

Wagening-UR report DWK 404

Improving the utilization of Silver carp (*Hypophthalmichthys Molitrix*) and other under-utilized fish species

Fact finding and goal establishing mission to the Islamic Republic of Iran
(31 January – 5 February 2004)

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February 2004

Title	Improving the utilization of Silver carp (<i>Hypophthalmichthys Molitrix</i>) and other under-utilised fish species. Fact finding mission to the Islamic Republic of Iran
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A&F number	
ISBN-number	
Date of publication	2004-02-20
Confidentiality	Non
Project code.	DWK 404

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Abstract

In recent years a scientific cooperation between Wageningen-UR and the Iranian Fisheries Research Organisation (IFRO), related to the Iran Fishery Organisation Shilat about processing has been started.

In February 1999 a draft memorandum of understanding on fisheries co-operation has been signed. Identified fields of co-operation were for instance Research and Development, especially of value added products, e.g. kilka, promotion of trade of fish and fisheries products between the two countries and also training.

Referring to the memorandum the scientific program for collaboration on processing of fish has started on 25 February 2002 (paragraph 3. Production, processing and trade of aquatics/ research).

In the Netherlands this cooperation has been made concrete by the project approval of “Improving the utilization of Silver Carp and other under-utilized fish species; phase 1: fact finding and goal establishing mission to Iran” as part of the DWK 404 project.

In this project are involved:

- Netherlands: Animal Science Group Fishery Research, (Frans Veenstra and Jeroen Kals), Agrotechnology & Food Innovations (Paul Bartels en René Koster), Dir. Visserijen (Pieter de Rijk) and the Dutch embassy in Tehran (Cees Gravendaal).
- Iran: Iranian Fisheries Research organisation (IFRO) Hamid R. Alizadeh, Ali Farzanfar, Mansour Sadrian and Mr. Arshad from the Iranian national aquatic processing centre.

The mission to Iran was made at 31 January – 5 February.

Three institutes has been visited for discussion of a bilateral research proposal in the north of Iran:

- The National Aquatic Processing Center at Anzali Port
- International Sturgeon Research Institute affiliated to IFRO at Rasht City – Sanga
- Iranian Fisheries Research Organization (IFRO) at Tehran

Also the Iranian Fisheries Organization (Shilat) at Tehran has been visited for this purpose.

Goal of the mission has been the definition of the objectives for the bilateral research that gives the highest added value to the economy of Iran and the Netherlands, in such a form that the research creates scientific collaboration on processing of fish.

As a result of the discussions a proposal has been written for further research based on the processing of the fresh water Silver Carp (*Hypophthalmichthys Molitrix*).

Important items are:

- Production of a proper fillet without the unpleasant fatty tissue bones and skin and fresh preservation of this fillet for distribution
- Processing of mince and the development of new products for better distribution and utilization of the fish meat.

In the Netherlands small scale research will be carried out and contacts with industry will be made for further development. Pilot experiments for implementation of the new processes and products will be made at the IFRO.

IFRO will put the same amount of effort to the project as in the Netherlands will be budgeted.

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1. Introduction

In 1998 a scientific cooperation between Wageningen-UR and the Iranian Fisheries Research Organisation (IFRO) about processing has been started in 1998 with the visit of Ir. C. Lammers. In February 1999 a draft memorandum of understanding on fisheries co-operation has been signed by the Head of the Fishing Company of Iran (Shilat, related to the Ministry of Agriculture) and the Director of Fishery of the Dutch Ministry of Agriculture, Nature Management and Food Safety.

Identified fields of co-operation were for instance Research and Development, especially of value added products, e.g. Kilka, promotion of trade of fish and fisheries products between the two countries and also training.

In 2000 Mr. F.C. Roest has made an inventarisation of the training, research and management capacities in Iran.

Several persons, we have met, have been in The Netherlands as a member of a delegation visiting The Netherlands because of the signing the memorandum or to buy equipment.

Referring to the memorandum the scientific program for collaboration on processing of fish has started on 25 February 2002 (paragraph 3. Production, processing and trade of aquatics/ research). In the Netherlands this cooperation has been made concrete by the project approval of “Improving the utilization of Silver Carp and other under-utilized fish species; phase 1: fact finding and goal establishing mission to Iran” as part of the DWK 404 project.

In this project are involved:

- Netherlands: Animal Science Group Fishery Research, (Frans Veenstra and Jeroen Kals), Agrotechnology & Food Innovations (Paul Bartels en René Koster), Dir. Visserijen (Pieter de Rijk) and the Dutch embassy in Tehran (Cees Gravendaal).
- Iran: Iranian Fisheries Research organisation (IFRO) Hamid R. Alizadeh, Ali Farzanfar, Mansour Sadrian and Mr. Arshad from the Iranian national aquatic processing centre.

The mission to Iran was made at 31 January – 5 February. The established agenda of the mission of 4 days can be found in appendix 1.

Three institutes has been visited in the north of Iran:

- The National Aquatic Processing Center at Anzali Port
- International Sturgeon Research Institute affiliated to IFRO at Rasht City – Sanga
- Iranian Fisheries Research Organization (IFRO) at Tehran

Also the Iranian Fisheries Organization (Shilat) at Tehran has been visited.

Goal of the mission has been the definition of the objectives for the bilateral research that gives the highest added value to the economy of Iran and the Netherlands, in such a form that the research also creates scientific collaboration.

2. Fish products in Iran

Iran wants to be self sufficient for food. Fish forms a good protein source as an alternative to meat (lamb, goat or poultry). Distribution from the coast to the inland with 80% of the inhabitants has to be improved for that reason. This is necessary for fresh fish, but also processed fish can be used. Convenience and price are factors to consider as can be seen by an increase of the fast food market in Iran for fish products, such as burgers.

Carp varieties are important for fish production in Asia and also in Iran. This fish is easy to culture in ponds or rivers. Some species are also able to live in brackish water (River outlets of at the Caspian Sea).

In the north of Iran, where Anzali and Tehran are located, 15500 ton of farmed carp species has been produced in 2003. Partly it can be used for production of mince. 65% of the culture production is Silver Carp. In the whole of Iran 35000 tons of Carp was produced 2003 of which 60% consists of Silver Carp. The Iranian authorities expect that this production will rise to 100.000 tons in the next five years with 65% Silver Carp (data presented by the Iran scientists).

In Iran other important sources of raw material for fish processing are:

-Kilka a kind of Anchovies (40.000 tons in 2003)

-non halal species caught as by-catch (450.000 tons in 2003; 40.000 from the Caspian Sea, 84.000 fresh water from the inland and 250.000 from the Persian Sea)

The non-halal species caught as by-catch from the trawlers (about 60 ships) could be used for export. Non-halal are for instance unscaled fish or shellfish. But in this moment it is thrown over board or dried and used as fertilizers. Shrimps and prawns are exported dormant by 1-2 °C. Also Oysters are exported or harvested for pearls.

The Kilka (type of Ancho fish) has a strong specific taste, which is disliked by the locals. Only by special catch methods this taste can be minimized. The best product is given by the catch in the morning of ships that are provided with a sucking device in the water near a light source. This gives less damage to the fish. While most of the Kilka is used for producing fishmeal (90%), some catches (especially with the sucking device in the morning) is used for human consumption, such as canning or production of marinated products

Other species used for production of human food are for example Tuna and Sardines from the Persian Sea and Sturgeon from the Caspian Sea. Caviar forms an important export product. Squid is also caught in the Persian Sea and used as feed for the shrimp culture.

The price of Silver Carp is about 0.50 Euro per kilo. For Kilka or Ancho fish the prices are as low as 0.20 Euro per kilo. In the Netherlands a kilo of Cod is costing 3.5 Euro per kilo, but for Pollack (frozen fillets) the price are around 1 Euro per kg.

3. Processing of fish

The Iranian National Aquatic Processing Centre, affiliated to the IFRO, carries out applied research on the processing of fish. It has been founded in 1997, further build with the help of UNDP and IFRO and officially inaugurated last year. The centre possesses new cold storage rooms, a pilot line for producing fish burgers and sausages from mince out of fish and packaging equipment. Most of the equipment of the line has been mounted on wheels for flexible operation. The production capacity is 2500 kilo per day (8 hours).

The lines consists of (see also the pictures):

- weighing
- detailing
- degutting
- meat separator (pressing meat from the bones, giving the mince)

- burger/finger forming
- preduster (protein/starch powder)
- battering (protein/starch/taste solution)
- breeding machine (crustforming)

- continue frying
- spiral freezer
- vacuum packaging (storage time 3 (fat) - 6 months (lean))

The burger forming equipment is constructed by Koppens (Bakel in Holland).

Several products are made, varying

- mince or surimi
- the shape (finger/burger),
- the fish (Silver Carp, Kilka etc.) or
- the final step in the process (not fried packed, pre-fried packed, frozen)

The burgers are made from 35% mince and about 8 mm thick.

Surimi is made from mince that has been washed with salted water for at least three times. It gives a more white and better gelling product, because the water-soluble or sarcoplasmatic proteins are washed away. . In this moment surimi is made by hand, but Japanese equipment for continue production will be delivered this year.

The use of Kilka or Ancho fish for surimi or mince is complicated by the 4 to 12 % fat (depending on the season) respectively, the grey color, less gelling capacity and the strong taste of the dead fish.

An alternative is the canning of fillets or degutted fish or marinated fillets. The Russian industry is canning the Kilka with vegetables and spices.

4. Possibilities from bilateral research

In Iran there is a good knowledge about the culturing of several types of fishes, especially for Carp species and Sturgeon. Inventarisation of fish presence in Iran and control of the fish population forms an important part of the studies, especially for the Sturgeon.

Also the contact between the research group IFRO with approximately 1000 employees and the commercial group formed by the Iranian Fisheries Organisation (Shilat) is well organized. The production of Caviar is ruled by the government, as also is the culturing of the Sturgeon.

Apart of that also the processing of fish is researched in close contact with the industries.

This research is especially directed to improve the added value of the fish by decreasing the losses or using bycatches.

In the Netherlands the same type of research is going at the Wageningen University and Research (WUR) institute RIVO, but in combination with for instance the WUR institute Agrotechnology & Food Innovations new processes are possible to increase the added value.

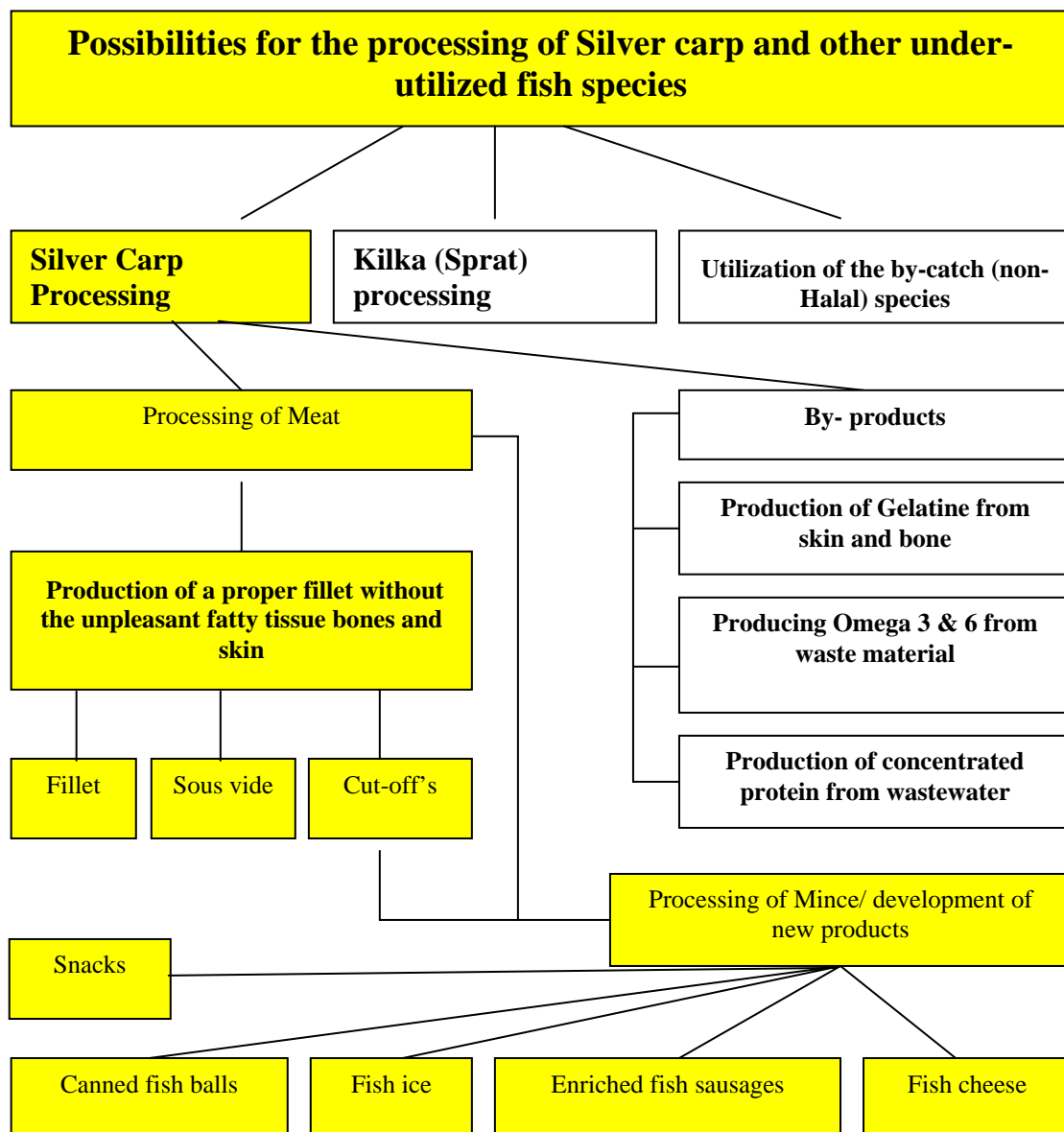


Figure 1: The research priorities and objectives as agreed during the meetings during the mission. The yellow (or grey) boxes mark the prior research objections now proposed for phase 2 of the project.

5. Further research

In the Netherlands this bilateral project forms a part of the North – South project (DWK 404) Of the ministry of Agriculture. Based on the results of the fact finding and goal establishing mission a new project proposal for further research has been composed (Appendix 3).

In the same time the Iranian Fisheries Research Organisation is creating an additional program. The Dutch proposal has an accent on the creation of new processes, new products and finding possibilities for new processes together with the industries, while in Iran research will concentrate on the pilot plant processing and industrial implementation. .

6. Conclusions

The major conclusion of the fact and goal establishing mission is that collaboration will be very useful for both countries and this project will be a good start to intensify and improve both the scientific and business relationships between Iran and the Netherlands for fish processing. The first result of this working together is the recent proposal, attached as appendix 3 and the statement of Dr. Rezvani (Head of IFRO) that Iran will put in the same financial efforts as the Netherlands. In our opinion the fact and goal finding mission was a success.

7. Appendices

Appendix 1 Revised Meeting Agenda of WUR (RIVO and A&F) Delegation Visit,
31 January – 5 February 2004

Appendix 2 Persons involved in this mission

Appendix 3 Draft proposal based on the fact finding mission to Iran

Appendix 1

Revised Meeting Agenda WUR (RIVO and A&F) Delegation Visit, 31 January – 5 February 2004

31 January

- 23:10 *Arrival of Delegates*
Arrival of delegates to Tehran, Mehrabad Airport on flight
KLM ROYAL DUTCH AIRLINES - KL 433
Welcome Delegates include Dr. *Paul Bartels* (A&F Inv. W-UR) and
Ir. *Jeroen Kals* (RIVO W-UR).
Mr. Ali Farzanfar, Director of Scientific cooperation's of IFRO,
Mobile No. 0912 3153788 will be in the Mehrabad Airport.

1 February

Tehran

- 01:00 – 05:00 *Rest*
In IFRO Guesthouse, Beheshti Ave. Pakistan Av. 10th Alley, No. 28/1 Tehran
(Tel. 0098 21 8732011).
- 05:30 – 12:00 *Travel (Tehran to Rasht to Anzali port "North of Iran" by Car),*
Dr. Mansour Sadrian will accompany Dutch Scientists
(Mobile No. 0912 1015089)

Anzali Port

- 12:00 *Visit with Director of National Aquatics Processing Center*
(Mr. Arshad) affiliated to IFRO.
- 12:30 – 13:30 *Lunch*
- 13:30 – 14:30 *Presentation by Mr. Arshad (Processing research activities)*
- 14:30 – 15:00 *Break*
- 15:00 – 16:00 *Presentation by Rivo Scientists (General, More out of fish).*
- 16:00 – 18:30 *Visit "Chinese Carp" Farm*
- 18:30 *Visit to lokal fish market*
- 20:30 *Arrival of Dutch Scientists (Kadousan Grand Hotel, Anzali port,*
Pasdaran Ave. Tel 0098 181 4223001-3 Fax. 0098 181 7221482)
Dinner time

2 February

Anzali Port

National Aquatics Processing Center

- 07:30 – 09:00 *Meeting- Dutch – Iranian sides on Joint project: introduction*
- 09:00 – 10:30 *Visit to Mince Processing of Silver Carp; Burger products.*
- 10:30 – 12:00 *Presentation by RIVO Scientists (More out of fish).*
- 12:15 – 13:15 *Lunch*
- 13:30 – 14:30 *Visit, Surimi Processing of fish products (Silver Carp)*
- 14:30 – 16:30 *Continue, Meeting on Joint project: fact finding*
- 16:30 *Visit to harbor of Anzali*
- 20:30 *Arrival of Dutch Scientists, Kadousan Grand Hotel*

3 February

Anzali Port

National Aquatics Processing Center

- 07:30 – 09:30 *Continue, Meeting- Dutch – Iranian sides on Joint project*
- 09:30 – 12:00 *Visit to the Canned Fish Processing Industry (Silver Carp and Tuna)*
- 12:00 – 12:30 *Visit to fisherman beach (Caspian Sea)*
- 12:30 – 13:30 *Lunch*

Rasht City – Sangar

International Sturgeons Research Institute affiliated to IFRO

- 14:30 – 16:00 *Courtesy visit to Dr. Mohammad Pourkazemi (Head) and Staffs, Departments (Included Processing Department)*
- 16:30 *Fish Vendors and Markets in Rasht*
- 18:30 *Rasht Airport (Flight to Tebran No.784 – 19:30 Iran Aseman Airlines)*
- 23:00 *Tebran, Accommodation in Laleh Hotel*

4 February

Tehran

Iranian Fisheries Research Organization (IFRO)

- 09:00 – 10:00 *Meeting, Dutch – Iranian sides on Joint project*
- 10:00 – 10:30 *Break in Mr. Alizadeh office (International Affairs of IFRO)*
- 10:30 – 12:00 *Courtesy visit to Dr. Sohrab Rezvani, (Head of IFRO)*
- 12:00 – 12:30 *Visit to relevant Departments of IFRO*
- 12:30 – 13:30 *Lunch*
- 13:30 – 14:45 *Joint Project Meeting, Conclusions for project out line*
- 15:00 – 16:00 *Courtesy visit to Mr Saeidi (Director General of Iranian Fisheries Organisation)*
- 16:00 *Visit to city of Tebran*
- 19:30 *Dinner at the home of the Dutch agricultural counselor Cees Gravendaal and Mr Mahdi Shafeghati*

5 February

Tehran

02:30 *Depart at Mehrabad Airport on KLM flight KL 434*

Appendix 2

Persons involved in this mission

Iranian scientists, spoken with by Dutch delegation during the fact finding mission.

Ali Farzanfar M Sc	Manager scientific Communication
Dr. Hamid Alizadeh	Ichthyology Researcher, Director International Affairs IFRO
Dr. Mansour Sandrian	Veterinary, Head Group Head Processing and Quality Control
Dr. Ashad	Director of National Aquatics Processing Center
Staff	National Aquatics Processing Center
Dr. Mohammad Pourkazemi	CITES representative and Director of International Sturgeons Research Institute
Ghorban Zarek Gashti	Researcher of International Sturgeons Research Institute
Dr. Achmad Ghoroghi	Head of biology
Dr. Nassar Najafpour	Ichthyology Researcher
Mr. Saeidi	Director General of Iranian Fisheries Organisation

Dutch people involved

Mr. Cees Gravendaal	Agricultural counselor
Mr. Mahdi Shafeghati	Assistant to Dutch agricultural counselor
Dr. Ir. Paul V. Bartels	Director of the expertise center on New food processing Wageningen UR, Agrotechnology & Food Innovations BV
Ir. J. Kals	Scientist on aquaculture and fish processing Dutch institute for Fish Research RIVO

Appendix 3

Proposal for the second phase of the bilateral research between Iran and the Netherlands based on the fact finding mission to Iran

Improving the utilization of Silver carp (*Hypophthalmichthys Molitrix*) and other under-utilized fish species 2004-2005

Possibilities for value adding supply chains and international trade of Silver carp (*Hypophthalmichthys Molitrix*) in the Islamic Republic of Iran.

This proposal will be filed together with our Iranian colleagues from IFRO as a result of the first phase “the fact finding and goal establishing mission” of the project within the framework of the DLO-research program international cooperation, (DWK 404) theme I: Iranian-Dutch collaborating research project related to Food safety and food chains as authorized by the program comity and written in the letter of approval of 7th of October 2003 (ref Adj/LJ/03/0021920).

Name and affiliation of the proposers involved

Proposal is written and will be executed by ASG, A&F Inv. in the Netherlands and IFRO and The Iranian national aquatic processing centre in cooperation with the embassy and Dutch ministry of Fisheries to stimulate the upgrading and export of aquatic products, especially Silver carp from Iran.

Involvement

(Referring to M.O.U: Iran, Netherlands 25 February 2002 (paragraph 3. Production, processing and trade of aquatics/ research):

- Netherlands: Animal Science Group, (Frans Veenstra and Jeroen Kals), A&F Inv. (Paul Bartels en René Koster), Dir. Visserijen (Pieter de Rijk) and from the Dutch embassy in Tehran (Cees Gravendaal).
- Iran: Iranian Fisheries Research organisation (IFRO) Hamid R. Alizadeh, Ali Farzanfar, Mansour Sadrian and Mr. Arshad from the Iranian national aquatic processing centre.

ASG and RIVO: The Netherlands Institute of Fisheries research (RIVO), with approximately 125 employees, is a division of ASG mainly concerned with biological, ecological, technological, environmental hygiene, nutrition, and aquaculture of fish and quality research. The technological research is focused on higher added value of fish and fishery products, conversion of by-products for food and non-food applications, optimization of the use, storage and processing of fish. RIVO is a member of the West European Fish Technologists Association (WEFTA) and maintains close links with numerous institutes. As the Agricultural Research Department is a partner in the Wageningen University and Research Centre (WAGENINGEN-UR), the institutes are co-operating closely with Wageningen Agricultural University.

A&F Inv. BV, Institute for Agrotechnology and Food Innovations, is an organization for strategic and applied-scientific research for the industries manufacturing food and non-food products on the basis of vegetable and animal raw materials, and for chain managing companies and organizations. The target of the institute's multidisciplinary research and development activities is to enhance the added value of agro-products and to develop new technologies, new applications and new markets for agro-raw materials. In three key activities, the institute covers the whole production column, from the primary raw material up to and including the half-products and/or end products.

Choice and confirmation of IFRO and the Iranian National Aquatic processing centre

Referring to the letter of understanding (reference: 32746) and the result of the bilateral meetings during our fact finding and goal establishing mission both parties have agreed to start a joint research project focussed on the “Possibilities for the processing of Silver Carp and/or other under-utilized fish species”. Further it has been stated that the Iranian Fisheries Research Organisation (IFRO) has been appointed as the Iranian party to the execution of the project and has been mentioned that the Iranian side will put in the same financial efforts as the Netherlands.

Problem statement

Referring to the M.O.U: Iran, Netherlands 25 February 2002 (paragraph 3. Production, processing and trade of aquatics/research) and accordance to LNV and program 404 it is agreed that in the form of a collaboration between the Dutch Research Institute and the Iranian Research Institute the Netherlands will help to bring the fish processing industry to a higher and more durable level.

Location and execution of the project

The project will be carried out in Iran by the IFRO and in The Netherlands by Wageningen UR, especially by ASG IJmuiden and Agrotechnology and Food Innovations at Wageningen.

Keywords Regional value adding supply chains and international trade, food quality and safety, under utilized fish species and Silver carp.

Tools Upgrading, technology, higher added value, traditional products, and partner shipping, sensory evolution

Time frame The project will be performed in the period of 2004 and 2005

Objectives

The research priorities and objectives as agreed during the first phase “the fact finding and goal establishing mission” of the project are depicted in the scheme below. The yellow or grey boxes mark the prior research objections now proposed for phase 2 of the project.

In summary the two main objectives of phase 2 will be:

- 1) The production of a proper fillet without the unpleasant fatty tissue bones and skin.
- 2) The development of new products /processing methods using mince of Silver carp.

Work plan

In trying to achieve the first objective “the production of a proper fillet without the unpleasant fatty tissue bones and skin” the following paths are proposed:

- 1) **Testing the available trimming machinery currently on the market:** Literature will be gathered, contacts with relevant industries, such as Marel, DSL, Carnitech and Baader will be made and if possible tests will be carried out with trimming machinery initially developed for other fish species to evaluate if the equipment is suitable for the production of fillets from Silver Carp. Fillets produced will be evaluated by comparison to fillets from other species currently available on the market.
- 2) **Evaluation of the pine bone cutter**
The possibilities to use a pine bone cutter will be evaluated. If the results from this evaluation are positive, tests will be carried out with a pine bone cutter to evaluate if it is possible to produce a fillet with cut pine bones in such a way it is acceptable to the consumer.
- 3) **The use of special parts to produce fillets**
The Silver Carp’s anatomy will be investigated by the use of X-rays to evaluate if some parts of the fish contain less bones and can be used to produce a high quality boneless fillet

In trying to achieve the second objective “ the development of new products/ processing of mince from Silver carp” several product ideas as mentioned below will be investigated for their feasibility:

- 1) “Fish cheese” by the use of acid coagulation of proteins from Silver Carp
- 2) “Fish ice cream” by the use of fish proteins of Silver carp instead of proteins from milk
- 3) Oil enriched fish sausages by using emulsion technology and additives to adapt taste, color and texture
- 4) Canned cooked fish balls with or without starch from Silver Carp mince
- 5) Direct or indirect expanded fish snacks products, such as chips, using extrusion technology
- 6) Sous vide vacuum packed cooked fillets from Silver Carp to create new foil packed products decreasing the problem of the sharp bone bones by making them soft.

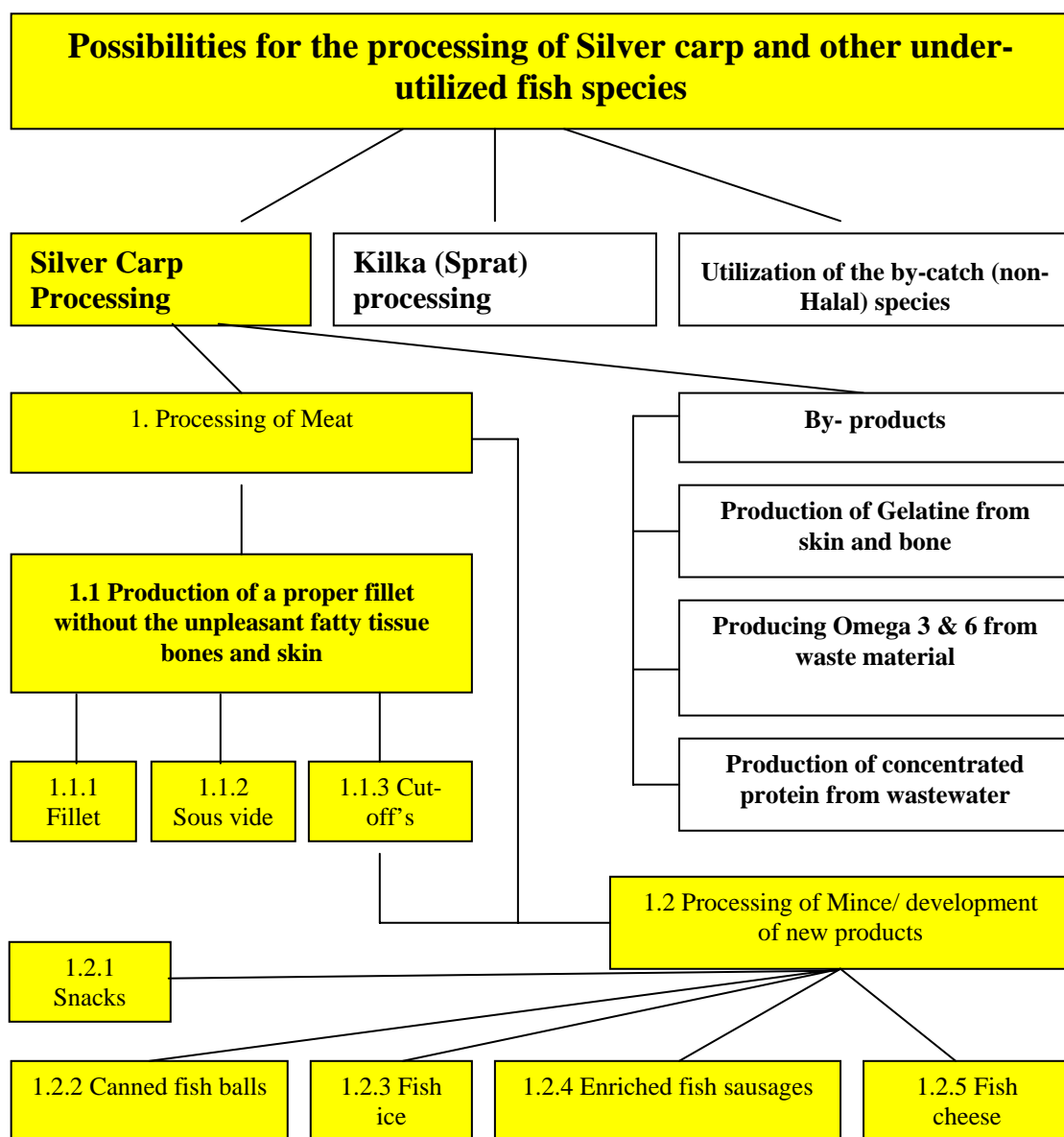


Figure 1: The research priorities and objectives as agreed during the first phase “the fact finding and goal establishing mission” of the project are depicted in the scheme below. The yellow or grey boxes mark the prior research objections now proposed for phase 2 of the project.

Budget requirement:

This project consists of two phases of which phase 1 “the fact finding and goal establishing mission” has already been successfully executed.

Phase 1: a fact-finding mission for further definition of the project (**ref Adj/LJ/03/0021920**)
As a part of the North – South program (404): 22 k€ in the beginning of 2004

Phase 2: Development of new, better and more durable processing methods to improve the utilization of (farmed) Silver Carp (*Hypophthalmichthys Molitrix*). On the Dutch side the requested budget within the North – South program DWK 404: 170k€

Activity	man month's	RIVO	A&F Inv.	Costs in E	Total in Euros
1.1.1. Testing the current available trimming machinery	2.5	1	1.5		
-Contact of companies and planning test arrangements	0.5			05225	
-Executing tests at different companies	1.5			15675	
-Expert evaluation of produced fillets	0.5			05225	
-Expected costs of machinery				2000	
-Expected costs of raw material				<u>1000</u>	
					29125,-
1.1.1. Evaluation of the pine bone cutter	0.5	0.2	0.2		
-Executing tests	0.25	5	5	02613	
-Expert evaluation of produced fillets	0.25			02613	
-Expected costs of machinery				01000	
-Expected costs of raw material				<u>500</u>	
					06726,-
1.1.1 The use of special parts to produce fillets	1	0.5	0.5		
-Executing tests	0.5			05225	
-Expert evaluation of produced fillets	0.5			05225	
-Expected costs of machinery				02500	
-Expected costs of raw material				<u>500</u>	
					13450,-
1.2.5 Production of “Fish cheese” by the use of acid coagulation of proteins from Silver Carp	2	1	1.5		
-Executing experiments	1.5			15675	
-Expert evaluation of produced “cheese”	1			10500	
-Expected costs of machinery				00500	
-Expected costs of raw material				<u>1000</u>	
					27675,-
1.2.3. Production of “Fish ice cream” by the use of fish proteins of Silver carp instead of proteins form milk	2.5	1	1.5		
-Executing experiments	1.5			15675	
-Expert evaluation of produced “ice cream”	1			10500	
-Expected costs of machinery				00500	
-Expected costs of raw material				<u>1500</u>	
					28175,-
1.2.4 Production of oil enriched fish sausages by using emulsion technology and additives to adapt taste, color and texture	1	1	0		
-Production of enriched sausages	0.5			05225	
	0.5			05225	

-Expert evaluation of produced sausages -Expected costs of machinery -Expected costs of raw material				01000 <u>1000</u>	12450,-
1.2.2. Production of canned cooked fish balls with or without starch from Silver Carp mince	1	1	0		
-Production of canned cooked fish balls	0.5			05225	
-Expert evaluation of produced canned fish balls	0.5			05225	
-Expected costs of machinery				01000	
-Expected costs of raw material				<u>1000</u>	12450,-
1.2.1 Snacks (direct or indirect) expanded fish products, such as chips, using extrusion technology	1	0	1		
-Production of expanded products	0.5			05225	
-Expert evaluation of expanded products	0.5			05225	
-Expected costs of machinery				02500	
-Expected costs of raw material				<u>1000</u>	13950,-
1.1.2 The use of Sous vide to produce cooked fillets from Silver Carp to create new foil packed products	1	0.5	0.5		
-Production of Sous vides products from Silver Carp	0.5			05225	
-Expert evaluation of produced products	0.5			05225	
-Expected costs of machinery				00500	
-Expected costs of raw material				<u>0500</u>	11450,-
10. Meetings, accompanying and technology transfer (4 times) including travel expenses	1	0.5	0.5		10500,-
11. Report writing and finalization of project					02500,-
Total man month's and Labor costs	13.5	6.7 5	6.7 5		135.951 ,-
Total material costs					021000, -
Total travel costs					010500, -
Total Euros					169951, -

* The expected costs of machinery are based on the expected overall costs for using equipment.

* The expected costs of the raw materials are based on the expected overall costs for raw materials.

In Iran an equal amount for research will be necessary to create pilot plant research, evaluate the economic feasibility and further implementation within the industry. IFRO will evaluate the produced products for acceptance of the local market. Dr. Rezvani (Head of IFRO) has offered to equal the amount within the IFRO as budgeted in The Netherlands (Meeting 4/1/2004).

Reasons for performing the project

Relevancy to international policy development LNV

The proposal will be written within the scope and objectives of the framework of the DLO-research program international co-operation, (DWK 404) theme I: Iranian-Dutch collaborating research project related to Food safety and food chains. This proposal is in particular written to stimulate the upgrading and export of (farmed) aquatic products from Iran. Specific keywords are: Regional value adding supply chains and international trade, food quality and safety. Tools are upgrading, technology, higher added value, traditional products, and partner shipping. The relevancy is cleared by the M.O.U. and the agreements between LNV and WUR (ref Adj/LJ/03/0021920).

Urgency of the issue, contribution to community and social objectives: economical, industry, safety, social and environmental impact

This project benefits to the Iran consumers and the fish supply chain as a whole (fishermen, fish farmers, processors, the food ingredient, functional food industry, and retailer). The better utilization of, high valued, raw materials and or under utilized fish species results in a better use of the natural resources, which has a positive effect on the health state of the people, environment and image of the fish industry. Introduction of the developed processes in the fish industry or in companies affiliated with industry will lead to increased employment and technological know-how. Environmental problems related to fish offal's are reduced as transport over long distances of putrefying offal's can be avoided and by-products that are momentarily used as low valued animal feed can be upgraded to food grade ingredients.

Spin-off: Economic impact and exploitation potential

The fish processors will use the new products to have better possibilities for distribution internally and for export and will be able to increase their margins and market share. The consumers will have more opportunities to include fish in their diet, which could increase the health of the whole population and may cause savings on community medical expenses.

Material & Methods:

Type of the Material	Technical Information	Numbers of Material	Availability status	Cost per unit	Total Costs (Euro)
Raw materials	Fish, ingredients and packaging etc.				7500 (incl. Transport)
Machinery	All kind				14500

Team Works:

-Scientific & Technical Staffs

Expert's Name	Type of Cooperation	Numbers of Personnel	Duration of Cooperation	Wages per month (Euro)	Total Expenses (Euro)
WO (10-11)	Research	4	6.75	9185,-	61999,-
SRO (13)	Research/Co	3	6.75	11880,-	80190,-

-Supporting & services personals

Personnel	Type of Cooperation	Numbers of Personnel	Duration of Cooperation	Wages per month	Total Expenses
n.a.	-	-	-	-	-

-Working trips

Description	Numbers of Personnel	Total Working Trips	Total Days of Working Trips	Wages working trips	Total Expenses
Meetings	2	4	20	2625	10500

-Cost of Working Trips is included in the expenses for working trips above.

Expenses of Transportation	Expenses for renting	Expenses of settlement	Expenses of meal	Total Expenses
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-Other personnel costs: non

Type of Costs (Description)	Number of Personals	Duration Period	Costs	Total Expenses
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Total Expenses

-Description of Expenses in Details see detailed table in budget section

No.	Title	Costs (Euro)	Total Expenses (Euro)
1	Labor	135951	135951
2	Material	21000	21000
3	Travel	10500	10500
4	Finalization	2500	2500
-	Total	169951	169951

Note:

The above tables contain the cost of labor of the Dutch institutes and other expenses needed. It is important to stress that the Iranian scientists will make additional labor costs and expenses.

Wageningen-UR report DWK 404

Description of operations	Months of the Year 2004												Months of the Year 2005											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1. Testing available trimming machinery					■	■	■		■	■	■	■												
2. Evaluation of the pine bone cutter																								
3. The use of special parts to produce fillets																								
4. Production of "Fish cheese" by the use of acid coagulation of proteins from Silver Carp																								
5. Production of "Fish ice cream" by the use of fish proteins of Silver carp instead of proteins form milk																								
6. Production of oil enriched fish sausages by using emulsion technology and additives to adapt taste, color and texture																								
7. Production of canned cooked fish balls with or without starch from Silver Carp mince					■	■	■	■	■	■	■	■												
8. Snacks (direct or indirect) expanded fish products, such as chips, using extrusion technology						■																		
9. The use of Sous vide to produce cooked fillets from Silver Carp to create new foil packed products																								
10. Meetings, accompanying and technology transfer (4 times) including travel expenses																								
11. Report writing and finalization of project																								

Reference

