

Final Report
for
The Project of Research and Development of Pejerrey Aquaculture and Propagation

By
Japanese long-term experts
and
Argentine Countreparts

In
September-05

The Project of Research and Development of Pejerrey Aquaculture and Propagation
(Japan International Cooperation Agency)

1. Outcome of the Project

1-1: Construction of aquaculture facilities in INTECH and EHC for improvement of infrastructure

INTECH

- * Installation of 6 fish tanks with 20 tons' water volume along with sunshade, inlet, outlet and aeration system
- * Provision of generator with automatic operating system and electric lamps above the tank with controller
- * Construction of upper tank for water distribution and sediment pond

EHC

- * Installation of 3 fish tanks with 20 tons' and 4 fish tanks with 80 tons' water volume along with sunshade, inlet, outlet and aeration system
- * Provision of 7 water wheels with 1 horsepower and 4 automatic feeders
- * Construction of sediment tank and sunshade

1-2: Operation of international seminar

Title & Date: "Jornadas de Biología del Pejerrey" on December 2 & 3, 2004

Purpose: International seminar for aquaculture and biology for Pejerrey

Participant: 65 persons from Argentina, Chile, Bolivia, Brasil, Mexico and Uruguay

1-3: Technical report & text

Title & Date: "Examination in Pejerrey Seed Production" in March, 2005

"Development of Artificial Compounded Foods for Pejerrey" in May, 2005

1-4: Dissemination of Project activities

- * Opening Project Homepage through internet in November, 2004
- * Preparation of Project Pamphlet in December, 2004
- * Participation of Pejerrey stocking ceremony in Chascomus Lake in combination with opening summer festival of Chascomus in December, 2004
- * Making Project T-Shirt for the propaganda in February, 2005
- * Operation of Pejerrey Tasting Party in February, 2005

1-5: Standardized techniques developed by Project

- * Cultivation of Pejerrey broodstock and Collection of the spawned egg in tank
- * Feeding regime for producing Pejerrey fingerling
- * Management of water quality to rear Pejerrey fry and fingerling in tank using aeration and submerged pump
- * Treatment against Gyrodactylus parasite on Pejerrey using hormonal bath with 250 ppm· 30 min.

2. The Project of Research and Development of Pejerrey Aquaculture and Propagation

2-1: Achievement of the Planned Project Operation

Sep. 8, 2005

Output	Planned Activities	Sep. 2002 → Sep. 2005											
		1st year				2ed year				3rd year			
1. Development of pejerrey seed production techniques	1-1 Development of techniques for procurement of high quality eggs	←————→											
	1-1-1 Rearing of broodstock fish	←————→											
	1-1-2 Establishment of induced breeding techniques	←————→★											
	1-2 Establishment of suitable feeding regimes	←————→											
	1-2-1 Development artificial feeds	←————★————→											
	1-2-2 Research on feeding regimes	←————→											
	1-3 Genetic indentification of Japanaese and Argentine pejerrey stocks	←————★————→★											
2. Research on mass seed production techniques for pejerrey	2-1 Investigation on suitable facilities and tools	←————★————→											
	2-2 Development of methods for mass seed production of food organisms	←————→											
	2-3 Establishment of disease prevention and treatment protocols	←————→											
	2-4 Research on seed marking techniques	←————→											
3. Planning of farming and other related forms of production	3-1 Survey of legislation on water resources utlization	←————→											
	3-2 Technical and financial evaluation of posible model pejerrey farming and other related forms of production	←————★————→											
	3-3 Preliminary evaluation of candidate sites for model pejerrey farming and other related forms of production	←————→											
4. Consideration of monitoring / evaluation results for improvement of the Project	4-1 Periodical monitoring and assesment	←————→											
	4-2 Improvement of activities based on the results of monitoring/evaluation	←————→											
	4-3 Compilation of a manual based on the research and development results	←————→											

←————→ : Execution of the activity
★ : Short term expert

2-2: Achievement Grid of the Project

Criteria	Evaluation Items	Confirmation Items	Source of Info.	Results
Activities	1. Development of Pejerrey seed production techniques			
	1-1 Development of techniques for obtention of high quality eggs			
	1-1-1 Rearing of broodstock	<ul style="list-style-type: none"> • Number of reared broodstock • Length and weight of reared broodstock • Number of eggs obtained from the reared broodstock 	Project report, interview/questionnaire to Japanese Experts and C/P, Observation	<ul style="list-style-type: none"> - Eyed eggs of Pejerrey, which were introduced from Kanagawa, have been reared in the water tanks at the Project site for three (3) years maintained as healthy broodstock. From the original stock, 580 are now kept at INTECH and reared up to 450g and 30 cm of average standard length. - Second generations from these fishes, hatched at the end of 2003, are now kept 500 at INTECH and 500 at EHC respectively, with an average body weight of 230g. These stocks are the basic broodstock for the Project. - The Project has obtained 2.15 million eggs by December 2004 from 312 female broodstock of three (3) years old from Kanagawa. The method was natural spawning. Fertilization rate reached 33% and hatching rate was 30%. - Broodstock rearing technologies have been developed by the Project, i.e. those in rearing method with water current in cylindrical water tanks, water quality management, feeding with formulated feed. - Both EHC and INTECH have been rearing broodstock of indigenous strains, e.g. Junin and Chasico lagoon as well by applying technologies transferred through the Project. In INTECH, 800 broodstock of Junin strain and 150 from Chasico have been reared till now, while 400 of Junin have been done in EHC. - 1,758 of broodstock have been reared by the Project as of May 2005, with 229.2g in weight and 30.0cm in length on average.
1-1-2 Establishment of induced spawning techniques	<ul style="list-style-type: none"> • Clarification of favourable conditions under which fish aquaculture is induced, in terms of hormone, photoperiodicity, water temperature, and fish food • Number and quality of eggs which were obtained with application of induced spawning techniques • Number of broodstock that spawned with application of induced spawning techniques 	Project report, interview/questionnaire to Japanese Experts and C/P	<ul style="list-style-type: none"> - Test in hormone administration was carried out. - Based on already known data, induced spawning techniques have been developed at experimental level and fundamentally established in order to determine favourable conditions of water temperature, photoperiodicity, quantity and frequency of hormone administration and feeding. - Trials on induced spawning techniques have been carried out as well and seeing good results for part of them on Junin strain. - Assessment of the reproductive condition and Induced spawning by the manipulation of light and/or temperature conditions were instructed by a short-term expert. - 50,750 eggs were obtained by application of induced spawning techniques from nine (9) females spawned out of ten (10) with application of the techniques. 	
1-2 Establishment of suitable feeding regimes				

1-2-1 Development of artificial feeds	<ul style="list-style-type: none"> • Comparison of the cost between artificial feeds that the Project has developed and the existing ones both from Argentina and from Japan • Results of comparative analysis on fish growth between those two categories above • Results of the comparison above 	Project report, Interview/questionnaire to Japanese Experts and C/P	<ul style="list-style-type: none"> -Formulated feed for broodstock has been ordered to local feed company, while the Project implemented experiments to develop those for juveniles. The results of those activities show that broodstock rearing is possible with formulated feed and seed production with locally available feed. -The broodstock have been fed with formulated feed which was developed by the Project. -It can be said that it is possible to rear broodstock with locally formulated feed. However, it has not been clarified yet how it affects the spawning rate of broodstock, so, there is room for further research. -Laboratory made compounded foods at EHC was clarified to use possibly rearing fingerlings instead of Japanese imported foods. -Costs for feeds are as follows: 6.2 peso/kg and 5.7 peso/kg for local artificial feeds (in sales price), 4.5peso/kg plus transfer costs for the one imported from Japan. On the other hand, the Project has found the suitable formula at the minimum cost of 2.5 peso/kg in material price.
1-2-2 Research on feeding regimes	<ul style="list-style-type: none"> • Number of Project-produced seeds and survival rate to see if the developed feeds do grow fish or not • Comparison of growth rate between fishes grown with Project-developed feeds and those with the existing ones 	Project report, Research results	<ul style="list-style-type: none"> -Feed regimes development tests are carried out. The Project has just clarified the feed regimes and they are applied through actual seed production activities. The data on number of produced seeds is available in the technical report, which is more than 100,000. -The comparison data of survival rate and growth rate by applying artificial feed has been obtained in the technical report... -It has been also made clear that seeds can be nurtured to one (1) gram in weight with rotifers, <i>Artemia nauplii</i>, cladocerans, and formulated feed, clarifying proper dose and duration of each application, which have been documented for reference.
1-3 Genetic identification of Japanese and Argentine Pejerrey stocks	<ul style="list-style-type: none"> • (Refer to the applicable seen above) 	(Ditto as above)	<ul style="list-style-type: none"> -The short-term expert gave training to the C/P in genetic identification procedures and genetic information analysis, while the C/P was received and trained in Japan for two (2) months from December 2003. -The above contributed to upgrade the C/P's technology level in genetic identification techniques and facilitated the clarification of polymorphism in Pejerrey both from Kanagawa and local strains of Salada Grande and Chascomus by applying micro-satellite. -Genetic characteristics based on nuclear DNA analysis have been identified both on Pejerrey from Japan and Argentina. Comparison analysis was made in progress. -A short-term expert dispatched in August 2005 provided technological guidance on completing genetic identification activities as well as advices on statistical interpretation based on the results of the comparison analysis.
2 Research on mass seed production techniques for Pejerrey			

<p>2-1 Investigation on suitable facilities and tools</p>	<ul style="list-style-type: none"> • Frequency and conditions of equipment/ facilities usage, clear recognition of how and for what to use each • Fish density in unit area • Quantity and cost of water necessary for project implementation 	<p>Project report, Interview/questionnaire to Japanese Experts and C/P</p>	<ul style="list-style-type: none"> -Facilities for seed production have been built and prepared in 2003 as infrastructure building for the Project, with development and installation of appropriate facilities and equipment for seed production and spawning, as well as broodstock rearing. -Those facilities made the C/P organizations to improve the seed production tests in efficiency, while showed desirable aquaculture methods for seeds and broodstock. -The investigation on improvement of facilities and tools was carried out by the end of the Project. -Almost all the equipment/facilities are found appropriate with specific ways of usage for the Project activities and frequently utilized during the term. -The Project sites are using groundwater for the activities, so it costs only for electricity to pump up water. The fish density is 150/m³ for seeds and 40/m³ for juveniles with the weight of 120g.
<p>2-2 Development of methods for mass seed production of food organisms</p>	<ul style="list-style-type: none"> • Quantity and quality of produced food organisms • Comparison in number of produced seeds, survival rate, and others between fishes grown with the developed food organisms and those with artificial feed 	<p>(Ditto as above)</p>	<ul style="list-style-type: none"> -Mass production method of food organisms has been applied by fertilizing water with chicken manures to propagate rotifers and cladocerans as feeds for juveniles. -By applying mass seed production of food organisms, both survival and growth rates of juveniles have been improved. Growth rate was found as 250% when applied with the developed methods compared with 150% only with artificial feeds. -As for chicken manures, the Project established access to free manures from chicken farm in Chascomus. -The produced food organisms were rotifers and cladocerans. The rotifer density in tank is 10/ml. As for cladocerans, the huge density has not been quantified in 80 tons' tank.
<p>2-3 Establishment of disease prevention and treatment methods</p>	<ul style="list-style-type: none"> • Cases of diseases • Process and methods of treating sick fishes • Process and methods of preventing diseases 	<p>(Ditto as 2-1)</p>	<ul style="list-style-type: none"> -Basic techniques on how to treat diseases caused by improper rearing conditions and management have been transferred to the C/P. -Method has been developed for identification and treatment of parasite Gyrodactylus, while those for prevention of bacteria not yet firmly set up. Technical guidance has been also provided on disease prevention method. -Necessary measures have been taken to prevent spreading of Gyrodactylus to neighbouring water area while applying preventive methods into practice at the Project site.

2-4 Research on seed marking techniques	<ul style="list-style-type: none"> • Cases of review, research, or discussion on seed marking techniques from the perspective of feasibility • Cases of review, research, or discussion from the perspective of cost • Cases of review, research, or discussion from the perspective of how to fully utilize data • Quantity and quality of collected information 	(Ditto as 2-1)	<ul style="list-style-type: none"> -The Project has established the mass seed production techniques and just reached the stage to start feasibility study in Pejerrey propagation. -Seed marking in fingerling was examined by heat branding, cold branding and fluorescent silicone elastomere. The silicone implantation on base of pectoral fins was recommended due to apparent mark and no risk of inadvertent consumption. -Technical report was prepared on seed marking techniques for experimental releasing juveniles by reviewing and examining applicability of the above three marking techniques for Pejerrey propagation by stocking. -As for local Pejerrey, follow-up study is required after releasing Argentine seeds into lagoons but technologies have not been transferred to the C/Ps yet. Releasing Pejerrey from Kanagawa strain needs to wait for obtaining the results of genetic identification and official decision.
3. Planning of aquaculture and other related forms of production			
3-1 Survey of legislation on water resource utilization	<ul style="list-style-type: none"> • Process of the survey implementation • Survey results 	Project report, Survey results	<ul style="list-style-type: none"> -The C/P was received and trained in Japan in November 2004 to learn about legal system on inland water fisheries in Japan. -After the C/P training in Japan, there was a presentation of the issue in Japan in JCC. The survey has been in progress and it was documented compared with Japanese experience.
3-2 Technical and financial evaluation of possible model Pejerrey aquaculture and other related forms of production	<ul style="list-style-type: none"> • Process of the evaluation implementation • Evaluation results 	Project report, Interview/questionnaire to Japanese Experts and C/P	<ul style="list-style-type: none"> -Two (2) short-term experts have been dispatched in the fields of artificial foods' survey and market survey respectively. The Project has been implementing six (6) pilot studies on semi-intensive and extensive aquaculture and propagation by stocking with seed releasing to ponds in pasture. Added to them, tests have been carried out on breeding juveniles in net cages set in lakes and ponds. -One of the pilot studies for checking profitability has been finished and obtained the first results in April 2005 and others are being implemented. -The surveys on feeds and market have concluded that intensive aquaculture of Pejerrey was not found profitable at the present conditions in Argentina. With the basis of these results, evaluation was attempted in terms of technologies as well as finance to indicate possible model Pejerrey aquaculture, by carrying out pilot studies. -As seen above, several possible models of Pejerrey aquaculture have been already prepared and executed to the stage of verification.
3-3 Preliminary evaluation of candidate sites for model Pejerrey aquaculture and other related forms of production	<ul style="list-style-type: none"> • Process of the preliminary evaluation implementation • Evaluation results 	Project report, Survey results	<ul style="list-style-type: none"> -Preliminary evaluation has been conducted to find favourable sites for model Pejerrey aquaculture and other related forms of production in private farms, small ponds in pastures, and lakes. The pilot studies mentioned on Activity 3-2 have been carried out in the selected sites through the evaluation.
4. Consideration of monitoring/evaluation results for improvement of the project			

4-1	Periodical monitoring and assessment	<ul style="list-style-type: none"> • Frequency of monitoring activities • Contents of monitoring activities • Implementing system of monitoring activities 	Project report, Monitoring results	<ul style="list-style-type: none"> - Argentine Pejerrey Aquaculture and Propagation Council has been held once and Joint Coordinating Committee (JCC) for this Project been held three (3) times. Apart from the Council and JCC, the Project Consultation Team from Japan conducted the monitoring and evaluation of the Project. - The Council and JCC have facilitated the collaboration among the concerned research organizations, which resulted in information sharing among those who are related with the Project. - Another session of JCC was organized in June 2005 simultaneously with final evaluation.
4-2	Improvement of activities based on the results of monitoring/evaluation	<ul style="list-style-type: none"> • Cases of improvements made based on monitoring results 	Project report, Interview/questionnaire to Japanese Experts and C/P	<ul style="list-style-type: none"> - Several improvements have been made in the Project by following the recommendations from the Council and JCC. It is exemplified as expanding the coverage of the Project to net cage culture activities and newly assigning personnel for the implementation of the Project. - Regarding public relations activities which were pointed out by the Project Consultation Study Team, the Project co-hosted "Workshop for Biological Studies of Pejerrey" jointly with INTECH, which was the organizer of the workshop. - Project homepage has been set up. (http://project.ica.go.jp/argentine/3035008E0/spanish/index.htm) - "Pejerrey Tasting Event" was carried out in March 2004 in Chascomus and in February 2005 in Buenos Aires with the purpose to popularise fish-eating culture in Argentina. More than 120 people participated both from Japanese and Argentine sides and received good reputation as well. - Pamphlets and T-shirts (600) have been prepared and distributed to governmental organizations concerned, media active, the participants to Pejerrey fishing event held on 14th and 15th May, 2005 and others. - In March 2005 EHC made an exhibit on Pejerrey in FERIAAGRO, which is a large-scale international agriculture and stockbreeding fair with participants from 35 countries, to disseminate the outputs of the Project.
4-3	Compilation of a manual based on the research and development results	<ul style="list-style-type: none"> • Existence of manual • Contents of manual 	Project report, Observation	<ul style="list-style-type: none"> - Data has been compiled from several activities and researches in seed production, genetic identification, feed development, disease prevention and treatment, and feasibility/ profitability of aquaculture and other forms of Pejerrey production. - Documentation was conducted on the title of Pejerrey seed production and artificial foods development as technical protocols for researchers.
Output1:	Indicators	Source of Information	Results	
Development of Pejerrey seed production techniques	①Quantity of high quality eggs	<ul style="list-style-type: none"> • Monitoring records • Project report 	<ul style="list-style-type: none"> - As of the end of December 2004, the Project produced approximately 2 million high quality eggs. - The basic induced spawning techniques have been established and a short-term expert instructed the further improved techniques. Those techniques enabled the C/P organization to obtain a large amount of eggs at one time, resulting from an efficient utilization of facilities, mass-production of seeds, mitigation of workload, and others. 	
	②Development of a feeding regime	<ul style="list-style-type: none"> • Project report 	<ul style="list-style-type: none"> - The Project has clarified that it is possible to rear broodstock with locally formulated feeds. Appropriate feed regimes have been also clarified for seed production. 	
	③Elucidation of genetic traits	<ul style="list-style-type: none"> • Project report 	<ul style="list-style-type: none"> - Identification of genetic characteristics on various Pejerrey strains was conducted by a short-term expert and C/Ps, and clarified genetic difference between Kanagawa and local strain. Technical guidance was provided by the short-term expert on comparison analysis and statistical interpretation. 	

Output2:		Indicators	Source of Information	Results
Research on mass seed production techniques for Pejerrey	①	Determination of adequate facilities and tools	• Project report	-This activity has been finished with development and / or instaliation of proper facilities/ equipment for seed production, spawning, and broodstock rearing
	②	Existence of mass-production techniques for food organisms	• Project report	-By fertilizing water with chicken manures, large-lot of feeds for juvenile, i.e. rotifers, and cladocerans have been successfully propagated. This success led the increase in both survival and growth rates of juvenile, which shows success in developing mass-production techniques for food orgasms. -The techniques can be said appropriate also in terms of cost and sustainability with access to free chicken manures as raw material.
	③	Existence of techniques for prevention and treatment of diseases	• Project report	-The Project has established proper method to control parasite Gyrodactylus and provided technical guidance for diseases prevention.
	④	Existence of method for marking of seeds	• Project report	-Various seed marking techniques were instructed and fluorescent silicone implantation was recommended as an experimental marking to Pejerrey fingerling, which are to be released in lagoon in 2005.
Output3:		Indicators	Source of Information	Results
Planning of aquaculture and other related forms of production	①	Report on the legislation of water resource utilization	• Project report • Observation of the report on both its existence and the contents	-The survey was conducted and it was documented compared between Japanese inland fisheries regulation and conventional rules with Argentine cases.
	②	Planning of aquaculture and other related forms of production	• Project report • Observation of the plan (document) on both its existence and the contents	-Draft plan of aquaculture and other related forms of production was prepared by evaluating the probability of extensive aquaculture and of propagation by stocking of artificially reared juveniles, since surveys on market and feeds have concluded that intensive aquaculture was not found profitable under the present conditions in Argentina. -Possible models have been proposed and executed to the verification stage, which requires continual implementation.
	③	Preliminary survey of candidates sites for model Pejerrey aquaculture and other related forms of production	• Project report • Observation of the report on both its existence and the contents	-Results of the survey was summarized as basic data of model farm of Pejerrey.
Output4:		Indicators	Source of Information	Results
Consideration of monitoring /evaluation results for improvement of the project	①	Existence of monitoring activities	• Report on monitoring activities • Project report	-Argentine Pejerrey Aquaculture and Propagation Council and JCC have been held once and three (3) times respectively, and several recommendations have been realized such as expanding the coverage of the Project to net cage culture.
	②	Distribution of a manual	• Observation of manual on both its existence and the contents • Records of manual distribution on number and recipients • Project report	-Data were compiled in the related fields and documented in a set of technical protocols for researchers.
Project Purpose	Description	Indicators/Expected Results	Source of Information	Evaluation
	Development of fundamental techniques for aquaculture and propagation of Pejerrey	① Number of seeds produced	• Project report	-More than 100,000 juveniles with 1 gram of body weight, which is one of the targets as a starting point for aquaculture and propagation by stocking, have been produced in the process of seed production tests in 2004 and 2005. It is further expected for the Project to improve the technologies to guarantee a stable production of this scale. -Besides, approximately 20,000 of high quality seeds of Junin Pejerrey have been successfully produced as well.

		② Existence of a plan of activities	• Project report	-Possible models for aquaculture and propagation by stocking have been planned and preceded to verification stage. Those models and part of verification results were compiled as basic document to establish an appropriate farm.
Overall Goal	Execution of model Pejerrey aquaculture and other related forms of production in the Chascomus area and surroundings	① Number of model Pejerrey farmers ② Profit of model aquaculture	• Reports from CONICET /INTECH	-No appropriate model Pejerrey farmers are yet to be established. -Still, several spontaneous actions have been found nearby the Project site: there could be found cases of local people who have got interested in the Project and asked the Project to provide Pejerrey seeds for their trial. -Profitability of Pejerrey aquaculture will be judged partly from the results of the verification tests that are ongoing at present. -Through the Project activities, the followings were found as crucial needs to be continuously tackled for achieving the overall goal: <ul style="list-style-type: none"> • To produce suitable natural feed and artificial compounded foods at lower cost • To improve the precision of the results of genetic comparison analysis between Kanagawa strain (originally coming from Argentina) and Argentine indigenous Pejerrey and its statistical treatment • To implement further pathological studies • To examine the effectiveness of the technologies in seed marking for propagation by stocking activities of artificially reared juveniles • To intensify and standardize the breeding and the "cage-culture" as a part of the activities of technical and financial evaluation of Pejerrey aquaculture models.
Super Goal	Promotion of Pejerrey aquaculture and fisheries activities in and around the Province of Buenos Aires	① Number of Pejerrey fish farmers ② Number of Pejerrey fishermen ③ Number of Pejerrey seed producers ④ Number of employees in the above and other related forms of production	• Statistics on Pejerrey aquaculture and other related forms of production to be collected by the INIDEP, Universities etc.	-As seen above, the Project does not cover dissemination and application of the technologies and it is not surveyed how many Pejerrey fish farmers are there. -Market survey results, however, show strong preference and interest in Pejerrey fish in Argentina. There is another expectation on how to apply the developed technologies through the Project to other kinds of fish species. Those facts lead positive evaluation on the applicability of the developed technologies.

3. Achievement of Project Inputs

3-1: Dispatch of Japanese Expert

Long-term Japanese Experts

No.	Name of Expert		Field	Period of Assignment		Affiliation in Japan	Principal services
				From	To		
1	Mr	Yoshioki Shirojo	Seed Production Technique/ Chief Advisor	15 Aug. 2002	14 Aug. 2004	Free	Management & planning of Project, Technical development and transference
2	Dr.	Masaru Okamoto	Aquaculture Technique/ Coordinator	11 Sep. 2002	10 Sep. 2005	Fisheries & Aquaculture International Co., Ltd.	Administration of local costs, Enhancement of communication between Project and JICA, Technical development and transference
3	Mr	Motohiro Ohashi	Seed Production Technique/ Chief Advisor	25 Jul. 2004	10 Sep. 2005	Fisheries & Aquaculture International Co., Ltd.	Management & planning of Project, Advice of progress in Project, Technical development and transference

Short-term Japanese Experts

No.	Name		Field	Period of Assignment		Affiliation in Japan	Principal services
				From	To		
1	Mr	Yoshiaki Kobayashi	Installation of Fish Culture Tanks, Aqueduct and Drainage	29 Jun. 2003	3 Jul. 2003	Fuyo Ocean Development Co., Ltd.	Technical advice to the newly constructed facilities by JICA Basic Facility Installation
2	Dr.	Takashi Sakamoto	Genetic Analysis	6 Nov. 2003	26 Nov. 2003	Tokyo University of Marine Science & Technology	Technical instruction for genetic analysis and evaluation of the analyzed results
3	Mr	Toru Fujiki	Fish Market Research	10 Jan. 2004	8 Feb. 2004	Overseas Agrofiseries Consultant Co., Ltd.	Survey on pejerrey market in the Buenos Aires Province through site research of demand, consumption and selling form
4	Mr	Masumi Shimozaki	Development of Artificial Food	14 Feb. 2004	7 Mar. 2004	Marui Industry Co., Ltd.	Technical advice to develop the compounded foods for pejerrey using local materials
5	Dr.	Takashi Sakamoto	Genetic Analysis	10 Aug. 2005	24 Aug. 2005	Tokyo University of Marine Science & Technology	Technical instruction and evaluation on the results of genetic analysis
6	Dr.	Carlos Augusto Strussmann	Enhancement of pejerrey maturation	10 Aug. 2005	24 Aug. 2005	Tokyo University of Marine Science & Technology	Technical instruction to control of pejerrey maturation through manipulation of photo-period, water temperature and feeding amount

3-3: Provision of Machinery and Equipment by Japanese Side

Note:

R/T:Route of Procurement
Frequency of Use
Condition

(J: From Japan, L: Local, E: With Expert)
(A: Always - B: Often - C: Sometimes)
(A: Good - B: Fair - C: Bad)

Y: Japanese Yen
\$: Dollar
P: Peso

No	Date of Arrival	Item	Description			Amount	Unit Price	S-total	Place of Storage	Frequency of Use	Condition
			Manufacture	Model Number	R/P						
1	1997/3/30	FRP round tank	INDUSOL	1 X 0.53m	L (E)	12	¥ 19,383	¥ 232,600	INDEP(8), INTECH(3), EHC(1)	A	A
2	1997/3/30	FRP cone tank	INDUSOL	0.5 X 1.35m	L (E)	10	¥ 50,260	¥ 502,600	INDEP(10)	A	A
3	1997/3/30	Artemia tank	INDUSOL	0.4 X 0.67m	L (E)	6	¥ 22,400	¥ 134,400	INDEP(3), INTECH(3)	A	A
4	1997/3/30	FRP round tank	INDUSOL	2 X 0.8m	L (E)	6	¥ 104,833	¥ 629,000	INTECH(4), EHC(2)	A	A
5	1997/3/30	Square tank	INDUSOL	1.2 X 1 X 0.76m	L (E)	20	¥ 25,130	¥ 502,600	INDEP(10), INTECH(7), EHC(3)	A	B
6	1997/3/30	Sheet tank panel	INDUSOL	5 X 1.2m	L (E)	9	¥ 291,504	¥ #####	INTECH(6), EHC(3)	A	A
7	1997/3/30	Sheet tank panel	INDUSOL	10 X 1.2m	L (E)	4	¥ 650,500	¥ #####	EHC(4)	A	A
8	1997/3/30	Gas chromatograph	JENK	GC-17AAF	L (E)	1	¥ #####	¥ #####	CEAN	A	A
9	1997/3/30	4 X 4 Truck	TOYOTA	HILUX DX3.0	L (E)	1	¥ #####	¥ #####	INTECH	A	B
10	1997/3/30	Truck's accessory	TOYOTA	Power winch etc.	L (E)	1	¥ 359,700	¥ 359,700	INTECH	A	A
11	1997/3/30	MilliQ machine	BIOPURE	MILLIPURE	L (E)	1	¥ 800,900	¥ 800,900	INTECH	A	A
12	1997/3/30	Balance	Inst. Cientifica	VI-4800AR	L (E)	2	¥ 92,750	¥ 185,500	INTECH	A	A
13	1997/3/30	Projector	Tecnograf SA	PLC-XU20	L (E)	1	¥ 700,600	¥ 700,600	INTECH	B	A
14	1997/3/30	Notebook computer	Hewlett Packard	Omnibook 500	L (E)	1	¥ 394,500	¥ 394,500	INTECH	A	B
15	1997/3/30	PC, Printer	Hewlett Packard	Vectra, Laserjet	L (E)	1	¥ 248,200	¥ 248,200	INTECH	A	A
16	1997/3/30	Scanner	Hewlett Packard	HP7450C	L (E)	1	¥ 119,100	¥ 119,100	CEAN	A	A
17	1997/3/30	PC, Printer	Hewlett Packard	Vectra, Laserjet	L (E)	2	¥ 222,500	¥ 445,000	INTECH	A	A
18	1997/3/30	Ultra low freezer	Thermo Forma	modelo 925	L (E)	1	¥ #####	¥ #####	INTECH	A	A
19	1997/3/30	Analisis program	Media Cybernetics	Image Pro plus4.1	L (E)	1	¥ 647,600	¥ 647,600	INTECH	B	A
20	1997/3/30	Image capture system	FOTODYNE	Foto/Analyst	L (E)	1	¥ #####	¥ #####	INTECH	B	A
21	1997/3/30	Thermo cycler	Eppendorf	Master cycler gradiente	L (E)	1	¥ 898,746	¥ 898,746	INTECH	A	A
22	1997/3/30	Micro centrifuge	Eppendorf	5415R	L (E)	1	¥ 419,296	¥ 419,296	INTECH	A	A
23	1997/3/30	Fax machine	TOSHIBA	TP478	L (E)	1	¥ 67,600	¥ 67,600	INTECH (P/J office)	A	A
24	1997/3/30	Osmometer	Fishier	91236	L (E)	1	¥ #####	¥ #####	INTECH	B	A
25	1997/3/30	Portable centrifuge	Precision	Durafuge	L (E)	1	¥ 388,723	¥ 388,723	CEAN	A	A
26	1997/3/30	Water multi-monitoring system	HORIBA	U-23	L (E)	1	¥ #####	¥ #####	INTECH	A	A
27	1997/3/30	Balance	MITTLER	AB204/SRS	L (E)	2	¥ 444,509	¥ 889,017	INTECH(1), EHC(1)	A	A
28	1997/3/30	Balance	MITTLER	AG285	L (E)	1	¥ 809,535	¥ 809,535	INTECH	A	A
29	1997/3/30	Nitrogen thermo bottle	TAYLOR	WHARTON	L (E)	2	¥ 155,357	¥ 310,714	INTECH(1), INTECH(1)	B	A
30	1997/3/30	Microtome	LEICA	CMI 510	L (E)	1	¥ #####	¥ #####	INTECH	A	A
31	1997/3/30	Freezer	Whirlpool	WHB53	L (E)	3	¥ 78,795	¥ 236,384	INTECH(1), EHC(1), CEAN(1)	A	A
32	1997/3/30	Refrigerator	ELECTROLUX	430L	L (E)	2	¥ 79,777	¥ 159,553	INTECH(1), EHC(1)	A	A
33	1997/3/30	Air conditioner	Panasonic	CU-CSA181	L (E)	4	¥ 214,306	¥ 857,224	INTECH(3), EHC(1)	A	A
34	1997/3/30	Evaporator	YAMATO	RB-210-110A	L (E)	1	¥ 688,252	¥ 688,252	CEAN	A	A
35	1997/3/30	Generator	Marsiglione	8kva, 6.4kw, 12A	L (E)	1	¥ 348,100	¥ 348,100	INTECH	C	A
36	1997/3/30	Generator	HONDA	EM2500	L (E)	1	¥ 142,037	¥ 142,037	INDEP	C	A
37	1997/3/30	Well pump	motorarg	423/5.5	L (E)	4	¥ 79,113	¥ 316,453	INTECH	A	C
38	1997/3/30	Pool pump	ESPA	0.25HP	L (E)	12	¥ 14,911	¥ 178,926	INDEP(6), INTECH(4), EHC(2)	A	B
39	1997/3/30	Pond pump	ESPA	DRAINEX 1.5HP	L (E)	6	¥ 53,903	¥ 323,419	INDEP(2), INTECH(2), EHC(2)	A	B
40	1997/3/30	FRP Boat	Marine Sur	Aquamarine 6.0	L (E)	1	¥ 287,017	¥ 287,017	INTECH	C	A
41	1997/3/30	Motor	YAMAHA	40HP	L (E)	1	¥ 643,948	¥ 643,948	INTECH	C	A
42	1997/3/30	Trailer	Marine Sur		L (E)	1	¥ 147,188	¥ 147,188	INTECH	C	A
43	1997/3/30	Digital Camera	Canon	Power shot G2	L (E)	1	¥ 222,936	¥ 222,936	INTECH	A	A
44	1997/3/30	Microscope set	Nikon	Eclipse E600	L (E)	1	¥ #####	¥ #####	INTECH	A	A
45	1997/3/30	Binoocular microscope	Nikon	SMZ-645	L (E)	2	¥ 370,547	¥ 741,093	INTECH(1), EHC(1)	A	A
46	1997/3/30	Microscope	Nikon	Eclipse E200	L (E)	2	¥ 250,220	¥ 500,440	INTECH(1), EHC(1)	A	A
47	1997/3/30	Photocopier	TOSHIBA	2060	L (E)	1	¥ 647,025	¥ 647,025	INTECH	A	A
48	1997/3/30	PC, monitor	System Brokers	P4, 1.8Mhz	L (E)	1	¥ 379,746	¥ 379,746	INTECH	A	A
49	1997/3/30	LPS	APC	Back Pro 650	L (E)	4	¥ 56,094	¥ 224,374	INTECH(3), CEAN(1)	A	A
50	1997/3/30	Television	SONY	KV-29FS12	L (E)	1	¥ 104,651	¥ 104,651	INTECH	A	A
51	1997/3/30	Video cassette recorder	SONY	SLV-EX95	L (E)	1	¥ 40,330	¥ 40,330	INTECH	A	A
52	1996/11/16	Notebook computer	IBM	ThinkPad i1800	E	1	¥ -	¥ -	INTECH (P/J office)	A	C
53	1996/11/16	Printer	Canon	BJ-M70	E	1	¥ -	¥ -	INTECH (P/J office)	A	A
54	1999/1/6	Notebook computer	IBM	ThinkPad R32	E	1	¥ 299,800	¥ 299,800	INTECH (P/J office)	A	C
55	1999/1/6	Printer	Canon	BJ-S700	E	1	¥ 44,800	¥ 44,800	INTECH (P/J office)	A	A
56	1999/1/27	Furnitures for P/J office	CASA MELAS	desks, chairs, book shelf, table	L	1	P 3,593.00	P 3,593.00	INTECH (P/J office)	A	A
57	1999/2/1	Artemia tank	EARTH CORP	SBF-100	J	2	¥ 54,000	¥ 108,000	EHC	B	B
58	1999/2/1	Titan heater	EARTH CORP	TH2-05	J	3	¥ 21,000	¥ 63,000	INTECH(1), EHC(2)	B	A
59	1999/2/1	Thermo stat	EARTH CORP	RL-200N	J	3	¥ 30,000	¥ 90,000	INTECH(1), EHC(2)	B	A
60	1999/2/1	Automatic feeder	EARTH CORP	KA-20	J	3	¥ 170,000	¥ 510,000	EHC	A	A
61	1999/3/22	Autosystem for Generator	GENAMAX	for 40Kva	L	1	P 7,350.50	P 7,350.50	INTECH	B	A
62	1999/3/22	Generator system	GENAMAX	50Kva	L	1	P #####	P #####	EHC	B	A
63	1999/3/24	Tank sheet	PILETIN	for 10m	L	4	P 1,586.00	P 6,344.00	EHC	A	A
64	1999/3/24	Tank sheet	PILETIN	for 5m	L	9	P 671.00	P 6,039.00	INTECH(6), EHC(3)	A	A
65	1999/3/27	Tank sheet	TEXTIL ROMA	for 6m	L	1	P 2,860.20	P 2,860.20	INTECH	C	A
66	1999/3/27	Blower	REPICKY	R100	L	3	P 3,075.00	P 9,225.00	INTECH	A	A
67	1999/7/28	Paddle Wheel Aerator	Aquatec eco-system	PW11	L	9	P 2,250.00	P #####	INTECH(4), EHC(5)	A	A
68	1999/1/2/28	Automatic feeder	EARTH CORP	KA-20	J	4	¥ 206,000	¥ 824,000	INTECH(3), EHC(1)	A	A
69	2000/3/6	Video camera recorder	Canon	FV50	E	1	¥ 74,600	¥ 74,600	INTECH	A	B
70	2000/4/23	Chest hi-wader	Waterdog	neoprene 4mm	L	1	P 675.00	P 675.00	EHC	A	B

3-3: Provision of Machinery and Equipment by Japanese Side

Note:

R/P:Route of Procurement

(J: From Japan, L: Local, E: With Expert)

¥ Japanese Yen

Frequency of Use

(A: Always - B: Often - C: Sometimes)

\$:Dollar

Condition

(A: Good - B: Fair - C: Bad)

P:Peso

No.	Date of Arrival	Description			Amount	Unit Price	S-total	Place of Storage	Frequency of Use	Condition	
		Item	Manufacture	Model Number							R/P
71	2000/4/27	Chest hi-wader	Waterdog	neoprene 4mm	L	1	P 675.00	P 675.00	EHC	A	B
72	2000/5/25	Pool cleaning system	MAVI	3/4HP	L	1	P 784.20	P 784.20	EHC	A	A
73	2000/6/16	Pool cleaning system	MAVI	1/2HP	L	1	P 748.80	P 748.80	INTECH	A	A
74	2000/8/27	Electrophoresis system	SEQUI-GEN	GT/PP3000	L	1	P 8,167.10	P 8,167.10	INTECH	A	A
75	2000/9/9	Water filter	VULCANO	VC-50	L	1	P 865.00	P 865.00	INTECH	C	A
76	2000/10/4	Mixer	FREIRE	Sin Mando INOX	L	1	P 1,310.00	P 1,310.00	EHC	A	A
77	2000/10/4	Meat chopper	FREIRE	No.32	L	1	P 1,640.00	P 1,640.00	EHC	A	A
78	2000/10/26	Balance	Monetti	EM3000	L	1	P 525.00	P 525.00	EHC	A	A
79	2000/12/6	Refrigerator	Saccol	1 door 104L	L	1	P 855.00	P 855.00	INTECH (P/J office)	A	A
80	2001/1/4	FRP round tank	INDUSOL	2 X 0.8m	L	3	P 1,350.00	P 4,050.00	EHC	A	A
81	2001/1/5	Well pump	Rotor Pump	HF11 5HP	L	1	\$ 844.08	\$ 844.08	INTECH	A	A
82	2001/1/20	Well pump	Rotor Pump	HF11 5HP	L	2	\$ 844.08	\$ 1,688.16	INTECH	A	A
	2001/1/25	Crasher	KUTER	16L	L	1	P 1,600.00	P 1,600.00	EHC	A	A
83	2001/3/9	Well pump	Rotor Pump	HF11 3HP	L	2	\$ 518.83	\$ 1,037.65	INTECH(1), EHC(1)		A
84	2001/3/10	Net cage	Moscuzza		L	1	P 2,010.00	P 2,010.00	EHC		A
85	2001/3/30	Balance	OHAUS	ARA-520	L	1	P 2,950.00	P 2,950.00	EHC	A	A
86	2001/3/30	Portable DO meter	Hanna Instruments	HI-9142	L	1	P 2,188.00	P 2,188.00	EHC		A
87	2001/3/30	Micro pipetter	Genex	BETA 1-5ml	L	1	P 785.00	P 785.00	EHC		A
88	2001/3/30	Blower	REPICKY	R100	L	2	P 3,495.00	P 6,990.00	EHC		A
89	2001/3/30	Net material	Moscuzza	Raschel 2.16 X 200m	L	1	P 4,000.00	P 4,000.00	EHC		A

3-4: Provision of Local Cost by Japanese Side

Unit: Yen ¥

No.	Category	Budgetary Year				Amount
		FY.2002	FY.2003	FY.2004	FY.2005	
1	Administration (General Affairs)	1,700,000	4,905,000	5,248,000	1,500,000	13,353,000
2						-
3	Technical Extension					-
4	Improvement of Infrastructure		5,495,000	1,014,000		6,509,000
5	Technical Exchange Program					-
6						-
7						
8						
Total		1,700,000	10,400,000	6,262,000	1,500,000	19,862,000

3-5: Budget Allocated for the Project by Argentine Side

Application of Budget (Lab. of Ichthyophysiology and Aquaculture, IIB-INTECH)

Unit: USD

No.	Description		FY.2002	FY.2003	FY.2004	FY.2005*1		Total
1	Technical Equipment for Staff	Received Budget	800	500	1,500	900		3,700
		Expenditure	800	500	1,500	900		3,700
2	Custom Fee for Imported Equipment	Received Budget	0	0	0	0		0
		Expenditure	0	0	0	0		0
3	Building construction	Received Budget	2000	500	500	1,000		4,000
		Expenditure	2000	500	500	1,000		4,000
5	Power supply, telephone, internet	Received Budget	1000	3000	3,600	1,200		8,800
		Expenditure	1000	3000	3,600	1,200		8,800
Total Received Budget			3800	4000	5600	3100	0	16500
Total Expenditure			3800	4000	5600	3100	0	16500
Balance of Fiscal Year			0	0	0	0		0

*1 Until March

Application of Budget (EHC)

Unit: USD

No.	Description		FY.2002	FY.2003	FY.2004	FY.2005*1		Total
1	Technical Equipment for Staff	Received Budget			6,345	1,552		7,897
		Expenditure			6,345	1,552		7,897
2	Custom Fee for Imported Equipment	Received Budget	0	0	0	0		0
		Expenditure	0	0	0	0		0
3	Building construction	Received Budget		1379				1,379
		Expenditure		1379				1,379
5	Power supply, telephone, fuel	Received Budget	7045	7045	7045	1,761		22,896
		Expenditure	7045	7045	7045	1,761		22,896
Total Received Budget			7045	8424	13390	3313	0	32172
Total Expenditure			7045	8424	13390	3313		32172
Balance of Fiscal Year			0	0	0	0		0

*1 Until March

4. Record of the Joint Coordinating Committee Meeting

1. First meeting

Place & Date:

Lecture Hall at INTECH on Nov. 25, 2002 (10.00~12.30)

Participant:

[INTECH] Alberto Fransch(Director), Gustavo Somoza(Sub-director), Leandro Miranda, Leandro Gaston Guilgur, Pablo Strobl,

[EHC] Gustavo Berasain, Marcela Velazco

[CEAN]Alejandoro del Valle(Director), Pablo Hualde

[INIDEP] Alberto Espinach

[JICA] Shirojo Yoshioki, Okamoto Masaru, Yamamoto patoricia

[Observer]

Mitsuda Tadashi(J-A Pejerrey Association), Abel Barrionuevo(J-A Pejerrey Association), Natalia Moncaut(INTECH)

Agenda:

Plan of Project activities, Personnel role of technical field, Reporting system, AOB

Contents of summary:

- Plan of Operation was confirmed according to technical field and personnel role.
- Counterparts' training in Japan and Japanese short-term expert were discussed and two candidates of the training, Gustavo Somoza and Gustavo Berasain, were elected in the field of genetic analysis for Pejerrey and planning for aquaculture development.
- Necessity of new facilities to implement the activities smoothly was discussed and running water system was recommended to construct at INTECH and EHC.
- Food development for Pejerrey was confirmed to proceed as high priority.

2. Second meeting

Place & Date:

Lecture Hall at INTECH on Aug. 20, 2003 (14.00~16.30)

Participant:

[INTECH] Gustavo Somoza(Sub-director), Leandro Miranda

[Ministry of Agriculture & Production in Bs As Province] Iwaszkiw, Laura Sanchez, Barchiesi, Gustavo Berasain(EHC), Marcela Velazco(EHC)

[CEAN] Alejandro del Valle(Director), Pablo Hualde

[INIDEP] Alberto Espinach, Seigneur

[JICA] Shirojo Yoshioki, Okamoto Masaru, Fuse Kazuhiro, Yamamoto Patoricia

[Observer]

Leandro Gaston Guilgur(INTECH), Pablo Strobl(INTECH), Juan Fernandiro(INTECH)

Agenda:

JICA basic facility installation, Result and plan of Project activities, Counterpart training and Japanese short-term, AOB

Contents of summary:

- Progress of constructed basic facilities by JICA was explained by Okamoto and the future plan to utilize them was discussed.
- Activities of cultivation of broodstock, obtention of egg and genetic analysis were presented by Gustavo Somoza. Seed production of Pejerrey was explained by Gustavo Berasain. Development of compounded foods was explained by Pablo Hualde. And artificial fertilization and effectiveness of new invented circular silo tank for rearing fingerling was explained by Alberto.
- Counterparts' training in Japan and short-term expert from Japan were discussed and local cost by JICA was explained by Yamamoto Patoricia.
- UBA and UNC were approved to withdraw from the member of Project temporarily.

3. Third meeting

Place & Date:

Lecture Hall at INTECH on Dic. 29, 2004 (9.00~12.00)

Participant:

[INTECH] Gustavo Somoza(Sub-director), Leandro Miranda

[Ministry of Agriculture & Production in Bs As Province] Oscar Fortunato, Francisco Gil del Muro, Laura Sanchez, Mauricio Remes Lenicov, Nicolas Gonzalez, Gustavo Berasain(EHC), Marcela Velazco(EHC)

[JICA] Ohashi Motohiro, Okamoto Masaru

Agenda:

Result and plan of Project activities, Counterpart training and Japanese short-term, Local cost by JICA, AOB

Contents of summary:

- Activities of compounded foods' development were explained by Ohashi Motohiro. Model farms for Pejerrey fattening in fish pond and by net cage were presented by Leandro Miranda and Mauricio Remes Lenicov. Cultivation of broodstock, obtention of egg and genetic analysis were presented by Gustavo Somoza and Leandro Miranda. Replanting Pejerrey egg, fry and fingerling to lagoons in Bs As Province was explained by Gustavo Berasain.
- Counterparts' training in Japan and short-term expert from Japan were discussed, and local cost by JICA was explained by Okamoto Masaru.
- Future plan of activities in each technical field was discussed to complete the theme until the final of the Project.
- Activity of net cage culture as model farm of Pejerrey was authorized to join the theme to be implemented in Project.
- Pejerrey tasting party was discussed to hold in Bs As in February 2005.

5. Device to advance Project operation properly and Lesson

1. Collaboration between INTECH and EHC: Different counterparts' organizations of INTECH and EHC collaborated to implement Project activities in basic research and practical production aspects.
2. Installation of basic experimental facility by JICA fund: Aquaculture facilities of Pejerrey seed production constructed in the first year promoted general operation of project activities.
3. Mutual understandings by common consent: Japanese experts and Argentine counterparts made an effort to talk about Project progress and issues without reserve.
4. Demonstration of more than 100,000 fingerling production with 1g B.W.: How to produce Pejerrey fingerling was instructed in practice as the whole seed production techniques such as broodstock cultivation, acquirement of fertilized egg, hatching egg, propagating natural feeds of zoo-plankton and rearing fry.
5. Encouragement of CP's intention to culture marketable size of Pejerrey: Project activities were intensified in practical fingerling and grow-out production according to CP's intention.
6. Adequate mediation by Argentina JICA staff: Argentina JICA Office played an important part in Project progress as coordinator between Japanese and Argentine sides.
7. Appropriate cooperation by Project Technical Supporting Committee: Committeemen cooperated with Project as technical adviser to Japanese experts as well as CP, and accepted CP technical training in Japan.