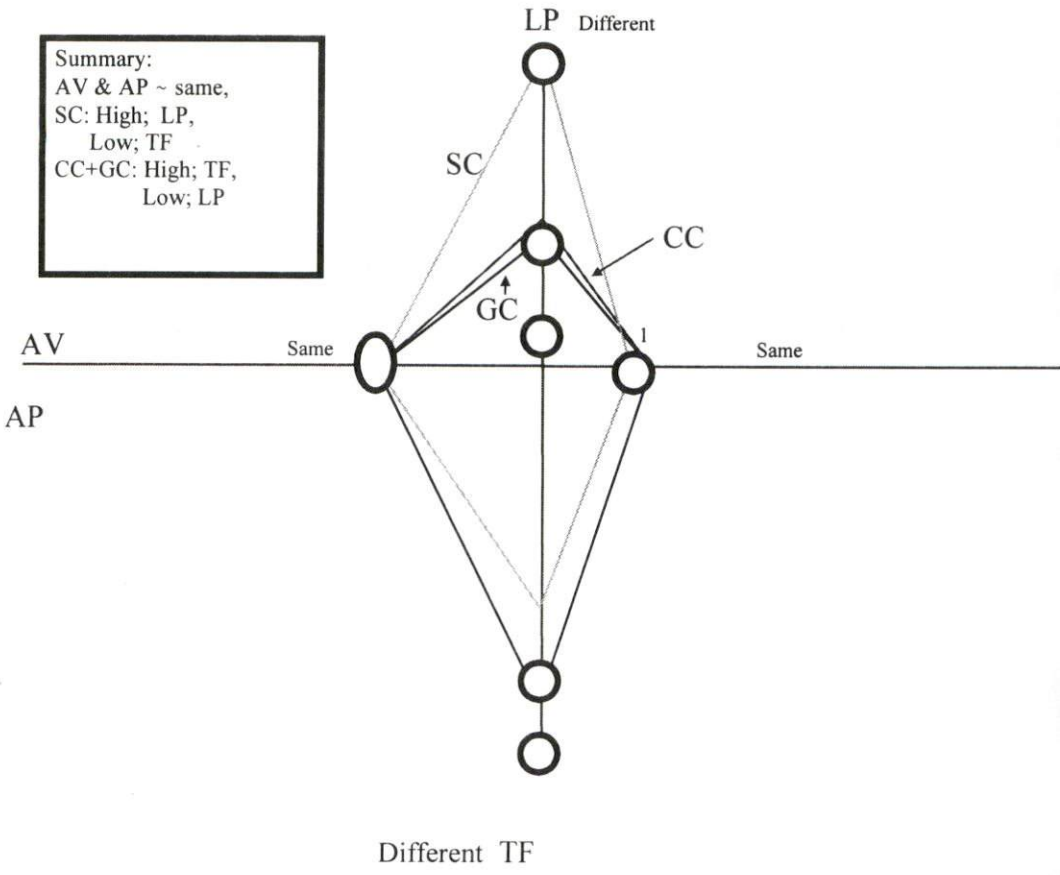


Figure 2: Priority attributes for carp species

CC: Common carp, GC: Grass carp, SC: Silver carp, 1= 10%, LP: Lower price, TF: Taste and flavour, AV: Availability and AP: Appearance.

Combination of two results shows some additional features; Broadly, familiarity with species, increased consumption. Except for silver carp, taste and flavour appears to be the chief reason for choice. The different attributes for carp species are shown in Figure 2 which provides a simple profile of each.

Table 2: preferred form of cultured carp for consumption in the sample population

Value	Multiple choice (%)	Single choice (%)
Whole fresh	36	36
Gutted fresh	45	39
Whole frozen	1	1
Gutted frozen	10	6
Fillet	21	14
Smoked	9	3
Salted	4	1
% multiple /(single responses)	23	77

As shown by table 2, it is clear that fresh fish (whole and gutted) is most preferred, followed by fillet. Very low preference for whole frozen may possibly be due to poor handling and quality issues, and better rolling of gutted frozen appears to be due to better presentation and higher quality. Seasonality of fish consumption showed that almost 37% of people consume fish all year round, 55% during a particular season, and 8% on special occasions. Thus, almost 63% consumed fish only periodically. When asked to identify 'which aspect do you take into consideration while purchasing cultured carp', 97% of the sample replied. Quality of fish appeared to be the

prim factor, while purchasing cultured carp, followed by price and trust in the seller. Forth eight percent of respondents considered multiple aspects, though, fish appearance affect 13% of respondents as well, while single respondents consider other aspects for purchasing. Some 78% of respondents would be ready to increase consumption with an increased supply and though, the extent can not be fully defined, this suggests a very positive response. Results suggest that income raise may positively affect demand for carp products. It also appears that price decline may increase demand, slightly more than that of income raise.

2- Responses by sub-group on consumption behaviour

A- Location of respondents (income groups)

Between the groups the lower price of silver carp is more important for people from the central part than those from elsewhere. For common carp; the importance of lower price and appearance factors declined from north to south. For grass carp; appearance and lower price seems to be the priority in central part (Fig. 3). Fresh fish is significantly preferred over other forms, at 91%, 72%, and 80% for northern, central and southern areas respectively, and gutted fresh is preferred over whole fresh fish in northern and central areas. While on average 29% more liked fillet in northern and central areas, only 12% did so in southern area (Fig. 4). Higher income groups consider that diversity of products, and a rise in income might shift demand towards a variety of high valued products. While more than 40% of respondents

consume fish all year round in central and northern areas, only 23% do so in the south.

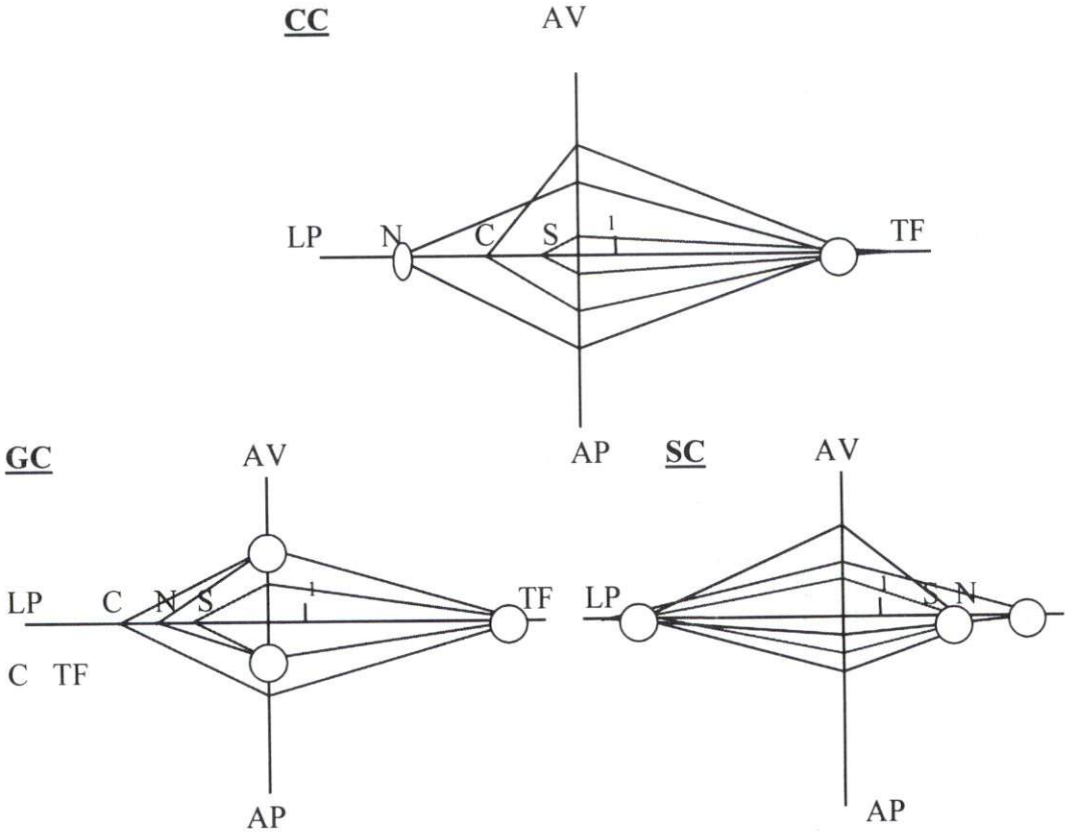


Figure 3: Priority factors in carp consumption by location

TF: generally similar, except for SC, and CC>GC>SC, CC+ GC: generally similar, SC: different, LP: for SC similar, for CC and GC different, AV+ AP: different.

LP: Lower price, AP: Appearance, TF: Taste and flavour, AV: Availability
N: North, C: Centre, S: South Tehran and Karaj.

Results suggested that increased supply might increase consumption more in lower income group than that in other groups. It appears that relative fish quality is significantly more important than other factors, and its relative importance increases from south to north. Price is the second most important factor influencing purchasing, followed by trust in the seller. Fish appearance and form also influenced purchasing, these factors declining from northern and central to the southern parts, though differences in purchasing decisions between northern and central parts is negligible.

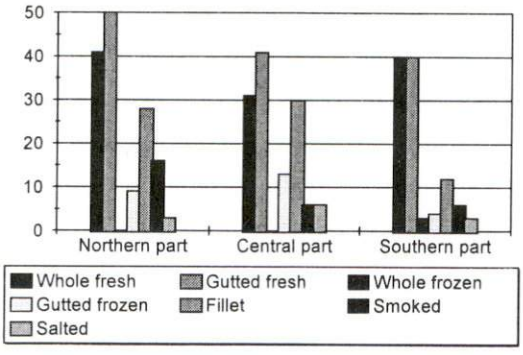


Figure 4: Consumption form of cultured carp in different locations (%)

B- The role of age

A range of age related patterns could be observed, age and seasonal consumption are positively related. Over the last two decades, with increased production and improved marketing facilities, year round consumption has generally grown, this change mostly affecting younger groups, suggesting that continued improvement in handling and marketing facilities and an increased variety of products may positively influence year round consumption. Consumers in all age groups identify taste and flavour as a priority factor, but lower price is more important for the >19 years group and positively related to age. Availability is more important for the >37 years group (especially for common and silver carps), and

though taste may influence all groups, decline in price and supply increase may be particularly important for increasing consumption in older groups. There is a significant difference in preferred forms, fresh fish (whole and gutted) are preferred by age groups of >19 years old, fillets in the youngest group, pointing to the potential preference for value-added products by the younger groups (Fig. 5). The linked factors of "supply increase, income raise and price decline" all show positive response, increasing with age. The effect of price decline is higher than that of income raise, which in turn is higher than that of supply increase. As noted earlier, the number of family members increases with age, associated in turn with crowded families located in the south, classified as groups having low income, all of which may result in both increasing demands for income raise and price decline increasing demand. Though, >25 years age groups paid more attention on price.

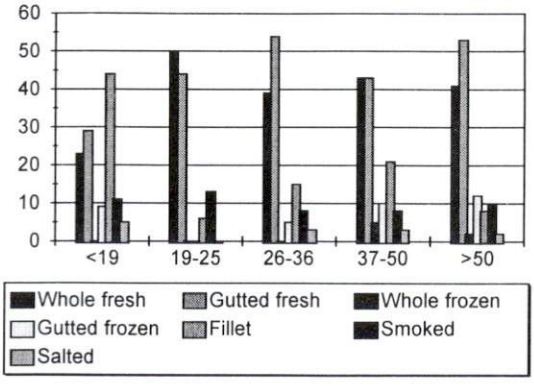


Figure 5: Preference of carp product by age group (%)

C- The role of birthplace

The study confined differences, especially between coastal area and inland provinces. The results show that there is a favourable market for carp and its products, particularly in inland provinces, and especially for processed products (Fig. 6). Though particular transport and handling facilities are being improved,

constraints may remain over the coming years. The static or declining position of captured fish supplies not only may increase these features in inland provinces but also in coastal areas.

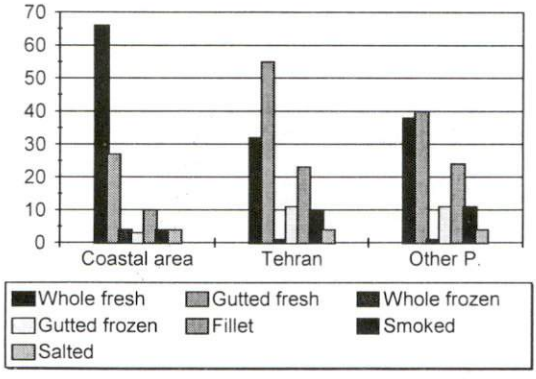


Figure 6: Processed culture carp consumption in difference areas
Other P. : Other provinces.

D- The role of occupation

The largest groups of population are students and all year round fish consumption is higher for them than that for other groups, while for housekeepers, one of the most important groups, that figure is less than half of that for students. Overall, all year round fish consumption of students is more than that of the national average, in employees and free-job workers it is similar, but for housekeepers it is almost two-thirds of that for the national average. Since housekeepers mostly have low education level and are more significant in southern Tehran, these factors may affect seasonal consumption. Students preferred fillet and claimed for inadequate familiarity (Fig. 7). Income raise and price decline might be expected positively affect demand from employees than other groups. Overall, the relationships between job and carp consumption with response to increase supply, income raise and price decline is insignificant, and so these will have a negligible effect across categories.

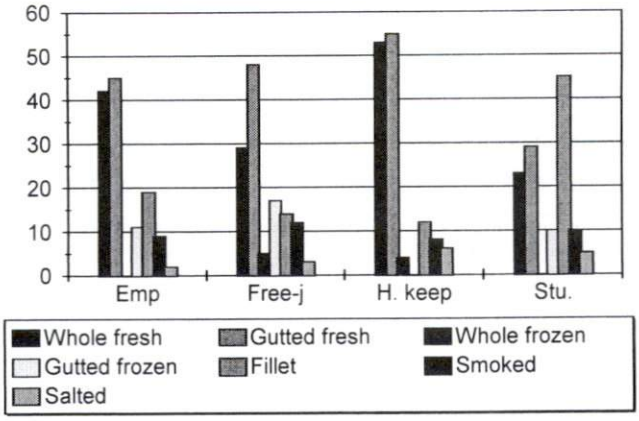


Figure 7: Processed culture carp consumption at difference occupational groups (%)

Emp: Employee, Free-j: Free-job, H. Keep: Housekeeper, and Stu: Student.

E- The role of education level

Year round fish consumption for level 4 group is double of that of national average, but for levels 1 and 2 are similar to that of national average. The figure for the illiterate group is almost half of that for national average, indicating its significant increase with increasing of education level. However, this is almost conversely related to the age and relates to the employee' which mostly similar to levels 2 and 3. Since, Iran is developing and education level of its people will increase over the coming years, year round consumption of fish might also be increased in future. In negative response to cultured carp as a top priority, lack of access to safe and suitable fish increases with increasing educational level, and inadequate familiarity with carp declines conversely, showing that a decline in price and improvement of handling and marketing facilities, as well as new developed markets may upset these negative aspects, particularly for upper educational levels. It was found that with increase educational level, the percentage share of both whole and gutted fresh increases, and choice of salted form declines, suggesting a

potential demand for added-value products (Fig. 8). The effect of supply increase, income raise and price decline are all positively related to increase of educational level and conversely related to the age. The relationships between education levels and "supply increase, income raise" to increase of carp consumption, is found that insignificant, but price decline is, on the other hand significant. This suggests that economic growth, which increases per capita earning, new production technologies which increases supply and reduced production costs may all contribute to expanded future demand.

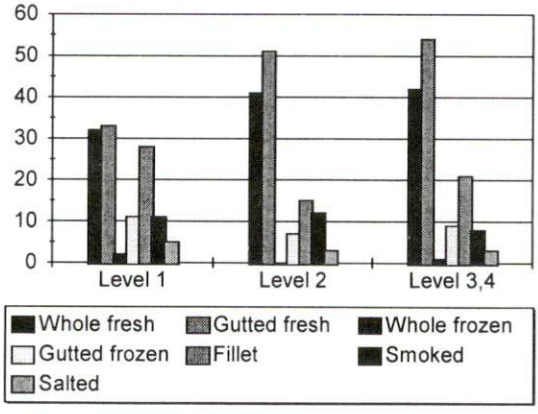


Figure 8: Processed cultured carp consumption (%) for different educational levels.

Level 1: below diploma, Level 2: diploma, Level 3: bachelor degrees, and Level 4: postgraduate qualifications.

F- The role of family status

Year round fish consumption for single group is more than that of national average, for NC and LF less than that of national average, but for SF similar to that of national average. As the number of children increases, year round consumption decreases and seasonal use increases, which appears to be related to more supply, cheaper and traditional purchasing in seasonal for LF. As noted before, respondents

with LF were mainly older, less educated and lived in S Tehran, though it seems all these factors affected all year round consumption in this group. All married groups were found to have a significant preference for fresh fish, and as household size increases, the share of filleted product decreases (Fig. 9). This appears to be related to the age, education and location, where LF are mainly older, less educated and live in the S. However, the difference between LF and SF for gutted fresh is negligible. In terms of choice against carp, the factor of taste, declines as household size increases. This may be related to traditional serving, since single respondents claiming cooking problems, however, the difference between LF and SF is negligible. Among the married groups, the potential effect of supply increase, income raise and price decline are more important for families with offspring, and there is a positive relationship between family size and "supply increase, income raise and price decline" to increase carp consumption.

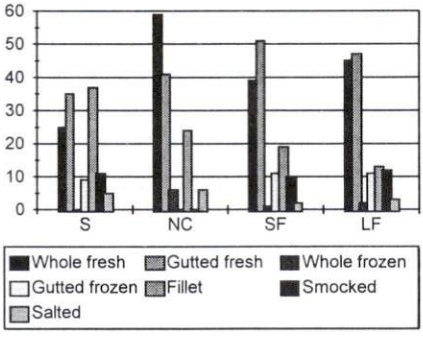


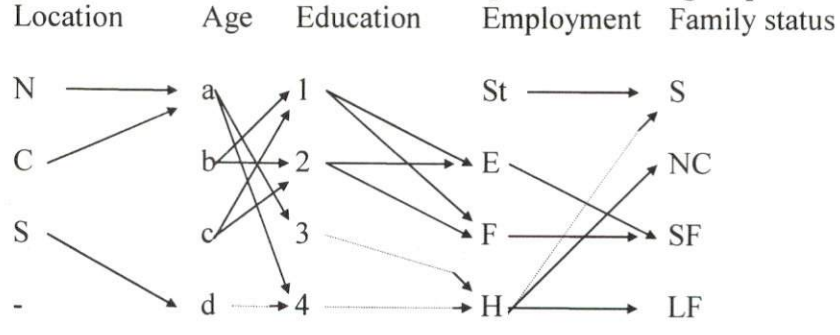
Figure 9: Consumption form of cultured carp (%) in different household groups

S: Single, NC: No children, SF: Small family, and LF: Large family.

Discussion

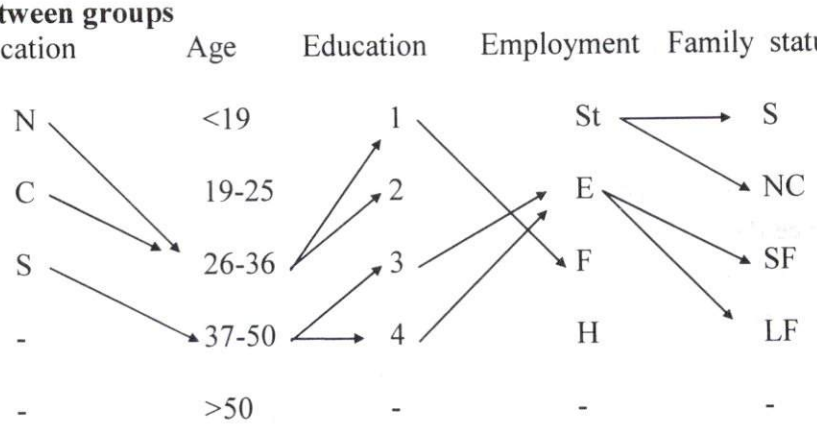
Bell (1968), Dellenbarger *et al.*, (1988), Jolly & Clonts (1993), Engel, *et al,* (1995) and Salehi (1999) emphasised on the role of cultural aspects on fish consumer behaviour in developing countries, like Iran. Sonnenschein (2005) indicated every consumed makes a difference and Seafood Watch Program (2005) study showed consumers would be willing to spend more money for identified products, this was noted by respondents in Tehran province, for the quality products by trust in the sellers. Recently, principles of organic aquaculture and quality and safety approaches were noted by many organisations and researchers (Josupeit *et al.*, 2001; Ferdouse, 2004 & 2005; Subasinghe, 2005; Ababouch, 2004 & 2005; Brown, 2004; Bergleiter, 2005; Johnson, 2005; Polo & De Lara, 2005; Young, 2005; Karalazos *et al.*, 2005; Salehi & Hosseinzadeh, 2005; Lem, 2005; Lupin, 2005; Censkowsky, 2005; Sporrer, 2005), in Iran, this was emphasized by natural products, mainly from special lakes and/or farms (Salehi, 2005). Satisfaction of consumer's needs have been strongly noted elsewhere (Baker, 1983; Chaston, 1983 & 1984; Josupeit, 1995; Kinsey, 1988; Kotler, 1984 & 1994; Shaw & Muir 1987; Pillay 1990; Bjorndal 1990; Doyle, 1994; Salehi, 1999 & 2003; Young, 1987 & 2005), as in Tehran noted by some carp producers and distributors. Overall, the relationships between consumer characteristics and carp consumption behaviour were analysed as follows;

(1) Positive linkages on year round consumption between groups



a: <25, b: 26-36, c: 37-50, d: >50 and St: student, E: employee, F: free-job, H: housekeeper.

(2) Positive linkages on supply increase, income rise and price decline between groups



(3) Key features of preferences

Major groups	Prefer	% of population
young, single	fillet, ready meal	~>50% (~25% <10 years old)
educated, middle age, small family	lower price, safety products, high quality	~<35%
old, large family	lower price, fresh, increased supply	except children ~15%

As shown, younger groups preferred ready meal and demand for a variety of products, in the coming years, education level of this group will increase, and increased supply and improved quality of products appears to be more attractive for this group. It was found that to increase carp consumption a raise in income and decline in price of carp products will have more affect on older groups, larger family sizes and educated people. The role of income raise, price decline and education was noted by others too (Kinnucan, 1985; Dellenbarger, 1988; Kinnucan & Wineholt, 1989; Salehi, 1999 & 2003; Hajmohammadi, 2002). It Iran, the study showed, at present condition, with only supply increase to increase consumption,

the difference between education levels, family status, job groups, and location are insignificant. Except for the students, it was found that the effect of job on consumption 'behaviour is also insignificant. The difference between locations (which related to socio-economic, different aspects such as income, education level, job and family status) is significant, though, this difference may be expected to affect seasonality consumption and increase consumption with a raise in income and price decline. Overall, increases of variety of product in markets, a raise in income and price decline may increase all year round fish consumption, and affect groups with offspring, representing almost 85% of the population. One major area, where help is needed is in supporting farmers to find markets for their products. Ideally, these markets should provide selling opportunities that have not been widely used before or those that are not profitable to others. As far as possible market prices would be attractive enough to support and stimulate production, which, will significantly and positively influence all year round consumption and demand. If high values are to be established, carp will have to become reliably attractive to modern, richer and educated consumers in Iran. High value fish products commonly and increasingly need a large volume of standardised measures, specialised packaging and handling. In addition, technological development in production, harvesting, transportation, storage and communications may be required. In Iran, carp culture is a relatively new industry, and pioneering approaches of the handling, processing technology, and marketing will demand to match expanding production to market need.

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