タイ水産物品質管理研究計画 計画打合せ調査団報告書

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平成7年8月

国際協力事業団

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序　文

国際協力事業団は、タイ国政府からの技術協力の要請を受け、平成６年４月から同国において水産物品質管理研究計画を開始しました。

このたび当事業団は、本計画の今後の実行計画を協議・検討するため、平成７年２月28日から３月11日まで、全国水産加工業協同組合連合会副会長　伊賀原弥一郎氏を団長とする計画打合せ調査団を派遣しました。

調査団は、タイ国政府関係者や派遣専門家と協議を行うとともに、プロジェクトサイトでの現地調査を実施し、帰国後の国内作業を経て調査結果を本報告書に取りまとめました。

今回の調査・協議の結果が本計画の協力目標達成に役立つとともに、この技術協力事業の実施が、今後の両国の友好・親善の一層の発展に寄与することを期待いたします。

終わりにこの調査にご協力とご支援をいただいた関係者の皆様に対し、心から感謝の意を表します。

平成７年８月

国際協力事業団
理事　亀若誠

目　次

1．計画打合せ調査団の派遣

1－1　調査団派遣の経緯と目的

タイ国において水産物は国民の重要な食糧供給源であるとともに、近年は輸出産品としても急速に成長している。しかし、水産物や水産加工品に残留している添加物や薬品等の有害物質が消費者の健康や輸出上の観点から問題となっており、水産物・水産加工品の品質管理技術および残留有害物質の検査技術の向上が求められている。

かかる背景のもと、タイ国水産局は国産の水産物・水産加工品の品質の向上を目的とし、その品質管理の技術とシステムの改善を図るため、わが国に対しプロジェクト方式技術協力を要請してきた。

これを受け、わが国は1993年実施協議調査団を派遣し、水産技術開発研究所（ＦＴＤＩ）および水産物検査品質管理部（ＦＩＱＤ）において1994年４月から５年間のプロジェクト方式技術協力を開始した。同年４月に業務調整員１名、また８月と９月に長期専門家各１名（リーダー及び食品分析）を派遣し現在に至っている。

本調査団は、タイ側関係者および日本人専門家との協議ならびに現地調査を行い、プロジェクトの進捗状況や問題点等を把握し、第１回合同委員会において、５年間の協力実施計画及び平成７年度の年度計画を策定することを目的として派遣した。

1－2　調査団構成

担当分野	氏　名	現　職
総　括	伊賀原　弥一郎	全国水産加工業協同組合連合会 副会長
品質検査	斎藤　正路	(財)日本冷凍食品検査協会 研究部長
生物毒	野口　玉雄	東京大学農学部水産化学研究室 講師
業務調整	大島　歩	国際協力事業団 水産業技術協力課 職員

1－3　調査日程

1995年2月28日から1995年3月11日までの12日間

日順	日付	曜日	旅　程	調　査　日　程
1	2／28	火	東京 → ﾊﾞﾝｺｸ	移動
2	3／1	水		JICA事務所打合せ、大使館表敬、水産局（DOF）、タイ経済技術協力局（DETEC）表敬
3	3／2	木		水産技術開発研究所（FTDI）視察・日本人専門家と打合せ
4	3／3	金		水産物検査品質管理部（FIQD）視察・日本人専門家と打合せ
5	3／4	土		日本人専門家と打合せ

6	3／5	日		資料整理
7	3／6	月		日本人専門家と打合せ
8	3／7	火		水産局との協議 ミニッツ最終案作成 水産局長主催夕食会
9	3／8	水		合同委員会・ミニッツ署名 団長主催昼食会
10	3／9	木		魚市場・水産加工工場等視察
11	3／10	金	ﾊﾞﾝｺｸ →	ＪＩＣＡ事務所報告 移動
12	3／11	土	東京	帰国

1－4　主要面談者

タイ側関係者

経済技術協力省	Mr. Nipon Sirivat（日本担当主任）
農業協同組合省 水産局	Mr. Plodprasop Suraswadi（局長）
	Dr. Kitjar Jaiyen（次長）
	Mr. Sompong Hiranwat（調査役）
水産技術開発研究所（FTDI）	Dr. Poonsap Virulhakul（所長）
	Ms. Niracha Wongchinda（漁獲物処理研究室長）
	Dr. Attaya Kungsuwan（生物工学研究室長）
水産物検査品質管理部（FIQD）	Dr. Montri Klitsaneephaiboon（所長）
	Ms. Sirilak Suwanrangsi（バンコク検査センター所長）
	Ms. Suwimon Keerativiriyaporn（工場検査室長）
	Ms. Supapun Brillantes（化学分析室長）

日本側関係者

在タイ日本大使館	下條　龍二（一等書記官）
ＪＩＣＡタイ事務所	表　伸一郎（所長）
	浅野　寿男（次長）
	服部　直人（担当所員）
プロジェクト	山形　　誠（チームリーダー）
	井田　光泰（業務調整）
	菊地　　嶺（食品分析）
個別派遣専門家	佐々木　實

2．要　約

今回の計画打合せ調査団の目的は、1993年12月に著名された討議議事録（R／D）暫定実施計画（ＴＳＩ）に基づき計画の進捗状況を把握すること、また５年間の活動計画及び前半２年間の詳細年度計画を策定することであった。

本調査団は本プロジェクトの実施機関である水産局、水産技術開発研究所（ＦＴＤＩ）及び水産物検査品質管理部（ＦＩＱＤ）の関係者、並びに日本人の長期専門家との協議の上、以下の事項において合意に達した。

1．現状

ＦＴＤＩ

研究者は個人の研究業務と輸出用伝統食品検査業務の双方に責任を負っているため、本プロジェクトを遂行する上で常に人員不足の状態におかれている。研究者個人の能力は高いが、研究機関全体として活動を強化する必要がある。また、機材についても活動を行っていく上で十分とはいえない。

ＦＩＱＤ

近年、水産物の輸出量が急増し、輸出検査の重要性が認められてきたことから、予算的にかなり優遇されている。分析業務を行うための機材は整備されていると認められ、人員も増強して、地方検査所及びステーションにおける検査業務の強化を図っている。技術的にも、輸入国の基準に合致する微生物及び化学分析は既に公定法で業務化されており、工場検査、特に缶詰や冷凍水産品に関しては輸入国の定めた基準に達している。

2．優先課題

ＦＴＤＩ

プロジェクト前半で化学分析能力の向上に重点を置く必要がある。同時に伝統水産品の適正検査手法の開発も優先課題である。また、研究能力維持のためＧＬＰ（Good Laboratory Practice）を制度的に導入する必要がある。

ＦＩＱＤ

分析業務と工場検査の効率化、また輸入国の要求する公定法の取得を優先的に行う必要がある。認可機関となるためにはＧＬＰも全面的に実施しなければならない。また工場の品質管理手法を高めるために技術情報提供を行うことも必要がある。

3．活動内容

ＦＴＤＩ

研究機関としてのＦＴＤＩの業務には検査手法の習得、効率的かつタイに適応した分析手法の研究と開発、またそうした手法の民間への普及など多岐に渡る。よって組織課題を十分に遂行するためにはＪＩＣＡからの研究活動への一層の支援が必要である。

1～3年目において分析項目毎の能力向上に重点を置く。この間、C/Pが各々の研究課題に取り組み、ＪＩＣＡ専門家が助言を与えるという立場をとる。プロジェクト後半には、前半に取得した分析技術を活かした研究活動を行うとともに、業界向けの簡易手法の開発にも力を入れる。また、添加物の分析手法などは短期的に習得可能だが、農薬、重金属、魚貝類毒など環境汚染物質、天然毒はモニタリングを含め長期的に取り組む必要がある。

ＦＩＱＤ

効率的分析手法の導入開発が課題である。毎年検査効率を上げることを目的とした3～4件の短期課題を選定し実施する。機材もそうした課題に対応したものを備える。

4．プロジェクト課題達成のための調整

技術移転を効率的に行うために専門家はＦＴＤＩに常駐し、ＦＩＱＤでは必要な時に短期集中的に指導することとする。また、技術移転を行う際には研究者（シニアスタッフ、ジュニアスタッフ）のみならず、テクニシャンも含めて1チームとし、技術が一部の研究者に独占されることなく、全員が技術を習得できるような体制で取り組む。また日本研修を行ったものは、帰国後、レポート（或いはマニュアル、ガイドライン）をプロジェクト及び所長に提出するとともに、デモンストレーション等を行い、他のスタッフへの技術普及を行う。

C／Pに移転された新しい技術・技法を維持するために、C／Pは部内発表会で中間、最終報告を行い、課題終了時までにはレポート（或いはマニュアル、ガイドライン）を作成することとする。

ＦＴＤＩにおける伝統食品の検査法確立、ＧＭＰ（Good Manufacturing Practice）、ＧＬＰ（Good Laboratory Practice）の実施は極めて重要度の高い課題であり、タイ側は所長、日本側はチームリーダーが責任者となりこれにあたる。またＦＩＱＤにおけるＧＬＰも同様の体制で実施する。

5．5年後に期待される成果

ＦＴＤＩ

5年後にタイ国の本分野における先進的機関として、研究成果を内外の専門誌へ活発に公表できるようになり、またそうした活動によってＦＴＤＩ及びその研究者の存在が広く認められるようになることを目標とする。

ＦＩＱＤ

5年後、輸入国からの返品（rejection）を現在より少なくするとともに、プロジェクト課題とＧＬＰの実施を通して、公定検査機関として全ての輸入国より認められることを目標とする。

3．協力部門別活動の進捗状況

3－1　微生物試験

微生物試験については、大半の食中毒細菌の検出をルーティンワークとして実施しており、技術移転は日本の公的試験方法の取得を目的としている。

1）効果的試験方法の開発

① 食中毒菌の検出

短期専門家（徳岡　旗一氏）により、日本の食品衛生法に基づくかび、腸炎ビブリオ、コレラ菌、大腸菌、黄色ブドウ球菌及びサルモネラ菌等の検出の実地指導が行われた（ＦＩＱＤ／ＦＴＤＩ）

② ＲＰＬＡ法による黄色ブドウ球菌の産生するエンテロトキシンの検出

同上短期専門家によりＡ、Ｂ、Ｃ、Ｄ毒素検出の実地指導が行われた（ＦＩＱＤ／ＦＴＤＩ）

③ バイオアッセイによる抗生物質の検出

同上短期専門家により、オキシテトラサイクリン及びペニシリンを中心にスクリーニング法及び分別法、更に確認方法としてカップ法、ＷＥＬＬ法及びバイオオートグラフィ法の実地指導が行われた（ＦＩＱＤ／ＦＴＤＩ）

2）ＧＬＰ（Good Laboratory Practice）の導入実施

ＦＩＱＤにおいてはＧＬＰに関するＦＤＡ（米国食品医薬品局）、カナダ、ＥＵ及びISO－9000等の資料を入手し、機器の点検等を実施しているが、系統的ＧＬＰの体制はない。ＦＴＤＩにおいてはＧＬＰの資料さえもないが、ＧＬＰの導入は白紙から始まるＦＴＤＩの方が容易と考えられる。

3）標準操作手順（ＳＯＰ：Standard Operational Procedures）の確立

ＳＯＰは短期専門家（徳岡　旗一氏）が作成した微生物及び抗生物質について英文があるが、実際の試験においては実施されてはいない。

4）水産物企業への技術移転

1995年３月にセミナーの開催は予定されているが、調査時点では実施されていない。

3－2　化学分析

1）　正確かつ効果的な分析方法の開発

ＦＩＱＤにおける分析項目は、鉛、カドミウム、無機水銀、ひ素*、ＴＣ系抗生物質*、クロラムフェニコール、オキソリン酸、揮発性塩基窒素、ヒスタミン、ＥＤＴＡ、二酸化硫黄（*は他センターにて実施）、無機リンの１３項目、またＦＴＤＩでは、安息香酸、天然色素（カンタキサ

ンチン）、ヒスタミン、全窒素、食塩分、水分、K値の７項目と少ない。

ＦＩＱＤにおける１９９４年１～１２月の分析実績は以下の通りである。

試験項目	検体数
微生物試験（SPC, E.coli, S.aureus Salmonella）	60,000
オキシテトラサイクリン	30
ＥＤＴＡ	480
二酸化硫黄	450
揮発性塩基窒素	900
ヒスタミン	2,500
無機水銀	12,000
カドミウム	12,000
鉛	12,000

ＦＴＤＩにおける分析実績は、記録がないため実体を掴めなかったが、長期専門家の話によると極めて少ないとのことである。いずれにしても両機関の分析項目数は、試験検査機関としては少ない。

現在長期専門家により、ヒスタミン比色定量法の見直しとＨＰＬＣによるヒスタミン等生体アミンの定量法及びＨＰＬＣによる安息香酸の定量法の確立について技術移転が実施されている。

また、魚介毒、ＰＣＢｓ、有機塩素系及び有機リン系農薬については、ＦＩＱＤスタッフを日本に派遣し分析技術を習得させた。

2）標準操作手順（ＳＯＰ）の確立

化学分析に関するＳＯＰは両機関とも作成されていない。

3）ＧＬＰの導入実施

３－１ の ２）参照

4）クロスチェックのための他試験機関との連携の確立

クロスチェックは未だ実施されていない。

３－３　検査と品質管理

1）検査方法の確立

短期専門家（島田　昌彦氏）により冷凍エビ工場における微生物検査の実地指導が行われた。現在冷凍エビの検査マニュアルを作成中であり、今後冷凍エビ工場における試験手順や品質向上法を定めた一般検査試験ガイドラインを設定する予定である。

なお、伝統的水産物加工工場（魚醤、干えび）における品質管理については、現在全窒素量、食塩分及び比重の測定を行っているが、品質規格は設定されていない。衛生管理については、同

上短期専門家により魚醤工場の実地指導が行われ、衛生管理ガイドライン及び検査手順書が作成された。

2）水産物企業への方法とガイドラインの移転

同上短期専門家の指導により作成された魚醤工場の衛生管理ガイドライン及び検査手順を一般工場に導入する予定である。

4．プロジェクト実施体制

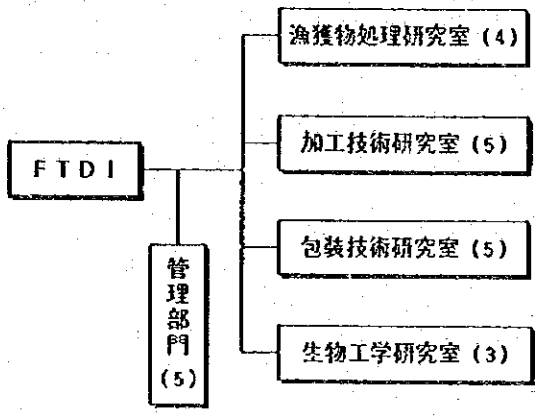
4－1　タイ側実施体制

4-1-1　カウンターパート機関

本プロジェクトの実施機関は、タイ国農業協同組合省水産局に属する水産技術開発研究所（ＦＴＤＩ）と水産物検査品質管理部（ＦＩＱＤ）の２機関である。

・水産技術開発研究所（FTDI: Fishery Technological Development Institute）

本研究所は、漁獲物処理及び品質管理技術の開発を通じて水産業を振興し、かつ水産資源の有効利用を図ることを目的として1956年に発足した。管理部門（５名）の他、漁獲物処理研究室（４名）、加工技術研究室（５名）、包装技術研究室（５名）、生物工学研究室（３名）の４つの研究室から成り、職員数は研究者、補助職員合わせて２３名である。



ＦＴＤＩ組織図

水産物の処理、加工、包装、品質管理の技術開発に関する調査研究及びその普及がＦＴＤＩの主な業務であるが、それに加えて、現在は輸出用の伝統水産加工物（干エビ、魚醤油等）の検査業務も行っている。これは近年、水産物の輸出量が急増したことにより、本来の検査機関であるＦＩＱＤのみでは全ての検査業務に対応しきれないため、伝統水産加工品についてはＦＴＤＩが担当することになったという経緯があるが、このルーティンワークが、本来業務の研究活動を滞らせる一因でもある。

また、タイ政府が政府機関職員の新規採用を抑制しており、職員の退職や辞職等により欠員が出ない限りは正規職員の採用を控えているため、業務量に比して職員が慢性的に不足しており、同時に職員の高齢化も問題となっている。

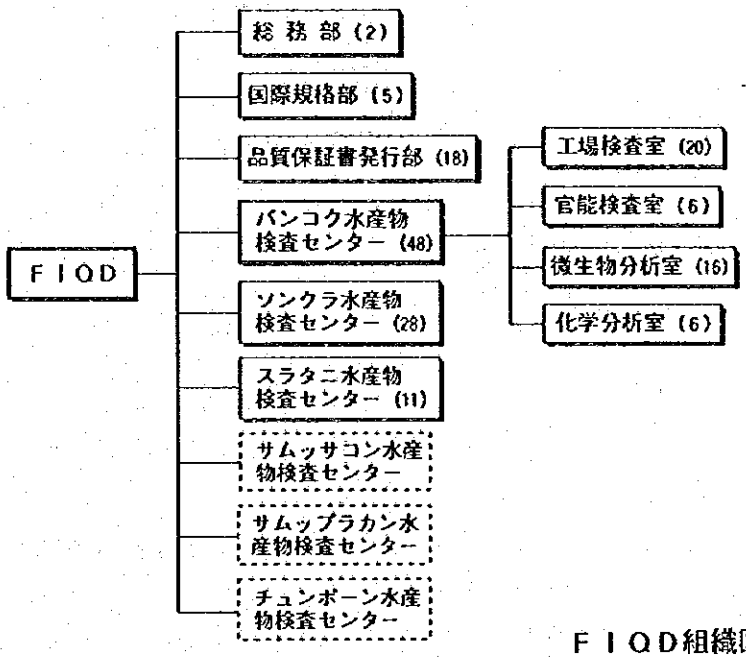
以前から計画されているＦＴＤＩの移転（現在のバンコク市内のヤナワから、水産局及びＦＩＱＤが存在するカセサート大学構内へ）については、当初予定の1995年３月になっても具体的に計画が進んでいる様子は見受けられない。水産局長によると、1996年９月頃には移転が実施されるだろうとの話であった。バンコクは交通渋滞がひどく、現在専門家はこの２つの機関の行き来

にかなりの時間を費やしているため、移転により両機関の距離が近くなることは、技術移転の効率性という面から考えても非常に望ましいことである。

・水産物検査品質管理部 (FIQD: Fish Inspection and Quality Control Division)

1992年にＦＴＤＩから独立した機関で、水産局と同じカセサート大学（バンコク郊外）の構内に位置する。輸入国（EU、USA、日本）が設定する各々の品質基準に合わせた水産輸出品の品質検査、証明書の発給並びに水産輸出品の製造施設の品質衛生管理診断の実施が主な業務である。

ＦＩＱＤは総務部、国際規格部、品質保証書発行部、及び３ヶ所の水産物検査センター（バンコク、ソンクラ、スラタニ）から成り、この他に現在建設中のサムッサコン、サムップラカン、チュムポンのセンターが1995年末には完成する予定である。バンコク検査センターは、化学分析室、微生物分析室、官能検査室、工場検査室の４つの検査室に分かれている。



ＦＩＱＤ組織図

4-1-2　カウンターパート配置状況

本プロジェクトについては、指導項目が非常に多岐に渡っているため、日本人専門家に対し特定のＣ／Ｐを常時配置するという形態ではなく、指導項目毎に担当Ｃ／Ｐを決め、専門家の指導を受けるという形態をとっている。

これは、ＦＴＤＩ、ＦＩＱＤともに各職員の担当分野が限定されているため、特定の職員が全ての項目の指導を受けるよりは、各項目につき、それを専門とする職員が指導を受けるという体制をとる方が効率的かつ効果的であると判断されたからである。

なお、各分野の主要なＣ／Ｐは下表のとおりである。

	FTDI	FIQD
微生物試験	Orawan Kongpun	Kanokpan Srimanobhas Jaree Polcnana
化学分析	Niracha Wongchinda(重金属／抗生物質) Somchai Rungjiratananon (重金属) Poratip Kiatkungwalkrai (食品添加物)	Supapun Brillantes (塩素系農薬、毒性) Supanoi Suntipiriyaporn (重金属、抗生物質)
工場検査	Varatip Somboonyarithi Pantip Suwansakornkul	Suwimon Keerativiriyaporn Krissana Sophonphong

4-1-3 予算配置状況

タイの予算年度は１０月から翌年の９月末までである。1994年度のＦＴＤＩ、ＦＩＱＤの予算は下表のとおりである。なお、この数字は人件費、資機材購入費、管理費等を含む。

（１バーツ＝約３．８円）

FTDI	FIQD
31,070,900 バーツ	24,038,700 バーツ

4-1-4 資機材整備状況

1994年度の供与機材として、ＦＩＱＤに高速液体クロマトグラフ（UV-VIS, FL, RI）、ＦＴＤＩには原子吸光光度計及びガスクロマドグラフ（ECD）等が購入される予定であるが、調達手続きが遅れており、調査団派遣時点では未だ設置されていない。

両機関における機器の管理は殆ど実施されていない状況であり、プロジェクトの供与機材が設置された場合には、ＧＬＰに従った機器管理要領の導入実施するべきである。

ＦＩＱＤは化学分析室と機器室が各１室であるため、複数の分析者による共用が可能であるが、ＦＴＤＩは、大学の研究室のように各部門毎に複数の部屋に分かれており、各部屋に機器が設置されているため共用が困難である。プロジェクトの供与機材の納入にあたってはガスクロマトグラフ、原子吸光光度計等の測定機器は、各部門が共同で使用できるように共有の機器室を設けるべきである。

ＦＩＱＤ及びＦＴＤＩにおける既存設置機器については、別表のとおりである。

[ＦＩＱＤ]

機　器　名	数　量	備　考
①　細菌準備室（培地の調製）		
(1) オートクレイブ	5　台	うち２台は大型
②　缶詰関缶試験室		
③　試料採取室		
④　細菌室		
(2) インキュベーター	3　台	うち２台は大型
(3) ストマッカー	2　台	
(4) クリーンベンチ	1　台	
⑤　抗生物質費用試料解凍処理室		
⑥　官能検査用トレーニング室		
(5) パネル試験台	1　台	
⑦　試料分解室		
(6) ドラフトチャンバー	2　台	
(7) マッフル	1　台	
(8) マイクロウエーブ分解装置	1　台	
⑧　化学分析室		
(9) ドラフトチャンバー	2　台	
(10) ＥＸＦＡＴ	1　台	
(11) シェーカー	1　台	
(12) ロータリーエバポレーター	1　台	
(13) 高純度蒸留水製造器	1　台	
(14) 冷却遠心機	1　台	
(15) ケルテックオート	1　台	
(16) 電子天秤	1　台	
(17) 原子吸光光度計 (フレーム、フレームレス)	1　台	
(18) 水分活性測定器	1　台	
(19) ガスクロマトグラフ (HP-FID)	1　台	
(20) 高速液体クロマトグラフ (ｳｫｰﾀｰｽﾞ製 UV-VIS, FL)	2　台	うち１台は２ポンプ
(21) 蛍光光度計	1　台	
(22) コンウェイユニット	数　組	

[ＦＴＤＩ]

機　器　名	数　量	備　考
①包装技術研究室		
(1)蛍光光度計	1　台	
(2)化学天秤	1　台	
(3)ブレンダー（ターラックス）	1　台	
(4)サンドバス	1　台	
(5)水分活性測定器	1　台	
(6)ドラフトチャンバー	1　台	
(7)ガス置換パッキン装置	1　台	
②漁獲物処理研究室		
(9)ケト水分計	1　台	
(10)天秤	1　台	
(11)ロタリーエバポレーター	2　台	
(12)同上用クーラー	1　台	
(13)同上用アスピレーター	2　台	
(14)ＥＸＦＡＴ	1　台	
(15)ケルテックセミオート	1　台	
(16)山本式フードチェッカー	1　台	
(17)大型台はかり	1　台	
(18)シームプロジェクター	1　台	
(19)ドラフトチャンバー	1　台	
(20)卓上型遠心器　(100ml×6)	1　台	
(21)ケルテック分解装置（×6)	1　台	
③加工技術研究室		
(22)レトルト	2　台	
(23)缶詰シーマー	1　台	
(24)蒸気加熱器	1　台	
(25)インキュベーター（0～20℃、湿度一不正確）	1　台	
(26)マッフル	2　台	
(27)乾燥器	1　台	
(28)採肉機	1　台	
(29)雷潰機	1　台	
(30)スクリュープレッサー	1　台	
(31)サイレントカッター	1　台	
(32)スライサー	1　台	
(33)イクスクルーダー	1　台	
(34)アイスメーカー	1　台	
(35)ミキサー	2　台	
(36)スタッファー	2　台	
(37)フィッシュパウダー製造機	1　台	
④使用済み培地処理室		
(38)オートクレーブ	3　台	

機　器　名	数　量	備　考
⑤缶詰実験室		
(39)化学天秤	2　台	
(40)電子天秤（0.1g）	1　台	
(41)pHメーター	2　台	うち1台は老朽化
(42)ソックスレー抽出器	1　台	
(43)ロータリーエバポレーター	2　台	
(44)同上アスピレーター	2　台	
(45)同上クーラー	1　台	
(46)ストマッカー（大型）	1　台	
(47)ケルテックセミオート	1　台	
(48)ドラフトチャンバー	1　台	
(49)ブレンダー（ターラックス）	1　台	
(50)遠心分離器	1　台	
⑥微生物検査室		
(51)ストマッカー	1　台	
(52)クリーンベンチ	1　台	
(53)顕微鏡	3　台	
(54)嫌気培養瓶	2　台	
(55)レオテックス	1　台	
⑦生物工学研究室		
(56)ガスクロマトグラフ（パーキンエルマー, ECD）	1　台	２５年前購入使用不能
(57)ガスクロマトグラフ（CP-9000-ECD, FID）	1　台	
(58)乾燥器	1　台	
(59)クリーンベンチ	1　台	
(60)分光光度計（島津 UV-160）	1　台	
(61)純水製造装置（ミリポア）	2　台	
(62)高純度純水製造装置	1　台	
(63)ストマッカー	1　台	
(64)インキュベーター	2　台	
(65)乾燥器	1　台	
(66)高圧滅菌器（小型）	1　台	
(67)ウオータバス	2　台	かなり老朽化している
⑧廊下		
(68)インキュベーター	8　台	
(69)オートクレーブ	2　台	
⑨小部屋		
(69)乾燥器	3　台	
(70)冷却遠心器　(20,000 rpm)	1　台	
(71)高速液体クロマトグラフ（ウォーターズ510, UV-VIS, FL）	1　台	2ポンプ、オートサンプラー、カラムオーブン
(72)アミノ酸試料封入装置	1　台	

4 -- 2　日本側実施体制

4-2-1　専門家派遣

本調査団派遣時までに派遣された長期及び短期専門家は下表のとおりである。

[長期専門家]

分野名	専門家氏名	派遣期間	所属先
チームリーダー	山形　誠	1994. 8. 1. ～ 1996. 7.31.	なし
業務調整	井田　光泰	1994. 4. 1. ～ 1996. 3.31.	ＩＣネット株式会社
食品分析	菊地　嶺	1994. 9.16. ～ 1996. 9.15.	なし

[短期専門家]

分野名	専門家氏名	派遣期間	所属先
微生物化学分析	徳岡　旗一	1994.10.17. ～ 1994.12.23.	(財)日本冷凍食品検査協会
食品工場衛生検査	島田　昌彦	1994.11.12. ～ 1995. 1.11.	マルハ中央研究所
魚貝類毒性分析	尾上　義夫	1995. 3.11. ～ 1995. 4.12.	鹿児島大学水産学部

4-2-2　研修員受入

研修員の受け入れ実績は下表のとおりである。

	研修員氏名	研修項目	研修期間	研修先
H6年度	Supapun Brillantes (FIQD 化学分析室長)	貝毒分析 (HPLC) 塩素系農薬分析 (GC-ECD)	1994.10.24. ～ 1994.12.28.	東北大学農学部 (社)日本冷凍食品検査協会
	Kanokphan Srimanobhas (FIQD 細菌検査室長)	抗生物質検査 (ﾊﾞｲｵｱｯｾｲ) 食中毒菌検査	1995. 2. 7. ～ 1995. 3.15.	東京都立衛生研究所
	Varatip Somboonyarithi (FIDI 包装技術室)	包装技術及び包装後の 品質変化検査	1995. 2. 7. ～ 1995. 3.15.	京都大学農学部 マルハ中央研究所等

4-2-3　機材供与

1994年度予算で購入された機材は下表のとおりである（全額現地調達）。長期専門家が全員着任した後に仕様を決定したため、調査団派遣時には殆どの機材が未だ納入されていなかったが、1994年度分については95年前半にはほぼ納入される予定である。

年度		主要機材	総　額（概算）
1994	FTDI	ガスクロマトグラフ 原子吸光分光光度計 蛋白質測定器 凍結乾燥器　　等	５８，５６０千円 （ＦＴＤＩに約８０％）
	FIQD	高速液体クロマトグラフ 水銀専用分析器 冷凍車	

5．5ヶ年活動計画及び詳細年度計画

ＦＴＤＩ、ＦＩＱＤそれぞれから提出された計画案を基にプロジェクト専門家、計画打合せ調査団員が活動内容を検討し、各分野毎に活動計画を策定した。英語版は第１回合同委員会のミニッツとして、タイ水産局調査役、プロジェクトリーダー、計画打合せ調査団団長との間で署名・交換された。

[５ヶ年活動計画]

・微生物試験

予算年度	SOP	実施機関	1994	1995	1996	1997	1998
大腸菌	有	FTDI			├──────┤		
サルモネラ菌	有	両機関				├──────┤	
腸炎ビブリオ	有	FIQD			├──────┤		
ウェルシュ菌	有	FIQD		├──────┤			
ボツリヌス菌	無	FTDI				├──────┤	├──────┤
好熱性細菌	無	FTDI			├──────┤		
好塩性細菌	無	FTDI				├──────┤	
乳酸菌	無	FTDI				├──────┤	
エンテロトキシン	有	両機関		├──────┤			
かび酵母	無	FTDI				├──────┤	├──────┤
抗生物質のﾊﾞｲｵｱｯｾｲ	有	FIQD	├─	├──────┤			

・化学分析

予算年度	分析法	実施機関	1994	1995	1996	1997	1998
食品添加物							
保存料							
安息香酸	GC-FID	FTDI		├──────┤			
酸化防止剤							
ＥＤＴＡ	HPLC, GC-FID	FTDI		├──────┤			
ＢＨＡ、	GC-FID	FTDI		├──────┤			
ＢＨＴ	GC-FID	FTDI		├──────┤			
漂白剤							
塩素、二酸化硫黄	Rankin, CM, GC	FIQD		├──────┤			
着色料							
タール色素類	TLC	両機関		├──────┤			
重合リン酸塩類	CC, TLC	FTDI		├──────┤			
汚染物質							
抗生物質							
スルファ剤	HPLC	両機関		├──────┤			
ﾏﾗｶｲﾄｸﾞﾘｰﾝ	CM	両機関		├──────┤			
重金属							
鉛、カドミウム	AA-FL	FTDI		├──────┤			
水銀	GC-ECD	FTDI		├──────┤			
ヒ素	DDTC-Ag, AA-FL--less	FTDI			├──────┤		
農薬							
有機塩素系	GC-ECD	両機関		├────────	────────┤		
有機リン系	GC-FPD, NPD, FTD	両機関		├────────	────────┤		
食中毒原因物質							
ヒスタミン		FTDI					
その他有害物質							
ＰＣＢ		両機関		├──────┤			
包装材		FTDI	├─	─情報収集─	─├────	──├	
バイオトキシン	HPLC, MA						
ＰＳＰ		両機関		├────	──モニタ	リング──	──────┤
ＤＳＰ		両機関		├──┤			
ＡＳＰ		両機関		├──┤			
ＴＴＸ		両機関		├────	──モニタ	リング──	──────┤
栄養成分							
ＤＨＡ、ＩＰＡ	GC-FID	FTDI			├──────┤		
アミノ酸	HPLC-FL, CM	FTDI					├──────┤
ビタミンA, E, D	HPLC-UV-VIS FL	FTDI				├──────┤	
品質指標							
ｲﾝﾄﾞｰﾙ, TVB-N等	HPLC, GC-FID	FIQD			├────────	────────	──────┤
AV, POV, COV, TBA	TC	FTDI		├──────┤			
官能検査							
エビ、マグロ、イカ				├─エビ─┤	├─ﾏｸﾞﾛ─┤	├─イカ─┤	

＊分析法

GC-FID 水素炎イオン化検出器付きｶﾞｽｸﾛ　　MA マウスアッセイ　　TLC 薄層ｸﾛﾏﾄｸﾞﾗﾌｨｰ
GC-FPD 炎光光度型検出器付ｶﾞｽｸﾛ　　CM 比色法　　CC ｶﾗﾑｸﾛﾏﾄｸﾞﾗﾌｨｰ
GC-FTD ｱﾙｶﾘ熱イオン化検出器付ｶﾞｽｸﾛ　　DDTC-AG ｼﾞｴﾁﾙｼﾞﾁｵｶﾙﾊﾞﾐﾝ銀法
GC-NPD 高感度窒素・リン検出器付ｶﾞｽｸﾛ　　HPLC 高速液体ｸﾛﾏﾄｸﾞﾗﾌｨｰ　　AA-FL 原子吸光光度法
GC-ECD 電子捕獲型検出器付ｶﾞｽｸﾛ　　HPLC-UV-VIS 紫外分光光度検出器・可視部検出器付高速液ｸﾛ

・工場検査

	1994	1995	1996	1997	1998
FTDI（個人衛生、工場衛生、HACCP）					
・加工工場					
魚醤油					
干エビ					
発酵魚					
・GMP（ﾃｽﾄｷｯﾄを用いたﾓﾆﾀﾘﾝｸﾞ及び業界向けの手法の開発）		モニタリ	ング	GMP	
FIQD					
・冷凍工場（工場衛生、テストキット）	G	MP	ﾃｽﾄｷｯﾄ	GMP	
・缶詰工場（工場衛生、テストキット）	G	MP	ﾃｽﾄｷｯﾄ	GMP	
・レトルト製品検査技術（工場衛生、テストキット）		ﾄﾚｰﾆﾝｸﾞ	HACCP	ﾏﾆｭｱﾙ	
・すりみ工場（HACCP）		HACCP	計画		

・GLP（Good Laboratory Practice）

	1994	1995	1996	1997	1998
FIQD					
優先順位					
1. SOP（標準操作手順）の開発					
2. 内部検査					
3. 認定					
FTDI					
優先順位					
1. 組織図					
2. SOP（標準操作手順）の開発					
3. 内部検査					

・品質管理研究活動

研究課題	1994	1995	1996	1997	1998
エソすり身の品質改良試験					
すり身製品の包装技術の向上					
エビの化学的、微生物学的変化に対する温度の影響					
重金属モニタリング					
魚粉の品質指標分析の手順研究					
魚醤の包装条件による品質保持試件					
生魚の処理及び輸送システムに関する研究					
冷凍水産物に適した包装材料の研究					
水産物の鮮度等級づけガイドライン策定					
エビ缶詰の腐敗因子に関する研究					

タイ水産物品質管理研究計画
１９９５年度詳細計画

活動項目		4	5	6	7	8	9	10	11	12	1	2	3
1．微生物試験													
1-1 ウェルシュ菌及び下痢性毒素の検出	FIQD				実験室内試験			最終発表					
1-2 キトサンの保存効果	FTDI		実験室内試験				中間発表		手法研究				
2．化学分析													
2-1 エビ缶詰の腐敗因子に関する研究	FIQD			ガイドライン作成			最終発表						
2-2 エソすり身の品質向上	FTDI		研究				中間発表						
2-3 水産物中のBHA、BHTの検出	FTDI		C/P日本研修		実験室内試験		中間発表		マニュアル作成				最終発表／論文
2-4 温度によるブラックタイガーシュリンプの微生物学的・化学的変化に与える影響	FTDI		計画		実験室内試験		中間発表		カイドライン作成				最終発表／論文
2-5 水産物中の重金属のモニタリング手法の確立	FTDI		実験室内試験		C/P日本研修			モニタリング					最終発表／論文
2-6 水産物中のPCB、残留農薬の検出	両機関		C/P日本研修		マニュアル作成		中間発表		短期専門家派遣／モニタリング				最終発表／論文
2-7 缶詰製品中のEDTAの定量	FTDI		手法研究		実験室内試験		中間発表		マニュアル／カイドライン作成				最終発表／論文
2-8 魚粉品質指標	FTDI			研究					カイドライン作成				最終発表／論文
2-9 HPLCによる抗生物質の検出	両機関		手法研究		短期専門家派遣		中間発表		実験室内試験				最終発表／論文
2-10 淡水産フグの毒性調査	FTDI				サンプリング／実験室内試験						モニタリング		最終発表／論文
3．工場検査													
3-1 水産レトルト製品の検査技術	FIQD							C/P日本研修		マニュアル作成			
3-2 冷凍すり身のGMP適用	FIQD		現場調査／マニュアル作成										
3-3 水産物の鮮度等級カイドラインの確立	FIQD							研究		シンガポール研修		出版	最終発表
3-4 陽気の材質別の魚醤の品質保持試験	FTDI					調査					実験室内試験		最終発表／論文

添　付　資　料

1.　第一回合同委員会議事録

MINUTES OF THE MEETING CONCERNING THE TECHNICAL COOPERATION FOR THE RESEARCH PROJECT ON THE QUALITY DEVELOPMENT OF FISHERY PRODUCTS AT THE FIRST JOINT COMMITTEE HELD ON MARCH 8, 1995

The Consultation Survey Team (hereinafter referred to as "the Team", organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Yaichiro Igahara, visited Thailand from February 28 to March 11, 1995, for the purpose of working out a detailed Japan - Thailand cooperative implementation (April 1994 - April 1999) concerning the Research Project on the Quality Development of Fishery Products in the Kingdom of Thailand (hereinafter referred to as "the Project").

During its stay in the Kingdom of Thailand, the Team exchanged views and had a series of discussions with the Thai authorities concerned with regard to the above mentioned plan and the desirable measures to be taken by the Government of both Japan and the Kingdom of Thailand for further successful implementation of the Project in accordance with the Record of Discussion (hereinafter referred to "the R/D") signed on December 7, 1993.

The first Joint Committee was also held during its stay in the Kingdom of Thailand at the Department of Fisheries in accordance with the Article VI of the R/D for the purpose of formulating an implementation plan (April 1994 - April 1999) of the Project and dealing with specific matters concerned with the implementation of the Project.

In accordance with the suggestions made by Dr. Plodprasop Suraswadi, Director General and Mr. Sompong Hiranwat, Senior Adviser of the Department of Fisheries to the Japanese Consultation Survey Team, and also the consultation between the survey team and the Fish Inspection and Quality Control Division (FIQD) and the Fishery Technological Development Institute (FTDI), the following issues were discussed and agreed to by all the participants of the Joint Committee, held on March 8, 1995. An elaboration of the project is shown in the "APPENDIX".

山形誠

Mr. Makoto Yamagata,
Team Leader
The Research Project on the Developmet
of Fishery Products

S. Hiranwat

Mr. Sompng Hiranwat
Senior Fishery Advisor
The Department of Fisheries

Y. Igahara

Mr. Yaichiro Igahara
Leader
Consultation Survey Team

1. Current situation

At FTDI, there is not enough equipment to implement all of the JICA project activities. Researchers are assigned to both the quality assurance of traditional fishery products for exports, as well as their respective research work. This has left FTDI understaffed and unable to fully implement the JICA project. While researchers at FTDI are competent, the institute needs to strengthen its research capabilities.

At FIQD, the equipment presently used for routine analytical work has proven effective. The division has been increasing the number of staff and has strengthened its inspection capabilities by establishing local offices and stations. Both microbiological examinations and chemical analyses that are to meet importing countries' standards are already a part of its routine work. Plant inspection, particularly for canned and frozen fishery products has also achieved the standard required by importing countries.

2. Priorities of JICA cooperation

At FTDI, some intense improvement in chemical analysis capability is desired. The development of appropriate inspection methods for major traditional fishery products is also seen as a priority. Moreover, Good Laboratory Practices (GLPs) will be required in order to sustain research activities in a systematic fashion.

At FIQD, priority should be given to improving the efficiency of analytical work and plant inspection, as well as adopting the standard analytical methods of various importing countries. Good Laboratory Practices (GLPs) should also be fully implemented to achieve accreditation. In addition, more technical and information services need to be extended to fishery enterprises in order to upgrade their quality control measures.

3. Project Activities

Given some of the difficulties that FTDI is faced with, it is necessary for JICA to enhance its relationship with them. Furthermore, FTDI's responsibilities as a research institute include obtaining prevailing determination methods, studying and developing efficient and suitable methods for Thailand, and transferring such methods to the fishery industry. Therefore, FTDI's research capabilities should be further supported in order to fully carry out such institutional responsibilities.

For the first 3 years, FTDI and JICA specialists will focus on establishing analytical methods for detecting various chemicals. Therefore, counterparts who conduct research will undertake their activities independently, and JICA specialists will support them by providing consultation. Then, during the fourth and fifth years, the focus will shift to research work, utilizing the adopted methods. The development of straightforward and expedient methods for the industry is also another issue to be covered at that time.

Unlike research on food additives which can be carried out for relatively short periods of time, the study on pollutants and natural poisons such as pesticides, heavy metals and biotoxins, should be a fundamental practice at FTDI. Considering that as such hazardous substances may cause serious damage to human life, they should be carefully monitored over a long period of time.

At FIQD, the focus is on the introduction and development of efficient analytical methods for inspection. Three to four short-term projects will be designed and implemented each year in order to improve inspection efficiency. Equipment should be also provided to serve such goals.

4. Arrangements necessary to achieve project objectives

In order to effectively transfer technology, JICA specialists will be stationed at FTDI and, when necessary, they will also work intensively with FIQD counterparts.

In order to facilitate technology transfer, the senior staff, junior staff and technician(s) will work as a team. When they work with JICA specialist(s), all team-members will participate in their project's implementation.

The technology transferred to the counterpart must be sustainable. In order to maintain the new methods and techniques, the counterpart must produce a report, manual, or guideline by the end of their project. They must also make a presentation at the interim, and final internal seminars.

Counterparts who have finished training in Japan must submit a report, manual, or guideline to the JICA project office and their directors. They will also demonstrate the acquired knowledge to fellow staff.

Inspection of traditional fishery products and the implementation of GLPs and Good Manufacturing Practices (GMPs) are important issues for FTDI. Therefore, the JICA team leader and the director should be directly involved in their supervision. At FIQD, the JICA team leader and the director should supervise the progress of GLPs implementation.

5. Final goals

In five years, JICA hopes that the project activities at FIQD will contribute to reducing the current rejection rate of fishery products by half. Moreover, they hope that FIQD will receive recognition from all of the importing countries as a result of project activities and the implementation of GLPs.

It is also desired that, in five years, FTDI will have spearheaded research activities in this field in Thailand, and actively published research papers in both domestic and international scientific journals. FTDI and its researchers will then be universally recognized in the area of quality control of fish and fishery products.

APPENDIX

THE RESEARCH PROJECT
ON
THE QUALITY DEVELOPMENT OF FISHERY PRODUCTS

FISHERY TECHNOLOGICAL DEVELOPMENT INSTITUTE (FTDI)
FISH INSPECTION AND QUALITY CONTROL DISIVION (FIQD)
&
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

March 8, 1995

PROGRESS REPORT (April, 1994 - February, 1995)

In Thailand, upgrading quality assurance capabilities has had significant socio-economic importance to the Government. Firstly, Thailand has been increasing its export of fishery products in recent years. Subsequently the Thai Government must comply with strict quality and safety standards set by importing countries, particularly Japan, the USA and the EU. In order to facilitate and promote export, the Government is expected to play the leading role in quality assurance of fish and fishery products.

In addition, it is important to establish domestic safety and quality standards for fish and fishery products and ensure the safety and wholesomeness of the products consumed in the domestic market. This prevents health hazards. Furthermore, improving quality control measures would lead to fishery product improvements (e.g. a new product with high calcium contents and nutritional values) and wiser use of scarce natural resources (e.g. use of by-catch for human consumption or improving edible portions of the fish).

Bearing in mind these needs of the Government, the JICA project office has worked with Fishery Technological Development Institute (FTDI) and Fish Inspection and Quality Control Division (FIQD) of the Department of Fisheries in the following three fields: Bacteriological examination and related research activities, chemical analysis, and inspection and quality control research activities.

1. Bacteriological examination and related research activities

1-1 Improving the bioassay method in detecting antibiotics

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

The microbiological unit at FIQD and the handling unit at FTDI were already capable of conducting Antibiotic (Tetracycline and Penicillin) examinations. However, FTDI and FIQD needed to improve their accuracy, and also understand the standard bioassay method used in Japan.

The activities

One short-term expert stationed at FTDI and FIQD for 2 months, demonstrated antibiotic detection methods (the DISK and the CUP methods) to 2 FIQD staff and 1 FTDI researcher. His counterparts' high absorptive capacity of technology allowed him to extensively transfer his knowledge to his counterparts. The examination methods have been fully transferred to his counterparts. Approximately 30 researchers and staff from FTDI and FIQD attended his final presentation in December, 1994.

Future goals and activities

In order to prevent over-use of antibiotics and ensure the safety of fish and fishery products in Thailand, FTDI and FIQD need to extend their services to the farms and processors, informing them of appropriate usage of antibiotics as well as detection methods. At the mid-March, 1995, the first training session will be held for the manufacturers by FIQD and the JICA project office, aimed at improving the micro assay method for various types of antibiotics. At the technical level, antibiotic detection methods using High Pressure Liquid Chromatography (HPLC) should be further developed at FTDI and FIQD in order to improve

their detection accuracy and cross-checking.

1-2 Improving the method for detecting Enterotoxins produced by *Staphylococcus aureus*, using the Reversed Passive Latex Agglutination Method (RPLA)

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

FTDI and FIQD has adopted the Bacteriological Analytical Manual (BAM) of the FDA to detect *Staphylococcus aureus*. Yet, the BAM merely identifies whether *Staphylococcus aureus* exists in fish and fishery products. It cannot detect whether enterotoxins, which cause serious food poisoning, have formed in the products. Therefore, the enterotoxin detection method was necessary to enhance detection capacity at FTDI and FIQD.

The activities

The short-term expert transferred the RPLA method to 2 FIQD staff and 1 FTDI researcher. They have achieved the technical skills to identify the enterotoxins such as *E. coli*, *Cl. welchii*.

Future goals and activities

The immunoassay method should be introduced in order to improve method accuracy through cross-checking.

1-3 Improving detection methods for food poisoning bacteria

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

FIQD has been able to conduct food poisoning bacteria examinations based on the BAM. Therefore, the goal of this activity was to develop a detection method following the Japanese standard method specified in the Japanese Food Sanitation Law in order to establish a Thai standard method which can satisfy the standards set by major importing countries.

The activities

The short-term expert worked with 2 FIQD staff and 1 FTDI researcher and introduced the detection methods of *Vibrio cholera*, *Vibrio parahaemolyticus*, *E. coli*, *Staphylococcus aureus and Salmonella*. The techniques have been fully transferred to his counterparts.

Future goals and activities

Further efforts should be made in standardizing the detection methods by the establishment of standard operational procedures. Also, a comprehensive Good Laboratory Practice (GLP), a management system for chemical and microbiological analysis, should be further developed in order to produce accurate laboratory results.

2 Chemical Analysis

2-1 Detecting food poisoning substances (Histamine)

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

The analysis of histamine contents in fishery products, especially salted mackerel, has been required by many importing countries. In Thailand several rejections of exported salted mackerel caused by high histamine contents have been reported. Therefore, it is necessary for FTDI to establish an appropriate method for histamine determination, as well as establish

quality control guidelines for processing and packaging, to prevent histamine formation. At the technical level of histamine detection, the colorimetric method currently used at FTDI has failed to produce consistent, reliable results.

The activities

A long-term expert has been working with his counterpart and technicians at FTDI, reviewing the present methods and testing an improved method. They tested the Diazo Reaction Colorimetry that used the Ion exchange chromatography; however, it failed to produce a satisfactory recovery rate, seemingly, due to reducing substances hindering coloration. Currently, they discuss ways to develop the HPLC method, the enzyme reaction method and the fluorometry method, as well as improve the recovery rate by the Ion exchange chromatography. FIQD has already initiated the determination of histamine using the fluorometric and the HPLC methods.

Future goals and activities

After completion of the research activities, an appropriate method of histamine determination should be formulated. Then, a quality control guideline to prevent histamine formation should be published for processors and packers.

2-2 Detecting and controlling food additives (Benzoic acid)

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

The use of benzoic acid is mostly prohibited in Thailand as well as many importing countries. However, cases have been reported of benzoic acid occasionally being used as a preservative to delay decomposition. Therefore, it is important for FTDI to establish an uncomplicated and expeditious detection method. Such a method can then be introduced to FIQD and incorporated into its routine inspection items.

The activities

Currently the long-term expert and his counterpart at FTDI have discussed the possibility of introducing the detection method that uses HPLC. Although the Gas chromatography (G.C.) method is widespread in Thailand, the HPLC method is considered to be a more suitable method for FIQD and FTDI for efficiently conducting analytical routine jobs.

At present, organic solvents, reagents and packed column are ordered and prepared for the HPLC at FTDI. Further training for the counterpart will be required for running the equipment. Thus, the actual transfer of technology might be delayed.

Future goals and activities

Detection of food additives are not limited to benzoic acid. The experience and techniques acquired through benzoic acid detection can be applied to the detection of other food additives. Another important goal is to increase the number of researchers and technicians who can operate HPLC and G.C.

2-3 Detecting Pesticides in fish and fishery products

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

The detection of pesticide residues in fish and fishery products is a new activity for both FTDI and FIQD. Basic training on G.C. is required for initiating analytical work.

The activities

The long-term expert and his counterpart have decided to work, first of all, on the detection of Organochloric pesticides, and then on an appropriate analytical method that uses G.C. One staff from FIQD has been assigned to obtain knowledge on PCBs detection method in Japan for 1 month. After the training, she is expected to help FTDI set up G.C., as well as transfer the techniques she acquired in Japan to junior staff at FIQD. The analytical work at FTDI is pending the arrival of a new G.C.

Future goals and activities

In the duration of the fiscal year, 1994, little progress is expected due to time constraints. The rough schedule for 1995 is as follows: 1) The FIQD staff will transfer the techniques obtained in Japan to the researchers at FTDI. 2) The long-term expert and his counterpart at FTDI will set up the G.C. for use. 3) They will establish an operational manual and conduct analytical work on Organochloric pesticide detection. 4) Analysis on Organophosphoric pesticides will follow forthwith. 5) Once an appropriate method is established, FTDI will start monitoring and assess pesticide residues in fish and fishery products.

2-4 Detecting harmful heavy metals in fish and fishery products

As an Atomic Absorption (A.A.) is scheduled to be purchased and installed at FTDI in the fiscal year, 1994, the long-term expert and his counterparts have discussed cadmium and lead detection methods. Like pesticide analysis, the detection of heavy metals in fish and fishery products is a new activity. Basic training on A.A. is required for initiating analytical work. The analytical work at FTDI is pending the arrival of an A.A.

2-5 Detecting biotoxins in fish and fishery products

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

Currently, the mouseassay method is used to detect biotoxins at FTDI and FIQD. It is necessary to introduce the HPLC method to FTDI and FIQD to identify toxic substances, as well as conduct quantitative analysis.

The activities

One staff from FIQD has been sent to Japan on the training of the HPLC method. The analytical work is pending the arrival of an HPLC.

Future goals and activities

The FIQD staff trained in Japan is expected to transfer her knowledge to junior staff at FIQD and researchers at FTDI. Then, an appropriate analytical detection method should be established at both FTDI and FIQD. One short-term expert is scheduled to demonstrate such methods as paralytic and diarrhetic shellfish poison detection methods for his counterparts at FTDI and FIQD. FTDI will also host a seminar on biotoxins to publicize the importance of biotoxin studies, as well as present detection methods.

3. Inspection and Quality Control

3-1 Establishing hygienic control measures and inspection manuals for

traditional fishery product plants

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

Unlike cannery and frozen shrimp plants, traditional fishery plants such as fish sauce and dried shrimp plants have not sufficiently implemented hygienic measures. Even well-equipped plants conduct only the total nitrogen, salt contents test and/or the specific gravity test at their plant laboratory.

The activities

One short-term expert has worked with his counterparts at FTDI, formulating guidelines for hygienic control at fish sauce plants and establishing an inspection manual for fish sauce. He has also demonstrated the environmental examination method to the inspectors at FTDI and FIQD, in order to familiarize them with microbiological inspection measures.

Future goals and activities

Improving hygienic standards of traditional fishery products involves great effort, as such plants differ significantly in size, product and the managements' attitude towards quality control. It is impossible to provide all the traditional fishery product plants with sophisticated hygienic measures. It appears to be more productive and effective to implement hygienic measures at selected plants, and then extend them to other plants.

An established inspection manual for fish sauce will be used as the basic manual. It will be modified and applied for other traditional fishery product plants.

3-2 The Pilot Project: Improving the environmental examination method at frozen shrimp plants

Background of technology transfer and assessment of the counterparts' technological capabilities before cooperation

Frozen shrimp plants in Thailand have already conducted microbiological analysis of their raw materials, products in process and final products. The analyses include viable bacteria counts of Coliform organisms, *E. coli, Staphylococcus aureus and Salmonella.* Also, most of them have already incorporated antibiotic tests into routine jobs at their chemical laboratories. However, few plants have conducted environmental examinations, such as the falling microorganisms plate method, the SWAB method or the microbiological examination of processing equipment.

The activities

The short-term expert has demonstrated an environmental examination method to the inspectors at FTDI and FIQD in order to familiarize them with microbiological inspection measures. At present, they have worked on the establishment of an inspection manual for frozen shrimp.

Future goals and activities

After producing an inspection manual, a general environmental examination guideline for frozen shrimp plants should be established so that the plants can learn examination procedures and upgrade quality control measures.

IMPLEMENTATION SCHEDULE OF THE RESEARCH PROJECT ON THE QUALITY DEVELOPMENT OF FISHERY PRODUCTS

Field of Activities \ Month	1994											
	4	5	6	7	8	9	10	11	12	1	2	3
1 Bacteriological examination and research studies	Job No.											
1-1-1 Antibiotics Determination (Bioassay)	94-01						|---------SE---------||---------MW-------|					FP PD
1-1-2 Enterotoxins Determination (RPLA Method)	94-01						|---------SE---------||---------MW-------|					FP PD
1-1-3 Food Poisoning Bacteria Determination (Microbiological methods)	94-01						|---------SE---------||---------MW-------|					FP PD
2 Chemical Analysis												
2-1-1 PCBs and Pesticides residues (G.C.)	94-03						|----------TJ----------||-----MW-----|					FP PD
2-1-2 Heavy metals (A.A.)	94-04						|-------MS-------||----------LT----------|					FP PD
2-1-3 Paralytic and Diarrhetic Shellfish Poison (HPLC)	94-05						|----------TJ----------||-----MW-----|					SEMINAR PD
2-1-4 Histamine (Column chromatography)	94-06							|---------MS----------||---------LT-------|				FP
2-1-5 Benzoic Acid (HPLC)	94-07							|--------------------MS--------||----LT-----|				FP PD
3 Inspection and Quality Control												
3-1-1 Inspection Manual of traditional fish products	94-02								|-------SE--------||--MW--|				FP PD
3-1-2 Hygienic Assessment system in frozen shrimp factories	Pilot Project									|-------SE/LT----------|			

(Abbreviations: TJ: Training in Japan, TS: Training in Singapore, MW: Manual Writing, iP: Interim Presentation, FP: Final Presentation, PD: Paper Deadline, SE: Short-term Expert, GW: Guideline Writing, Publication: P, MS: Method Study, LT: Laboratory Tests)

Project Implementation Schedule in 1995

1 Bacteriological examination and research activities

1-1 Detecting *Clostridium perfringens* and enterotoxins

Objectives

To familiarize researchers with determination methods of *Cl. perfringens* in Japan

Justifications

In order to learn the *Clostridium perfringens*, detection methods used in importing countries is critical to establish a standard method for microbiological examinations.

Description

1) Learn detection techniques of *Cl. perfringens* using direct plating and most probable number techniques 2) detect enterotoxins using RPLA methods, *Cl. perfringens*

Inputs

Reversed Passive Latex Agglutination Method, a long-term expert

Expected outputs

FIQD staff familiarize themselves with the methods used in Japan and establish a standard method in Thailand. An examination manual should be produced.

1-2 Preservative effect of Chitosan on salted-dried fish products

Objectives

To study application of chitosan extracted from shrimp shell in order to improve preservative effects.

Justification

At present, the shrimp industry in Thailand has been rapidly developing, resulting in a great amount of shrimp shell. The study on the extraction of polysaccharides, called chitosan has been conducted, yet various applications of chitosan necessary and suitable for the fishery industry has not been established.

Description

1) To examine proper ratios of chitosan solution to coat salted-dried fish products 2) To conduct microbiological and chemical quality checking through various storage periods 3) To conduct the organoleptic test of each period.

Expected output

Proper coating ratios of chitosan for salted-dried fish products

Application of chitosan as a natural preservative agent for other fish products

2 Chemical Analysis

2-1 Study on factors affecting decomposition of canned shrimp

Objectives

1) To determine factors affecting quality of canned shrimp 2) to establish guidelines for sensory assessment of canned shrimp 3) to study the correlation between sensory assessment and chemical methods in determining decomposition of canned shrimp

Justifications

A number of shipments of canned shrimp from Thailand are rejected by major importing countries each year. The methods used to assess the quality are sensory assessment and chemical analysis (Indole). Rejections can result from either one reason or both. It is necessary to study factors affecting the quality of the product in order to control decomposition occurrences. Storage time on board and normal practices of buying cooked and peeled shrimp from outside sub-standard peeling shades may significantly contribute to the decomposition of canned shrimp.

Description

1) Conduct sensory sessions to familiarize panelists with canned shrimp of different quality levels (prepared and commercial samples) 2) determine the quality of canned shrimp produced from raw materials that have been stored on-board for various times 3) compare quality of canned shrimp produced from fresh shrimp and cooked and peeled shrimp, which have been done by outside peeling shades 4) determine the correlation between sensory assessment and chemical method (Indole method)

Inputs

panelists

Expected outputs

1) Guidelines for sensory assessment of canned shrimp 2) recommendations on quality control for processors of canned shrimp

2-2 Quality Improvement of Lizard Fish Surimi

Objectives

To study the quality changes of surimi made from Lizard fish that occur during storage such as gel forming ability, degradation of protein and the improvement in the case of quality of Lizard fish surimi.

Justifications

Surimi production in Thailand is primarily based upon thread fine bream (*Nemipterus spp*) and bigeye snapper (*Priacanthus spp.*). The harvesting of surimi fish is expected to decrease in future years. A large supply of low priced Lizard fish should be considered as a potential source of raw material for the surimi industry. The advantages of using very fresh Lizard fish are that the surimi is very white in color, has a good flavor and a very high gel

forming ability. Therefore, the improvement of the process for producing surimi made from fresh and frozen Lizard fish, should be implemented.

Description

1) To study the quality changes of surimi made from fresh and frozen Lizard fish and the changes that occur during up to 6 months of storage 2) to study the effect of leaching methods on functional properties of Lizard fish surimi 3) using electrophoresis, to study the protein pattern in Lizard fish surimi for identification of protein degradation 4) to expand understanding of the use of ingredients such as egg white, beef plasma and carrageenan for increasing the gel forming ability of surimi-based products

Inputs

Electrophoresis, vacuum mixer, moisture meter, a long-term expert

Expected outputs

A research paper on the quality changes of surimi from fresh and frozen Lizard fish

2-3 Detecting BHA and BHT in fishery products

Objectives

To establish a standard method of detecting BHA and BHT in dried fish products

Justifications

BHA and BHT have been occasionally misused by processors. A guideline for the proper use of these substances is required to control residues. Prior to this, a standard detection method is urgently required to be established at FTDI and FIQD.

Description

1) compare various analytical methods 2) establish a standard method for dried fish products 3) establish a guideline for processors

Inputs

1) training in Japan 2) column for HPLC and G.C.

Expected outputs

1) a standard analytical method 2) a guideline

2-4 Effects of temperatures on post mortem chemical and microbiological changes in black tiger shrimp

Objectives

To examine chemical and microbiological post-mortem changes in shrimp at various temperatures, and establish freshness indices for shrimp

Justifications

Shrimp is the main fishery export commodity from Thailand. Presently, there are some problems with the quality of the products. Importing countries usually enforce chemical and microbiological standards of quality. However, in Thailand, information on how environmental conditions affect the storage life of shrimp is not available. Therefore, it is necessary to establish freshness indices for black tiger shrimp.

Description

1) Assess post-mortem changes by sensory, biochemical and microbiological tests at various storage temperatures. 2) establish freshness indices for black tiger shrimp

Inputs

Low temperature chamber, shaker for separatory funnels, deep freezer and pH meter, a long-term expert

Expected outputs

A freshness indices guideline for processors

2-5 Establishing a monitoring system for harmful heavy metals in fish and fishery products

This job will be carried on from 1994. Please refer to the "PROGRESS REPORT".

2-6 Detecting pesticide residues and PCBs in fish and fishery products

This job will be carried on from 1994. Please refer to the "PROGRESS REPORT".

2-7 Determining and Controlling EDTA in canned fishery products

Objectives

1) To revise the current EDTA determining method in canned fishery products 2) to introduce the appropriate processing to control the usage of EDTA in canned fishery products

Justifications

Canned shrimp and canned crab meat are the most important fishery products exported by Thailand. To prevent discoloration during processing, EDTA is added to these products. The daily intake of EDTA is limited by all importing countries. In order to control EDTA contents in canned shrimp and canned crab meat, an effective method for determining EDTA is required. Moreover, the necessity of using EDTA in processing of these products should be examined.

Description

1) Study methods and techniques of EDTA determination 2) investigate into the use of EDTA in processing 3) introduce the appropriate processing and other additives to reduce the usage of EDTA 4) gain analytical techniques that use HPLC

Inputs

Expected outputs

Guidelines for EDTA control and usage

2-8 Study of quality indices analysis procedures of fish powder

Objectives

1) To establish analytical manuals for quality control of fish powder 2) to establish criteria for quality indices of fish powder and fish meal (Shrimp feed grade) 3) to examine and analyze the available data on collected products as data for quality identification

Justifications

To facilitate maximum utilization of by-catch fish, such as transforming it into powder.

Quality control is important to assure the use of scarce natural resources. The off-standard product could be utilized as shrimp feed mixture.

Description

1) Collect secondary data to discover appropriate methods for quality analyses of the products 2) evaluate protein and degradation during storage of products 3) collect different kinds of fish powder and conduct product quality analyses 4) establish quality analyses manuals for fish powder and fish meal

Inputs

Proximate composition analyzer, quality examination procedures

Expected outputs

1) Quality analysis manual for fish powder and raw materials 2) quality criteria for separating raw materials for fish powder and for fish meal

2-9 Determination of Antibiotics (Oxytetracycline and Oxolinic acid) in fish and fishery products

Objectives

To strengthen research capacities to detect antibiotics that uses HPLC in fish and fishery products

Justification

Currently, some antibiotic residues, such as Oxolinic acid, can be analyzed by the HPLC method. Therefore, it is important to learn the method in order to increase research ability at FTDI and detection efficiency at FIQD.

Description

1) To study the methods of Oxytetracycline and Oxolinic acid determination 2) To establish a method suitable for FIQD 3) To cross-check detection results using the Photo Diode Array Detector

Inputs

A short-term expert, HPLC

Expected outputs

A standard method for antibiotic residue analysis

2-10 Survey on toxic freshwater puffer fish

Objectives

To identify toxic species of puffer fish distributed in the Northeastern part of Thailand, and establish a means to protect consumers.

Justification

The occurrence of food poisoning due to ingestion of freshwater puffer fish has been frequently reported from the Northeastern provinces. Therefore, it is a urgent task for FTDI to initiate monitoring of toxic puffer fish. Results obtained through the monitoring is expected to provide better understanding of toxic puffer fish for the consumers in the region.

Description

1) To conduct sampling of freshwater puffer fish in the Northeastern provinces, particularly in Yasothorn, Udornthani and Khonkaen provinces 2) To conduct toxins assay in each parts of tissues using the mouse bioassay and the HPLC 3) To accumulate data 4) To distribute information and knowledge on consumer protection

Expected output

Identification of toxic puffer fish in the region

Chemical data to be utilized for consumer protection

3 Inspection and Quality Control Research Activities

3-1 Process control of retort pouch seafood products

Objectives

1) To obtain the inspection guidelines for retort pouch products based on food safety standards 2) to acquire the heat penetration and heat distribution testing techniques

Justifications

1) Retort pouch is presently an alternative packaging material which is increasingly used in the sea food industry. In order to control the safety standards of such products, technical and regulatory food safety knowledge must be acquired.

Description

1) visit retort pouch product processing plants 2) study product quality criteria and inspection methods, such as package strength tests, burst tests, etc. 3) study critical factors and process establishment 4) Survey on retort specifications and test heat penetration and heat distribution

Inputs

Thermocouple sets and wires, burst test equipment and seal strength testing equipment and training in Japan

Expected outputs

FIQD inspectors will familiarize themselves with inspection techniques in retort pouch products. The quality control guidelines of retort pouch products will be established.

3-2 Application of Good Manufacturing Practice (GMP) on frozen Surimi plants

Objectives

To develop practical GMP guidelines for frozen Surimi processing in Thailand

Justifications

In order to obtain and maintain the consistency of product quality, the GMP guidelines need to be established and applied to the surimi processing plants.

Description

1) Survey the existing quality control practices in various processing plants 2) inspect the microbiological quality at various steps of surimi processing 3) develop GMP guidelines

Inputs

Inspection kits
Expected outputs
GMP guidelines for frozen surimi plants

3-3 Establishing a grading guideline for seafood freshness

Objectives

1) To study spoilage patterns of commercial fish and shellfish in Thai waters 2) to set up guidelines for grading fish and shellfish freshness in both Thai and English

Justifications

So far, there is no formal descriptive and illustrative guide to freshness grades for fresh seafood used by industry, food technologists and other interested parties. Grading of fish is primarily based on foreign guidelines, which may only cover common cold water fish. In addition, the terms used for describing sensory quality may be misinterpreted if the reader is not familiar with the language used.

Description

1) Carry out group discussions on sensory attributes and descriptive terms for freshness of seafood 2) conduct a spoilage run on selected major seafood commodities (e.g. shrimp, fin fish and cephalopods) 3) observe and photograph changes 4) determine the relationship between chemical and freshness and compare the results with sensory evaluation results.

Inputs

Training in Singapore, insulated containers

Expected outputs

A descriptive and illustrative guideline for the grading of seafood freshness which is clear, concise and easy to understand.

3-4 Storage quality of fish sauce in various types of packaging

Objectives

To study the quality changes of fish sauce as amino acid contents, biogenic amine, and volatile acid, etc. in various types of packaging containers

Justifications

Fish sauce is one of the famous traditional fishery products in Thailand. Normally fish sauce is packed in either glass bottles or ceramic containers. With rapidly expanding exports, some handling and transportation problems have appeared. In order to deal with the problems, various types of containers have been introduced, such as PVC and PET. However, changes in the quality of fish sauce in plastic containers have been observed. Therefore, the study of quality changes of fish sauce in various types of containers should be carried out.

Description

1) Survey the commercial packaging of fish sauce as well as analyze quality 2) survey and classify the quality of commercial fish sauce 3) examine the quality changes in various types of containers during storage 4) conduct quality evaluation

Inputs

Spectrophotometer, color-meter for liquid food

Expected outputs

Data on quality changes by different types of packaging

IMPLEMENTATION SCHEDULE OF THE RESEARCH PROJECT ON THE QUALITY DEVELOPMENT OF FISHERY PRODUCTS

Field of Activities \ Month	1995											
	4	5	6	7	8	9	10	11	12	1	2	3
1 Bacteriological examination and research studies												
1-1 Detecting *Clostridium perfringens* and enterotoxins (FIQD)			|-----LT-----|			FP						
1-2 Preservative effect of chitosan (FTDI)	|----------LT----------|					IP	|----------MS----------|					
2 Chemical Analysis												
2-1 Study on factors affecting decomposition of canned shrimp (FIQD)			|----------GW----------|			FP						
2-2 Quality Improvement of Lizard Fish Surimi (FTDI)	|----------Research----------|					IP						
2-3 Detection of BHA and BHT in Fishery Products (FTDI)	|----------TJ----------||--------LT--------|					IP	|----------MW----------|			FP	PD	
2-4 Effects of Temperatures on post mortem chemical and microbiological changes in black tiger shrimp (FTDI)	|-----Planning---||----------LT----------|					IP	|----------GW----------|			FP	PD	
2-5 Establishing a monitoring system of heavy metals in fish and fishery products (FTDI)	|----------LT----------||----------TJ----------||----------Monitoring----------|										FP	PD
2-6 PCBs and Pesticide residues in fish and fishery products (FTDI & FIQD)	|----------TJ----------||----------MW-------|					IP	|----------SE/Monitoring----------|			FP	PD	
2-7 Determining and Controlling EDTA in canned fishery products (FTDI)	|----------MS----------||--------LT--------|					IP	|----------MW/GW----------|			FP	PD	
2-8 Study of Quality Indices Analysis Procedures of Fish Power (FTDI)				|----------Research----------||----------GW----------|						FP	PD
2-9 Antibiotic detection with HPLC (FTDI&FIQD)		|----------MS----------|		|----------SE----------|		IP	|----------LT----------|				FP	PD
2-10 Survey on Toxic Freshwater Puffer Fish (FTDI)	|----------Sampling & LT----------||--Monitoring--|											FP	PD

IMPLEMENTATION SCHEDULE OF THE RESEARCH PROJECT ON THE QUALITY DEVELOPMENT OF FISHERY PRODUCTS

Field of Activities \ Month	1995											
	4	5	6	7	8	9	10	11	12	1	2	3
3 Inspection and Quality Control Research Activities												
3-1 Process control of retort pouch seafood products (FIQD)							TJ			MW		FP PD
3-2 Application of "Good Manufacturing Practices" on frozen Surimi (FIQD)		Site survey/MW				FP						
3-3 Establishing a grading guideline for seafood freshness (FIQD)							Research		TS	P		FP
3-4 Storage quality of fish sauce in various types of packaging (FTDI)					Survey					LT		FP PD

(Abbreviations; TJ: Training in Japan, TS: Training in Singapore, MW: Manual Writing, IP: Interim Presentation, FP: Final Presentation, PD: Paper Deadline, SE: Short-term Expert, GW: Guideline Writing, Publication: P, MS: Method Study, LT: Laboratory Tests)

I Bacteriological examinations and related activities

1) Develop efficient examination methods

- Introduce new equipment that enables FTDI and FIQD to efficiently conduct examinations
- Introduce and present examination methods to the counterparts at FTDI and FIQD

2) Implement GLP at FTDI and FIQD

- Establish a GLP at FTDI and FIQD
- Establish cooperation with other divisions and organizations, and conduct cross-checking
- Establish a good media control system and conduct qualitative selection of media

3) Establish Standard Operating Procedures (SOPs)

- Formulate SOPs for all bacteria to be examined at FIQD

4) Transfer technologies to the fishery industry

- Based on the established SOPs, standardize examination methods both at FTDI and FIQD
- Organize seminars and training for plant QCs
- Provide plants with guidelines

II Chemical Analysis

For a period of 5 years, the following chemical analytical technologies and techniques are proposed to be transferred to FTDI and FIQD: food additives, pesticide residues, harmful heavy metals, residual synthetic antibiotics, biotoxins, food poisoning substances, general compositions such as protein (amino acid), lipids (highly unsaturated fatty acid), minerals and vitamins. Each chemical analysis follows the process of technology transfer mentioned below.

1) Develop reliable and efficient analytical methods

- Using official analytical methods, establish more efficient and accurate methods
- Train staff on equipment in order to activate research at FTDI and upgrade inspection capabilities at FIQD

2) Establish standard operational procedures for chemical analysis

- Formulate SOPs for chemical analysis

3) Implement GLP at FTDI and FIQD

- Introduce the concept of GLP
- Establish an accuracy control committee and create an effective laboratory management system

(e.g. establishing checklists for equipment maintenance, checking detection limits based on the established SOPs)

4) Establish cooperation between FTDI and FIQD and with other organizations

- Introduce same SOPs into FTDI and FIQD
- Cross-check test results at FTDI and FIQD
- Classify the functional assignments concurrently shared by FTDI and FIQD, and create a system by which FIQD receives technical feedback from FTDI
- Establish cooperation with other research institutes and inspection organizations for cross-checking and exchanging information

- Provide the industry and consumers with information on the chemical aspects of product safety

III Inspection and Quality Control Research Activities

1) Introduce various inspection methods

- Survey hygienic conditions at fishery plants and identify problems
- Introduce inspection methods suitable for each plant and product

2) Establish standard inspection manuals and guidelines

- Standardize inspection manuals for each product, for both inspectors and manufacturers
- Standardize practical inspection manuals for each product for inspectors

3) Transfer methods and guidelines to the fishery industry

- Organize seminars and on-site training for manufacturers
- Extend information services to industry and consumers through distribution of leaflets and guidelines

4) Research Activities:

- Incorporate analytical methods obtained through the project implementation into FTDI's research activities
- Upgrade FTDI's research capabilities so that it will be able to be solve technological problems addressed by the fishery industry as well as consumers.

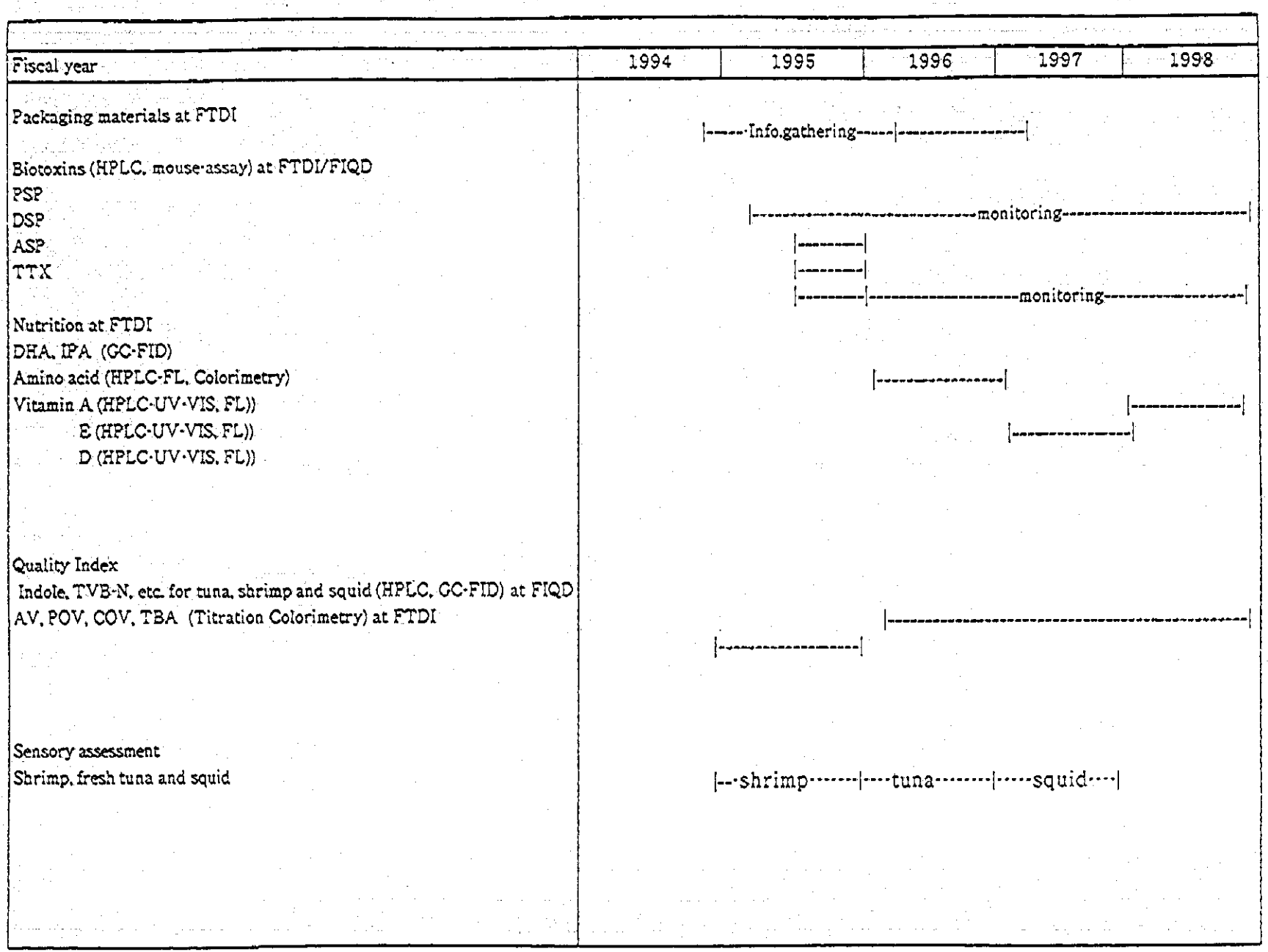
IMPLEMENTATION SCHEME

Calendar year: 1994, 1995, 1996, 1997, 1998

Fiscal year		1994	1995	1996	1997	1998
I. Microorganism Identification Methods	SOPs					
Coliform (E.coli. 0-157) at FTDI	Yes			------		
Salmonella spp. at FIQD at FIQD	Yes				------	
Vibrio spp. - Identification at FIQD	Yes			------		
C. perfringens at FIQD	Yes		------			
C. botulinum at FTDI	No				------	------
Thermophilic - Identification at FTDI	No			------		
Halophilic at FTDI	No				------	
Lactic acid bacteria at FTDI	No				------	
Enterotoxins at FTDI/FIQD	Yes		------			
Yeast and Mould at FTDI	No				------	------
Bioassay for antibiotics at FIQD	Yes	------	------			

Calendar year	1994	1995	1996	1997	1998
Fiscal year	1994	1995	1996	1997	1998
2. Chemical Analysis					
Food Additives					
• Preservatives		|----------			
BA (GC-FID) at FTDI					
• Antioxidants		|----------			
EDTA (HPLC, GC-FTD) at FTDI		|----------			
BHA, BHT (GC-FID) at FTDI					
• Bleaching Reagent		|----------			
Cl, SO2 (Rankin, Colormimetry, GC) at FIQD					
• Coloring agent					
◊ Tars (Thin Layer chromatography) at FIQD/FTDI		|----------			
Polyphosphate (Column Chrom., Thin Layer Chrom.) at FTDI		|----------			
Contaminants					
• Antibiotics		|----------			
• Sulfa (HPLC) at FTDI/FIQD		|----------			
• Malachite Green (Colorimetry) at FTDI/FIQD					
• Heavy Metals		|----------			
Pb, Cd (AA-FL) at FTDI		|----------			
Or-Hg (GC-ECD) at FTDI			|----------		
As (DDTC-Ag, AA-FL-less)					
• Pesticides		|----------			
Or-Cl (GC-ECD) at FTDI/FIQD		|----------			
Or-P (GC-FPD, NPD, FTD) at FTDI/FIQD					
PCBs at FTDI/FIQD		|----------			
Histamine at FTDI					

*The method to be transferred from FIQD to FTDI.


Fiscal year
1994
1995
1996
1997
1998
Packaging materials at FTDI
Info.gathering
Biotoxins (HPLC, mouse-assay) at FTDI/FIQD
PSP
DSP
ASP
TTX
monitoring
monitoring
Nutrition at FTDI
DHA, IPA (GC-FID)
Amino acid (HPLC-FL, Colorimetry)
Vitamin A (HPLC-UV-VIS, FL))
E (HPLC-UV-VIS, FL))
D (HPLC-UV-VIS, FL))
Quality Index
Indole, TVB-N, etc. for tuna, shrimp and squid (HPLC, GC-FID) at FIQD
AV, POV, COV, TBA (Titration Colorimetry) at FTDI
Sensory assessment
Shrimp, fresh tuna and squid
shrimp
tuna
squid

Calendar year	1994	1995	1996	1997	1998
Fiscal year	1994	1995	1996	1997	1998
3.Plant Inspection					
FTDI					
Personal Hygiene, Plant Sanitation, HACCP					
Processing Plants					
Fish Sauce			----------		
Dried Shrimp				----------	
Fermented Fish					----------
*GMPs check-points: Hazard, Histamine, Raw fish Quality, Filth					
GMPs activity: Monitoring using test kits and developing methods for industry		|----------Monitoring----------	|----------GMPs----------|	
FIQD					
Freezing Plants (Plant Sanitation, Test Kits)	|----------GMPs ----------|	---Test Kits---	|----------GMPs----------|
Cannery Plants (Plant Sanitation, Test Kits)	|----------GMPs----------|	---Test Kits---	|----------GMPs----------|
Retort Pouch Product Inspection techniques (Plant Sanitation, Test Kits)			---Training-----	-----HACCP manual-------		
Surimi Plants (HACCP)			----------HACCP Plan----------		
4. GLPs at FTDI and FIQD					
GLPs at FIQD with consultation of JICA			----------		
Priority: 1. SOPs Development 2.Internal Audit 3. Accreditation					
GLPs at FTDI with consultation of JICA			----------		
Priority: 1. Organization chart 2. SOPs Development 3. Internal Audit					

Calendar year	1994	1995	1996	1997	1998
Fiscal year	1994	1995	1996	1997	1998
5. Quality Control Research Activities (Research Topics)					
Quality Improvement of Lizard Fish Surimi		├---------┤			
Improving packaging techniques for extruded products and other surimi-based products					├---------┤
Effects of temperatures on post mortem chemical and microbiological changes in black tiger shrimp		├---------┤			
Heavy metal monitoring		├---------┤	├---------┤	├---------┤	├---------┤
Study of Quality Indices Analysis Procedures for Fish Powder		├---------┤			
Storage Quality of fish sauce in various types of packaging		├---------┤			
Study on live fish handling and transportation system				├---------┤	
Study on packaging materials suitable for frozen products			├---------┤	├---------┤	
Establishing a guideline of grades of seafood freshness		├---------┤			
Study on factors affecting decomposition of canned shrimp		├---┤			

2. 品質保証書

(Health Certificate, Sanitary Certificate, Certificate of Analysis)

HEALTH CERTIFICATE

for fishery and aquaculture products originating in Thailand and intended for export to the European Community

Reference No. :

Country of dispatch :	Thailand
Competent authority :	Ministry of Agriculture and Cooperatives, Department of Fisheries
Inspection department :	Fish Inspection and Quality Control Division TEL 579-6729 FAX 579-6687

I. Details identifying the products

* Description of product[1] : fishery - aquaculture
  - Species (scientific name) : .....
  - Presentation of product and type of treatment[2] : .....
* Code number (where available) : .....
* Type of packaging : .....
* Number of packages : .....
* Net weight : .....
* Requisite storage and transport temperature : .....

II. Origin of products

Name(s) and official approval number(s) of establishment(s) approved by the Ministry of Agriculture and Cooperatives, Department of Fisheries, for export to the EC :

.....

.....

.....

.....

.....

III. Destination of products

The products are dispatched

from : .....
(place of dispatch)

to : .....
(country and place of destination)

by the following means of transport : .....

Name and address of dispatcher : .....

.....

.....

Name of consignee and address at place of destination : .....

.....

.....

(1) Delete where appropriate.

(2) Live, Refrigerated, frozen, salted, smoked, preserved, ...

IV. Health attestation

The official inspector hereby certifies that the fishery and aquaculture products specified above :

1. were caught and handled on board vessels in accordance with the health rules laid down by Directive 92/48/EEC ;

2. were landed, handled and where appropriate packaged, prepared, processed, frozen, thawed and stored hygienically in compliance with the requirements laid down in Chapters II, III and IV of the Annex to Directive 91/493/EEC;

3. have undergone health controls in accordance with Chapter V of the Annex to Directive 91/493/EEC;

4. are packaged, marked, stored and transported in accordance with Chapters VI, VII and VIII of the Annex to Directive 91/493/EEC ;

5. do not come from toxic species or species containing biotoxins ;

6. have satisfactorily undergone the organoleptic, parasitological, chemical and microbiological checks laid down for certain categories of fishery products by Directive 91/493/EEC and in the implementing decisions thereto.

7. in addition, where the fishery products are frozen or processed bivalve molluscs : the molluscs were obtained from production areas subject to conditions which are at least equivalent to those laid down by the Directive 91/492/EEC of 15 July 1991 laying down the health conditions for the production and the placing on the market of live bivalve molluscs.

Done at .....on.....
(Place) (Date)

.....
Signature of official inspector
(Name in capital letters, capacity
and qualifications of person signing)

No. TH 0356

Exporter (name and address)	Reference No.	Date of issue

SANITARY CERTIFICATE

DEPARTMENT OF FISHERIES
Ministry of Agriculture and Cooperatives
Bangkok, Thailand.

Consignee (name and address including country)	Country of destination
	Processing plant (name and address)
Date of shipment Mode of transport ☐ Sea ☐ Road ☐ Air	
Vessel	
Place of departure	Date of submission

Shipping marks	Description of goods	Quantity	Weight

This is to certify that the above-mentioned of Thai Origin Products have been processed in a clean wholesome manner in a processing plant under the supervision of the Department of Fisheries.

We further certify that the products have been packed in a satisfactory condition in hermetically sealed metal containers for food packing and have been undergone a sufficient sterilization process. The samples of the products were drawn at random for bacteriological analysis. The results showed that the goods underwent a sufficient sterilization process.

_____
Analyst

_____

กสก. C 1

Exporter (name and address)	Reference No. Date of issue
Consignee (name and address)	**SANITARY CERTIFICATE** DEPARTMENT OF FISHERIES Ministry of Agriculture and Cooperatives Bangkok, Thailand.
	Country of destination
Date of shipment Mode of transport ☐ Sea ☐ Road ☐ Air	Processing plant (name and address)
Vessel	
Place of departure	Date of submission

Identification of Product

Scientific Name: ....

Description of Product: ....

....

....

Packing: ....

Quantity: ....

Net weight: ....

Shipping mark: ....

....

Sanitary Information

this is to certify that:

(1) the plant in which the above-mentioned product has been prepared, processed, and stored is under the sanitary supervision of the Department of Fisheries;

(2) the above-mentioned product is suitable for human consumption;

(3) all ingredients and additives used in the process were those permitted under Swiss law; and

(4) the loading conditions of the product are in accordance with general hygiene requirements.

____

กคร. P11

Exporter (name and address)	Reference No.	Date of issue

CERTIFICATE OF ANALYSIS

DEPARTMENT OF FISHERIES
Ministry of Agriculture and Cooperatives
Bangkok, Thailand.

Consignee (name and address)	Country of destination
	Processing plant (name and address)
Date of shipment Mode of transport ☐ Sea ☐ Road ☐ Air	
Vessel	
Place of departure	Date of sampling

Shipping marks	Description of goods	Quantity	Weight

Remark: This report is issued to

1. Total viable plate count per gram = _____
2. *Escherichia coli* MPN per gram = _____
3. *Vibrio cholerae* were not detected. in 25 gram of the food.
4. Salmonellae were not detected. in 25 gram of the food.
5. *Staphylococcus aureus* coagulase-positive MPN per gram = _____

_____
Analyst

It is hereby certified that the sample of the above mentioned consignment _____

_____

_____

กกร. F2

Exporter (name and address)	Reference No.	Date of issue

CERTIFICATE OF ANALYSIS

DEPARTMENT OF FISHERIES
Ministry of Agriculture and Cooperatives
Bangkok, Thailand.

Consignee (name and address including country)	Country of destination
	Processing plant (name and address)
Date of shipment Mode of transport ☐ Sea ☐ Road ☐ Air	
Vessel	
Place of departure	Date of submission

Shipping marks	Description of goods	Quantity	Weight

The samples of the above consignment were selected at random for bacteriological analysis. The results were free from.

1. Total viable plate count
2. Flat Sour Spoilage Bacteria
3. Anaerobe Bacteria
4. Sulfide Bacteria

_____
Analyst

It is certified that the products have been undergone a sufficient sterilization process and samples are suitable for human consumption.

_____

กอร. C 3.1

Exporter (name and address)	Reference No.	Date of issue

CERTIFICATE OF ANALYSIS

DEPARTMENT OF FISHERIES
Ministry of Agriculture and Cooperatives
Bangkok, Thailand.

Consignee (name and address)	Country of destination
	Processing plant (name and address)
Date of shipment Mode of transport ☐ Sea ☐ Road ☐ Air	
Vessel	
Place of departure	Date of Sampling

Shipping marks	Description of goods	Quantity	Weight

It is hereby certified that the sample of above mentioned _____

_____

_____

_____

_____
Analyst

_____

DOR. C 3.2

3. 5ヶ年計画（案）

FTDI

Draft 5-Year Project

Fishery Technological Development Institute

Goal	Main activities
Y 1	
- Strenghtening analytical methods for both chemical and microbiological analyses in order to control the quality of fishery products	1. Background survey 2. Set-up of projects 3. Determination of histamine 4. Determination of hazardous micro-organisms in fishery products
Y 2	
Development of standard analytical methods for quality control of both raw material and fishery products (biotoxins, heavy metals, preservatives and etc.) - Development of standard method for determination of biotoxins in shellfish and fishery products - Guidelines manual for GMP of traditional products (fish sauce)	1. Study on determination of biotoxins 2. Determination of BHA and BHT 3. Determination of heavy metals 4. Setting up of biotoxins analysis system including survey on toxic kinds (both freshwater and sea water fish) 5. Establishing GMP manual for fish sauce factory
Y 3	
- Post-harvest loss minimization for live and fresh fish through developed quality control, transportation methodologies and packaging technology - Development of quality traditional product	1. Study on live fish handling and transportation system 2. Study on packaging material and style suitable for frozen product 3. Development of process quality

through established GMP - Development of preservatives and pesticides determination methods in fishery products - Development of microbiological determination methods necessary for process and product quality control	control system for dried-salted product including guideline manual of GMP 4. Determination of toxic fungi and bacteria
Y 4	
- Maximization of aquatic resources utilization through developed quality control process and packaging tenchnology (cured products, products from fish industrial waste)	1. Development of quality control process for cured products: fermented, smoked fishery product 2. Establishing guidelines manual of GMP for fermented and smoked products 3. Establishing guidelines for food additives usage and control in fishery products 4. Development of packaging for fermented and smoked products 5. Product development from fish industrial waste and quality control
Y 5	
- Maximization of aquatic resource utilization through developed process quality control and packaging technology (value-added products and products derived from fish industrial waste)	1. Study on product and packaging deveolopment for extruded products and other surimi-based products 2. Establishing quality control manual (GMP) for extruded products 3. Product development from fish industrial waste and Q.C. * Technology transfer will be arranged appropriately for each year

Y 5 (98)

1. Gutting and skinning machine
2. Microbiology analysis (Microscope, monitoring system, camera, VDO)
3. Hood (Laminar flow)
4. Hood (Biohazard)
5. Amino acid analyser
6. Contact freezer
7. Low temperature incubator
8. Audiovisual aid (VDO, slide projectors etc.)

Training

1st year : 1) Biotoxins 2m/m
2) Microbiology 2m/m
3) Packaging 2m/m

2nd year: 1) Pesticides analysis 3m/m
2) Heavy metal analysis 3m/m
3) Retort pouch plant inspection 3m/m
4) Guidelines of grading seafood establishment 2m/m

3rd year : 1) Live fish handling and transportation 3 m/m
2.) Retort pouch application and quality control 3 m/m
2) Observation tour (6-8 persons) on fishery products and processing plants 2 weeks

4th year: 1) Technology & Quality control of snack food 3m/m
2) Food additives/preservatives analysis 3m/m
3) Bacterial genetic manipulation for some products development and quality control 3m/m

EQUIPMENT LIST

Y 3

1. Rotary sterilyzer set (boiler, vacuum seamer etc)
2. Extruder line
3. Texture analyzer
4. Heat penetration determination equipment
5. Low temperature control bath
6. 5Freeze dryer (shelve type)
7. Vacuum mixer
8. Carbondioxide incubator
9. Phototaking set (include slide making facilities)
10. Van (10 - 12 seat)
11. Media production (scanner for computer, book binding set etc.)

Y 4 (97)

1. Packaging development set (continued from Y3 for rotary sterilize set)
2. Autoclave (shelf type)
3. Freeze dryer centrifuge
4. Electrophoresis set (genetic engineer)
5. Chilled room, 4°C (walk-in)
6. Cold storage, -20° C (walk-in)
7. ELISA set
8. VDO camera and monitor
9. Cleaning set (Ultrasonic bath, pipet washing)

Seminar

1st year - 1) Introduction of marine biotoxins

2nd year - 1) Workshop on biotoxins determination (HPLC, bioassay and other methods)

2) Determination of histamine and other amine compounds in fishery products

3rd year - 1) Determination of food additives in fishery products

2) Process quality control and packaging for traditional products

4th year - 1) Application of GMP in traditional processing plants

2) Modified system for live fish handling and transportation

5th year - 1) Process quality control and packaging for snack food and value-added products

2) Introduction of utilization of fish industrial waste and quality control

Publications

1st year - 1) Review of Abstracts

2) Poster of toxic puffer fish

2nd year - 1) Research bulletin

2) Guidelines manual for traditional processing plant

3rd year - 1) Research bulletin

2) Poster of good fish handling practices

4th year - 1) Research bulletin

2) Manual of Microbiological Determination Methods for Quality Control

5th year - 1) Research bulletin

2) Manual of Chemical Determination Methods for Quality Control

5th year: 1) Technology & quality control of surimi-based products 3m/m

2) Packaging for ready-to-eat, value-added product and long shelf life product 3m/m

3) Quality control and application of products obtained from fish industrial waste 3m/m

Short Term Experts

1st year : 1) Biotoxin

2) microbiology

3) Tradtional product

2nd year: 1) Biotoxins (workshop) 2m/m

2) Antibiotics (HPLC) 3m/m

3) Heavy metal analysis (AA) 3m/m

3rd year: 1) Live fish handling and transportation 3m/m

2) Process quality control for cured product 3m/m

3) Retort pouch technology and QC 3m/m

4th year: 1) Process quality control development for extruded product 3m/m

2) Food additives/preservatives application and analysis 3m/m

3) Microbial genetic manipulation 3m/m

5th year: 1) Process quality control for surimi-based products 3m/m

2) Packaging development for value added product. 3m/m

3) Application and quality control of some products obtained from fish industrial waste 3m/m

* Please noted that for QC experts of each project are both chemical and microbiological field of expertise.

4. 5ヶ年計画（案）

FIQD

Matrix of 5-year Plan

for

The Research Project on the Quality Development of Fishery Products

(Fishery Technological Development Institute)

Set up	Determination	Study Projects	Establishment	Development	Service	Goal
I. Inspection System, and GMP/HACCP (for Traditional processing plants) *Problem:* There is no system of such processing plant available now.	1. Personal hygiene 2. Plant sanitation 3. GMP 4. HACCP	1. Survey on MP of processing plants: - fish sauce - Dried shrimp - Fermented fish (Varatip, Pantip, Poratip, Jirawan, Somchai and Supaporn)	1. Inspection manual for fish sauce plant (for inspector) 2. Guidelines manual of GMP/HACCP for fish sauce plants (for plants)	- Upgrading of plant sanitation and personal hygiene of the traditional processing plant	1. Plant inspection 2. Certify traditional processing plants	1. Fish sauce plant of higher standard 2. Plant model of dried shrimp and fermented fish

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II. Chemical Analysis Methods (for both inspection and research work) *Problems:* - Some chemical analysis methods for product quality control are needed to be improved	1.Preservatives/ additives (benzoic acid, EDTA, BHT, BHA, phosphate, sulfur dioxide) 2. Contaminants: (antibiotics, pesticides, heavy metals) 3. Toxic substances: (biotoxins, histamine, polymers from packing materials) 4. Others: (free fatty acids, proximate composition, vitamins)	Determination of: 1. Benzoic acid in traditional fishery products 2. BHA and BHT in fishery product 3. Pesticides residues in fishery products (Poratip, Supaporn) 4. Histamine in fish sauce 5. Phosphate in minced fish products 6. Polymers contamination in fishery products (Pantip, Varatip, Orawan) 7. Sulfur dioxide in fish sauce (Orawan)	1. Chemical Analysis Manual for Q/C of Fishery Products 2. Guidelines of Food Additives Usage 3. Analytical Manual for Biotoxins in Aquatic Animals	Stydy on quality control of: - raw/fresh and frozen fishery products - Traditional products - Value-added product - Products developed from fish industrial waste	1. Technology transfer (seminar, workshop and etc.) 2. Issueing of certificate for traditional products exported 3. Publication release	Harmonization of chemical analysis methods for reseach on Q/C of both raw materials and fishery products, including inspection of traditional products

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II. (continued)		8. Antibiotics in shrimp 9. Heavy metals in fish (Niracha, Sumate, Somchai) 10. Biotoxins in aqautic animals 11. Free fatty acids obtained from tuna waste (Attaya, Bodin) 12. Proximate Composition of fish powder (Rerngrudee, staff) 13. Amino acid and vitamins content in fsh and fishery products (Poratip, Supaporn)				

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III. Microbiological Analysis Methods (for both inspection and research work) *Problems:* Some microbiological analysis methods for product Q/C are needed to be improved.	- Total viable count - *Coliforms* - *Salmonella* - *Staphylococcus aureus* - *Listeria spp.* - *Vibrio spp.* - *Shigella* - *Clostridium perfringens* - *Cl. botulinum* - Thermophiles - Halophiles - Bacterial Enterotoxins - Lactic acid bacteria - Yeast and molds	1. Determination of pathogenic bacteria in traditional fishery products (Niracha, Orawan, Somchai, Supaporn, Bodin) 2. Study on shelf-life of fishery products in various type of packaging materials and types (Pantip, Varatip) 3. Study of preservative effect of selected chemicals (Supaporn, Attaya, Bodin) 4. Study on process quality control system of fishery products. (all staff)	Microbiological Determination Manual for Fish and Fishery Products	Study on Q/C of : - Raw/fresh and frozen fishery products - Traditional products - Value-added products - Products developed from fish industrial waste	1. Technology transfer (seminar, workshop, and etc.) 2. Issuing of certificate for traditional products exported 3. Publication release	Harmonization of microbiological analysis methods for research on Q/C of both raw materials and fishery products including inspection of traditional products