

No.

タイ王国
家畜衛生・生産研究所計画
長期調査報告書

昭和61年8月

国際協力事業団

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序 文

タイ国政府は、地方における家畜衛生活動の現状に鑑み、家畜疾病の診断・研究・調査活動及び畜産分野も含めたスタッフの養成と情報網の整備を行う中央機関として家畜衛生・生産研究所の設立を計画し、日本への無償資金協力及び技術協力の要請を行なった。

我国は、昭和 59 年度に、同研究所の建設にかかる無償資金協力の実施を決定し、また、昭和 60 年度には、プロジェクト方式技術協力のための事前調査を実施して、要請内容の確認、技術協力の基本的枠組み等について先方と協議を行った。

更に、事前調査の報告を踏まえ、今般、実施協議調査に先立ち、本計画の研究計画の概要、タイ国側の体制を十分把握、検討し、協力計画案を作成することを目的として、伊藤全氏（元家畜衛生試験場研究第二部長）を長期調査員として派遣した。

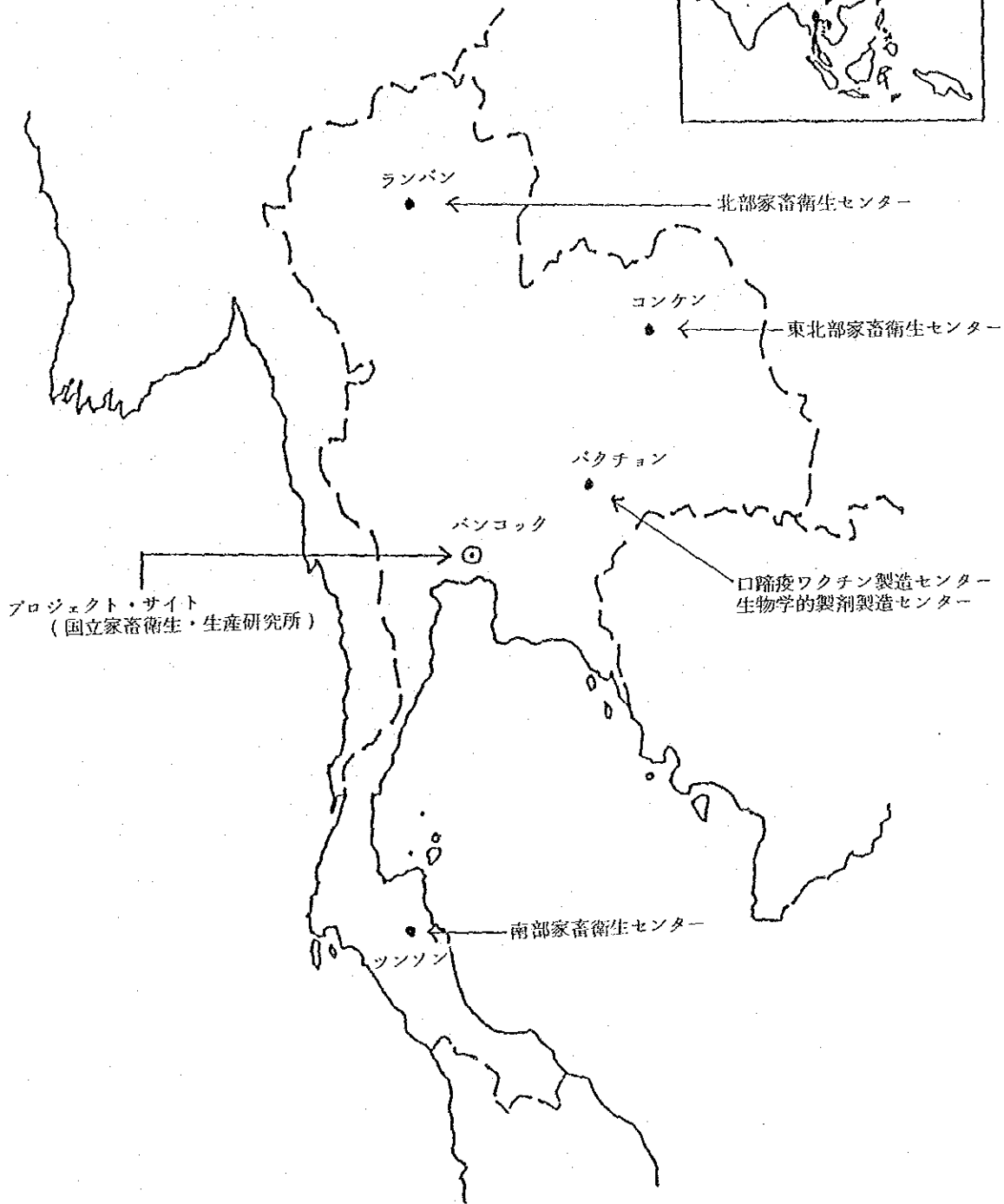
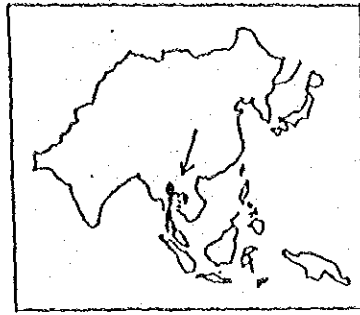
本報告書は、これらの調査結果を取りまとめたものであり、今後技術協力に携わる関係者の参考となれば幸いである。

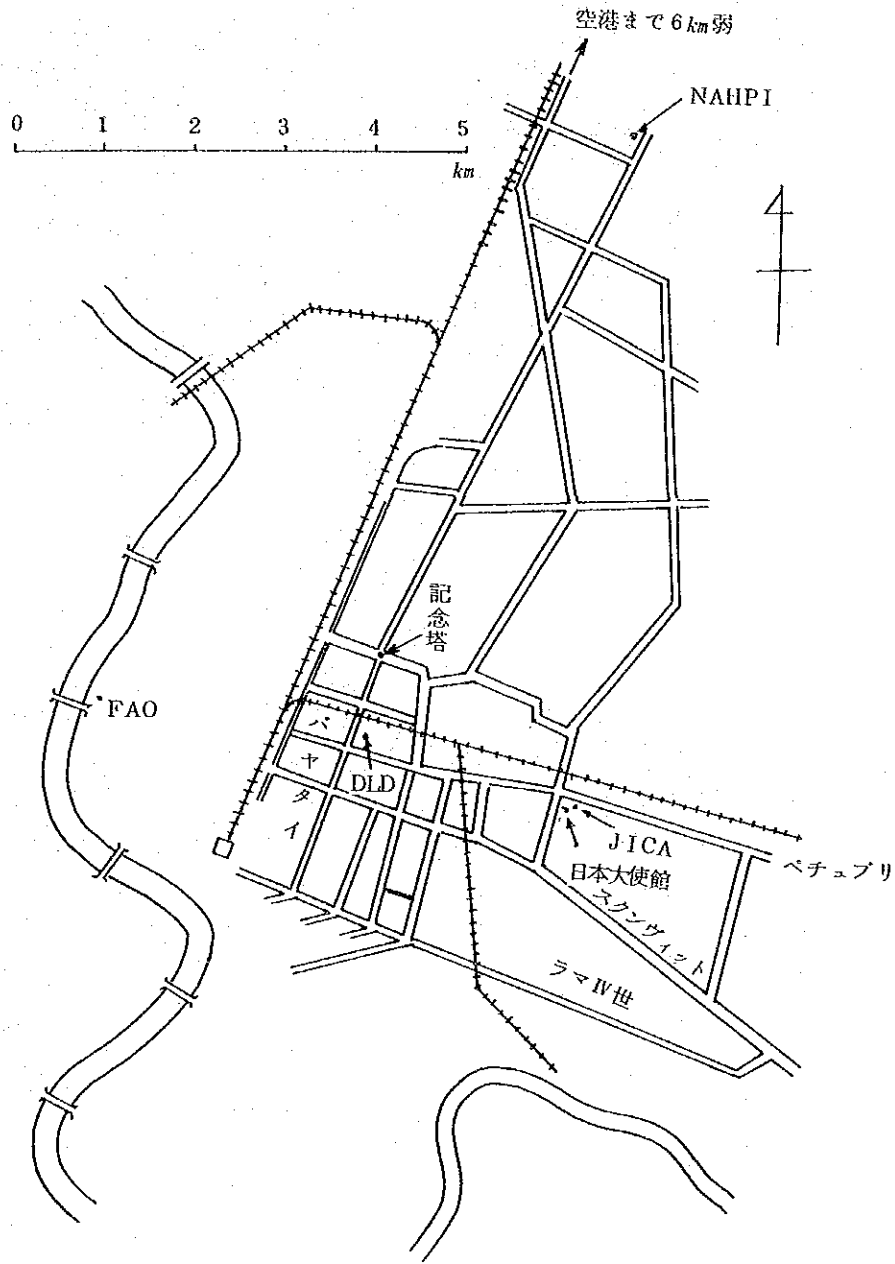
最後に、調査の任にあられた伊藤全氏並びに御協力をいただいた国内及びタイ国の関係者各位に深く感謝申し上げる次第である。

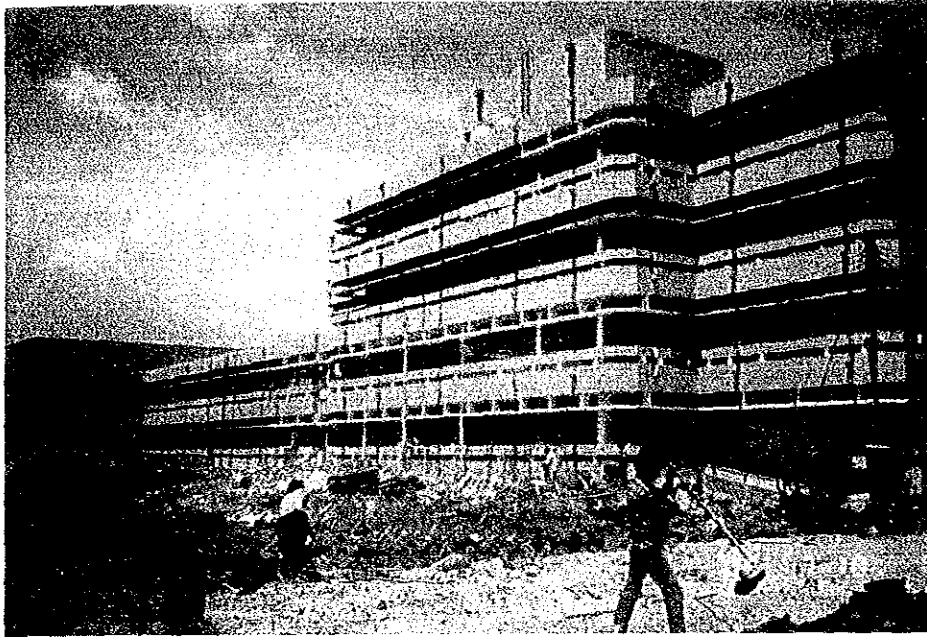
昭和 61 年 8 月

国際協力事業団
農業開発協力部長
宮本和美

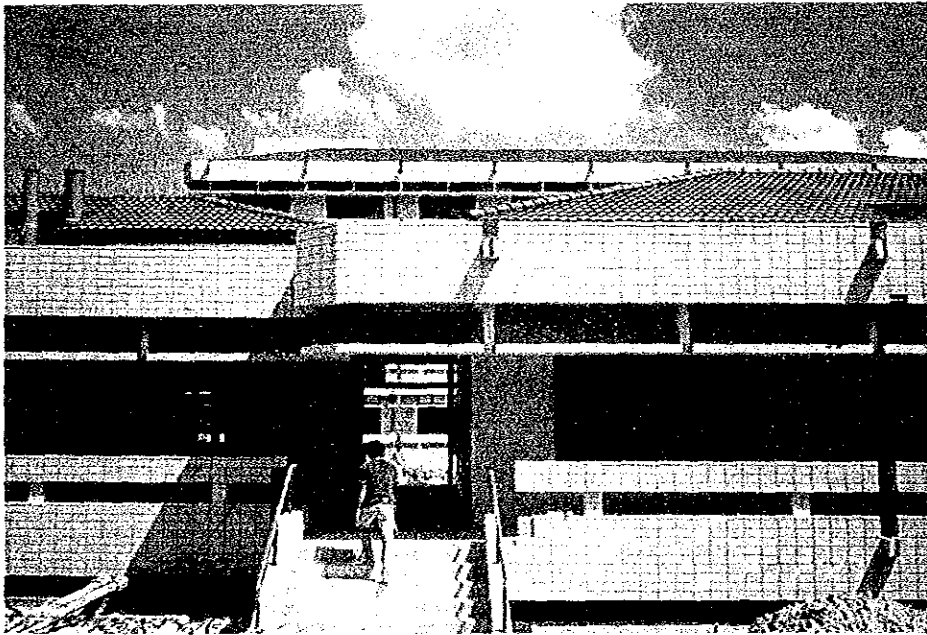
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受入 月日	'87. 1. 28	122
登録 No.	15915	87.9 ADL







国立家畜衛生・生産研究所
(北側：管理棟，廊下，実験棟)



国立家畜衛生・生産研究所
(実験動物棟)



畜産振興局 Tim 局長



課題検討会 (準備委員)



口蹄疫ワクチン製造センター（バクチョン）
（実験動物棟）



南部家畜衛生センター（ツンソン）

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1 長期調査員派遣

1 調査員派遣の目的と調査事項

(1) 目的

タイ国家畜衛生・生産研究協力計画にかかる新研究所の設立に伴う既存の組織・機構の再編成等について調査し、併せて具体的な調査研究の項目と内容をタイ側と調整し、我国として効率的に対応できる協力事項を策定することにより、本計画の円滑な実施協議につなげる。

(2) 調査事項 (T/R)

事前調査団がタイ側と合意した当該プロジェクトの基本的枠組に基づき、以下の調査を実施する。

- ① 国立研究機関としての設置に関する法的措置についての調査
- ② 新研究所の所掌事務及組織についての具体的な内容、並びに現組織の改変、人事等に関する調査
- ③ 口蹄疫ワクチンセンターで行う業務についての調整
- ④ 具体的な調査・研究項目とその内容の、タイ側との調整、並びに協力のR/D案及び年次計画案の作成。
- ⑤ 長期及び短期派遣専門家の専門分野、人員数、派遣の期間についての調整
- ⑥ 協力期間中に供与される機材リストの作成、並びに無償資金協力(第Ⅱ期分)にかかる機材についての助言

2 調査期間

昭和61年6月5日から7月28日まで(54日間)

3 日程表

6月5日(木) 11h15 成田発(CX501) 14h30 香港着
15h30 香港発(CX751) 17h00 バンコク着

Dr. Vimol 様からの出迎えを受け、携行資材の通関を無事終了

Indra Regent 泊

6月6日(金) 9h00 JICA バンコク事務所 稲留氏、鈴木氏表敬、懇談。

日本大使館 永山書記官表敬、懇談。

14h00 畜産振興局(以下DLDと略記)に出頭。携行資材の開梱、点検。

Dr. Viset から、本件の実験関係は主としてDr. Praphadが担当する旨

- の紹介あり、行動予定につき協議。～16h30 以降 Florida Hotel 泊
- 6月7日(土) 9h00 DLD (以下特に記さない限りDLD) : 携行事務機の点検, 試運転。
- 6月8日(日) 資料整理など。
- 6月9日(月) 10h00 Tim局長表敬, 面談。
10h30 Pinit次長表敬, 面談。
11h00 Bangkhenの現場へ。Dr. Anong同行。奥野氏と面談。
16h00 JICA事務所。三苫氏と面談。～17h
- 6月10日(火) 10h30 長期調査の目的を実験関係準備委員に説明。
13h30 各委員との個別面談開始。
- 6月11日(水) 9h30 個別面談継続。
- 6月12日(木) 9h30 委員集合検討会。
14h00 Dr. Sasaki, FAO訪問。
- 6月13日(金) Dr. Suan (Div. Vet. Res.), Dr. Sutham (Div. Biologics) 両部長と懇談。
- 6月14日(土) 11h30 Dr. Visetと懇談。
- 6月15日(日) 資料整理など。
- 6月16日(月) 9h30 合同検討会(第1回), 午後も検討会は継続したが, 私はDr. Visetと懇談。
- 6月17日(火) 口蹄疫ワクチンセンター (Pakchong) 往復。Dr. Praphad同行。
- 6月18日(水) 9h30 合同委員会。
午後 業務整理。
- 6月19日(木) 10h00 JICA三苫氏と懇談。
16h10 夜行列車でTungsongへむけ出発。Dr. Banchong同行。
- 6月20日(金) 6h35 Tungsong着, Diagnostic Center訪問。
午後 NakhonsithanmaratのProvincial office訪問。
- 6月21日(土) 9h00 Hadyaiへむけ出発, 11h30 Hadyaiの動物検疫所着, 見学。
午後 Provincial及びRegional office訪問。
17h00 建設中のHadyai市の屠畜場見学。 Hadyai泊
- 6月22日(日) 9h00 Padang Besarへむけ出発, 同地の動物検疫所見学。
21h00 Hadyai発, 22h15 Bangkok帰着。
- 6月23日(月) 旅行留守中のDLD内での検討進捗状況聴取。
- 6月24日(火) 9h30 合同検討会。
14h30 日本大使館 永山書記官に南部事情の報告。

- 6月25日(水) 口蹄疫ワクチンセンター (Pakchong) 第2回訪問。Dr. Supote 同行。
Pakchong 泊
- 6月26日(木) Vet. Biologics Production Centre 訪問。16h30 Bangkok 帰着。
- 6月27日(金) 午前 業務整理 (以後1週間、土曜を除き、個別面談を含む)。
12h15 Dr. Anucha と会食 (Hilton)。
- 6月28日(土) 業務整理。
- 6月29日(日) 資料整理など。
- 6月30日(月) 局内検討会。
- 7月1日(火) 業務整理。
- 7月2日(水) 業務整理。
- 7月3日(木) JICA 三苦氏と最終段階の打合せ。業務整理。個別面談ほぼ終了。
- 7月4日(金) 局内総合検討会。
- 7月5日(土) 業務整理。Dr. Viset と翌週予定のつめ。
- 7月6日(日) 資料整理など。
- 7月7日(月) 局内検討会。
- 7月8日(火) 総括検討会 (主として研究面)。夕方局長ほか3名招待・懇談。
- 7月9日(水) 総括検討会 (主として管理面)。夕方局長の招宴。
- 7月10日(木) Bangkok: 奥野・武藤両氏と懇談。関係者招待・懇談 (公費)。
- 7月11日(金) 午前 D.K. Books ; 関係事務員を招待・懇談。
14h40 口蹄疫関係要請書内容入手。ほぼ同時刻に、28日までの任期延長についての連絡受領。
- 7月12日(土) 10h00 Prof. Praachak と懇談。
Chulalongkorn 大学獣医学部図書室。
- 7月13日(日) Khonkaen の project leader 八田氏と出張打合せ。
- 7月14日(月) 10h00 DPEC に赴き Mr. Sutin に要請書の件を依頼。
14h30 Bangkok 山田氏と懇談。
- 7月15日(火) 10h00 Kasetsart 大学図書館。Piboonsin 館長と面談。
- 7月16日(水) 7h00 Bangkok 発、7h45 Khonkaen 着。Dr. Patchima 同行。
Northeast Regional Veterinary Diagnostic Center, Dr. Bruedener と面談。
Anim 1 Breeding Center, Northeast Agriculture Development Research Center, 八田氏と懇談。 Khonkaen 泊
- 7月17日(木) 人工授精センター, 博物館, Ubolratana ダム, Khonkaen 大学農学部,

医学部及び図書館。Dr. Cherdchai と面談。

17h45 Khonkaen 発, 18h30 Bangkok 着。

7月18日(金) 業務整理。夕刻 Dr. Praachak の誘いで GIBA Talk に出席。

7月19日(土) 業務整理。

7月20日(日) 18h30 第三国研修評価チーム来タイ, 懇談。

7月21日(月) 入安居で休日。資料整理。

7月22日(火) 14h00 第三国研修評価チーム来局。

7月23日(水) 18h30 本橋氏来タイ, 懇談。

7月24日(木) 7h30 Pakchong へ, 帰路 Bangkok (小野寺, 矢ヶ崎, 本橋氏に同行)

7月25日(金) JICA, 日本大使館挨拶。

7月26日(土) 業務整理。

7月27日(日) 日建設計の畑氏来タイ, 懇談。

7月28日(月) 10h30 Bangkok 発 (TG640), 18h25 成田着。

◎ タイ文字のローマ字表記を大別すると, 発音によるもの, 翻字によるものの2種類があり, そのいずれにも若干のふれがある。この報告書のなかでの標準化は不可能であった。また, 英字綴りも英国式, 米国式が入り乱れており, ここではあえて統一しなかった。

4. 主要面会者リスト

Dr. Tim Bhannasiri	Director General, Department of Livestock Development (DLD)
Dr. Pinit Suphavitai	Deputy Director General, DLD
Dr. Piya Aranyakanonda	Deputy Director General, DLD
Dr. Snan Phiphitkun	Director, Division of Veterinary Research
Dr. Suthan Bunya-Uppaphat	Director, Division of Biologics
Dr. Vises Prasert	C/NAHPI Deputy Director in Administration
Dr. Anong Bintaviahok	International Coordination
Dr. Vimol Jirathanawat	International Coordination
Dr. Praphad Nerani Imansuk	C/NAHPI Deputy Director in Technology
Dr. Urasri Tantasawatli	C/NAHPI Chief of Virology Section
Dr. Patchima Intrakanheang	C/NAHPI Chief of Parasitology Section
Dr. Wallapa Santivattra	C/NAHPI Chief of Bacteriology Section
Dr. Supote Methiyapan	C/NAHPI Chief of Pathology Section

Ms. Nuahmanee Kanjanapibool	C/NAHPI Chief of Biochemistry Section
Ms. Cherdchai	Feed Quality Control Division
Dr. Banchong Apiwatanakorn	C/NAHPI Chief of Exp. Anim. Section
Dr. Paranee Tangwiwatana	C/NAHPI Chief of Training Section
Dr. Thinakorn Chindakhew	Director, Foot-and-Mouth Disease Vaccine Production Centre, Pakchong
Dr. Suneejit Kongton	FMD Vaccine Production Centre
Dr. Ab Kongton	FMD Vaccine Production Centre
Dr. Nonglak Cholsindhu	FMD Vaccine Production Centre
Dr. Tarika Pramoolsinsap	FMD Vaccine Production Centre
Dr. Vimol Pariyakanok	Vet. Biologics Production Centre, Pakchong
Dr. Wootipol Rungwetviithya	Vet. Biologics Production Centre
Dr. Nimit	Director, Southern Veterinary Diagnostic Centre, Tungsong
Dr. Pipol	Southern Vet. Diagn. Centre
Dr. Wongkuang	Southern Vet. Diagn. Centre
Dr. Chongnas	Southern Vet. Diagn. Centre
Dr. Lanee	Southern Vet. Diagn. Centre
Dr. Anan	Director, Animal Quarantine Station, Hadyai
Dr. Pracha	Animal Quarantine Officer, Hadyai
Dr. Kukiat	Regional Veterinary Officer, Songkla (moved to Director, Office of Secretary)
Dr. Nimit Leesirikul	Director, Northeast Veterinary Diagnostic Centre, Khonkaen
Dr. Nopdol Meemark	Northeast Vet. Diagn. Centre
Dr. Bhudachart	Northeast Vet. Diagn. Centre
Dr. Rolf Baron von Kruedener	German veterinarian attached to Northeast Vet. Diagn. Centre
Dr. Cherdchai Ratanasethakul	Faculty of Agriculture, Khonkaen Univ.
Ms. Piboonsin Watanapongse	Director, Main Library, Kasetsart Univ.
Dr. Praachak Poonwises	Vet. Fac., Chulalongkorn Univ.
Dr. Anucha Chintakamond	Advisor to Deputy Prime Minister
Dr. Sasaki, Masao	FAO Regional Office for Asia and the Pacific.

Bangkok

(以下敬称略)

浦 部 和 好	日本大使館参事官
永 山 勝 行	日本大使館書記官
後 藤 教 基	JICA バンコク事務所長
鈴 木 信 一	JICA バンコク事務所
三 苫 英太郎	JICA バンコク事務所
稲 留 常 弘	JICA バンコク事務所
大 嶋 幸 夫	Office of Permanent Secretary, MOAC,
八 田 貞 男	Agricultural Development Research Center in Northeast Thailand, Khonkaen
坂 口 進	JICA Expert in ADRC
吉 田 正 道	JICA Expert in N.I.H. (日本脳炎ワクチン)
矢ヶ崎 忠 夫	畜産局衛生課
小野寺 節	家畜衛生試験場
本 橋 常 正	日本生物科学研究所
畑 清	日建設計
奥 野 正 勝	日建設計
武 藤 国 治	ヤマト科学株式会社
山 田 輝 次	三光医理化株式会社

Ⅱ 調査結果

1. 新組織についての法的措置

NAHPI 設置についての法的措置としては、

MOAC : 農業・協同組合省

CSC : 人事委員会

BB : 予算局

DTEC : 技術・経済協力局

NESDB : 国家経済・社会開発委員会

と非公式に折衝し、CSC を除き了承を得ている。しかし公式には局外には出ていない。

当初の Dr. Visés の説明では、現組織は当面維持していく方針で、その理由は、組織改変による新機関の設置には人員増が1%しか認められないことにあるとのことであったが、7月9日の総括検討会の席上、局長から Div. Vet. Res. の Bangkok への移行が明らかにされるとともに、他の部の改組は行わないとの方針も示された。Dr. Visés によると「方針の変更」というが、真意はどこにあるのか判然としない。NAHPI 準備委員会の委員(室長段階)でさえこの方針をこの時まで知らなかったとのことである。

なお、将来 NAHPI で製剤の検定業務を行うことも考えている。

離任直前に作成していた CSC 説明用の新機構図の英訳の送付を依頼、これを帰国後入手した。その内容は別紙1のとおりである。

2. 予算措置

1986/7 予算要求額は当初 22889,700b (昨年12月調査時と同額)であったが、うち 7,746,700b は建設関係であり、予算要求の技術的な理由からこの額は削り、本年度内に処理するように努力している。したがって、予算要求額は 14,958,400b (計算が若干あわぬ)で、これは BB まで承認を取り付けている。うち人件費は 500 万 b 余、そのうちの worker 費 755,200b は BB の承認だけでよいが、officer の 4,815,500b については CSC の承認が必要であり、現在折衝中である。

この計算からすると、光熱水料を含むいわゆる運営費は約 900 万 b (6,000 万円弱)と推察され、この額は、計画書の 1.5 億 b に当たる部分である。計画書の光熱水料 (778 万 b) を最小必要額として引き去ると、残るのは 120 万 b くらいにしかない。

3. 人事

5 月末日 (最終的には 6 月 15 日) を締切日として、現職員のなかからの希望を募った。管理部門関係では officer 19 名、worker 6 名、研究関係では officer 92 名 (うちウイルス 29、細菌 18、化学 16、寄生虫 8、病理 4 など)、worker 7 名の応募があった。

Div. Vet. Res. の現職員の約1割は異動を希望していない。また、異動を希望しても実力のない者を Banghen に出したくないという考えもある模様で、7月10日に開かれた人事関係会議はたいへんだったということである。その後もなん回か人事関係会議は開かれており、8月初旬に予定されている機材説明までには、ある程度の人名が挙がってくるものと思われる。

4. 口蹄疫ワクチンセンター (Pakchong) での業務

難波専門家帰国後も特に支障なしにワクチン製造を行っている。

Pakchong へは再度訪問して、将来計画について意見を求めたが、「センターとしては、DLDの意見が知りたい。Dr. Ogata 書簡(昨年12月)についても、DLDの意見を承知していない。」などというのみであった。結局、当初滞在期間の最終日になって要請書本文だけを Dr. Vises から受け取ったわけであるが、その内容についての討議は全く行っていない。このようなことになったのについては、それなりの背景がある模様であるが、当調査員としてはその実情を的確には把握できなかった。

5. 研究課題等

ウイルス・細菌・寄生虫・病理・生化学並びに実験動物・研修関係の分野別資料は別紙2のとおりである。

6. 派遣専門家・研修生

5分野別の計画を単純に累積したものは別紙2のとおりである。

7. 機材関係

5分野別の計画を単純に累積したものは別紙2のとおりである。

NATIONAL ANIMAL HEALTH AND PRODUCTION INSTITUTE の機構

Director General

Deputy Director General (Administration)
 Deputy Director General (Animal husbandry)
 Deputy Director General (Animal health)

Director of NAHPI

Division of Administration	*v/ s/ p
General Administration Section	1/(8)
Planning and International Coordination Section	1/ 0
Training and Extension Section	1/(2)
Information Center	
Procurement Section	
Technology Central	61/18/21
Diagnosis and Research Coordination Section	
Virology Section	10/ 1/ 3
Bacteriology and Mycology Section	10/ 2/ 3
Parasitology Section	10/ 2/ 3
Pathology Section	7/ 1/ 4
Toxicology and Biochemistry Section	11/12/ 3
Immunology and Serology Section	6/ 0/ 1
Epidemiology Section	6/ 0/ 3
Experimental Animal Section	1/ 0/ 1
Supply Service Section	

3 Regional Diagnostic Centers (North, Northeast, Southern)

* 配置予定人員数

v: veterinary doctor/ s: scientist/ p: paraveterinarian

(): other than veterinary doctor

(8月 8日入手資料)

The National Animal Health and Production Institute will serve as a national veterinary diagnostic center, national research center for animal diseases and production training of the technicians concerned with livestock production and national livestock information center.

As a national veterinary diagnostic center, the institute will be responsible for the diagnosis of animal diseases occurring in the central region. The specimens can be submitted to this institute directly from the farmers in the central region, and district veterinary officers, or via private veterinarians. Additionally, the institute will serve as a reference center for regional diagnostic centers.

This institute is established both for the execution of research work on immediate problems and for the up-to-date response to the rapid progress in veterinary science and husbandry.

The institute research activities will be primarily on endemic diseases, infectious diseases causing economic problems, certain diseases of import-export concerns, toxicology, animal feed quality, and drug residues.

The principal activities will be as follows:

- 1) Research into developing and improving of diagnostic procedures for animal and poultry diseases.
- 2) Research into the development and improvement of veterinary biologics and diagnostic reagents, and of procedures for the quality control of biologics. Routine vaccine production and quality assays are not included here.
- 3) Research into improved assay procedures for quality and safety control of feed animal products. Routine assay work is not included here.
- 4) Diagnostic services as a reference center for regional diagnostic laboratory centers.
- 5) Collection, analysis and distribution of information in the field of animal health and livestock development.
- 6) Training and extension of livestock development technology for animal health personnel.
- 7) Technical cooperation with related organizations.

Planned research and training activities at NAHPI are described in detail below:

VIROLOGY rev.

1. DEVELOPMENT OF IMMUNODIAGNOSTIC TECHNIQUE FOR THE DETECTION OF INFECTIOUS VIRAL DISEASES

Diseases of interest:

Poultry: Newcastle disease (ND), Duck virus enteritis (DVE or DP),
Infectious laryngotracheitis (ILT)
Swine: Swine fever (SF), Aujeszky's disease (AD),
Transmissible gastroenteritis (TGE)
Cattle: Bovine leukosis, Infectious bovine rhinotracheitis (IBR)
Equine: Infectious anemia (EIA)

Objectives: To develop agar gel precipitation (AGP), fluorescent antibody (FA) and enzyme-linked immunosorbent assay (ELISA) for the detection of viral antigens and antibodies

Methods involved:

- a. Isolation and purification of viral agents from field isolates to develop antigen and raise hyperimmune serum
- b. Preparation of AGP antigen, FA conjugates and enzyme conjugates
- c. Standardization of the procedures and study on their sensitivity

Expectations: The result from this study will provide more sensitive and specific methods for diagnostic works and serological investigations. Moreover, the diagnostic reagents will be useful for routine diagnosis in the country without import.

Duration: Four-year period 1987-1991

Budget: 1,900,000 Baht

Expert request: Three (18-man-month) experts on AGP, FA and ELISA

Training request: Four (24-man-month) training on AGP, FA and ELISA technique (poultry, swine, cattle and equine)

2. DEVELOPMENT OF EFFECTIVE VACCINES AGAINST HERPESVIRUS CAUSING ECONOMIC PROBLEMS TO THE LIVESTOCK INDUSTRY

Objectives: To develop effective vaccines against AD and ILT

Methods involved:

- a. Preparation and purification of inactivated, attenuated or subunit vaccine
- b. Experimental trial for safety and potency test
- c. Field trial for evaluation of the protective efficiency of the vaccine

Expectations: Vaccine prepared from this method will provide high protective immunity. The subunit vaccine can prevent not only the clinical disease but also the virus infection which will be useful for effective disease control and eradication.

Duration: Five-year period 1986-1991

Budget: 1,800,000 Baht

Expert request: Three(36-man · month) experts on subunit vaccine of ILT and AD

Training request: Two(24-man · month) training on subunit vaccine technique

Study: Two (48-man · month) study on veterinary virology and immunology

3. APPROACHING ON THERAPEUTIC EFFECT OF PORCINE AND BOVINE VIRAL DIARRHOEA

Objectives:

- a. To determine virus etiology of porcine and bovine viral diarrhoea
- b. To evaluate the effectiveness of "oral rehydration solution" for treating animals with diarrhoeal disease

Methods involved:

- a. Virus isolation by cell culture
- b. Identification of viral morphology by electron microscopy
- c. Virus serotype by electrophoretotyping in comparison with cell culture technique
- d. Experimental trial by administration of "rehydration solution"

Expectations: The causative agent of viral diarrhoea among swine and cattle will be clarified and oral rehydration therapy will be of great beneficial effect for the field use.

Duration: Five-year period 1986-1991

Budget: 1,000,000 Baht

Expert request: Two(12-man · month) experts in veterinary virology and immunology of porcine and bovine viral diarrhoea

Training request: Two(12-man · month) training on virus identification and serotyping technique

4. INVESTIGATION ON IMPORTANT EXOTIC AND OTHER EMERGENCY VIRAL DISEASES

Diseases of interest: Exotic diseases (African swine fever, African horse sickness etc.) and other infectious viral diseases outbreaks causing serious problem in the country

Objectives: To study the methodology of rapid diagnosis and preventive measures

Expectations:

- a. Rapid resolution of the immediate problem
- b. Detection of carrier and/or infected animals

Duration: Five-year period 1986-1991

Budget: 700,000 Baht

Training request: One 6-month training on rapid diagnostic techniques and preventive measures of certain exotic diseases

B U D G E T (Baht)

T o p i c s	1986-87	1987-88	1988-89	1989-90	1990-91
1. Immunodiagnoses		600,000	500,000	400,000	400,000
2. Herpesvirus vaccine	300,000	400,000	400,000	400,000	300,000
3. Viral diarrhoea	150,000	200,000	200,000	300,000	150,000
4. Emergency diseases	100,000	150,000	150,000	150,000	150,000
	550,000	1,350,000	1,250,000	1,250,000	1,000,000

EXPERT AND TRAINING REQUEST

	1986-87		1987-88		1988-89		1989-90		1990-91		
	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo	
1. Immunodiagnoses	exp.		1	6	1	6	1	6			
	tr.	1	6	1	6	1	6	1	6		
2. Herpesvirus vac.	exp.	1	12			1	12			1	12
	tr.			1	12			1	12		
	study	1	24	1	24						
3. Viral diarrhoea	exp.			1	6			1	6		
	tr.	1	6			1	6				
4. Emergency diseases	tr.	1	6								

ADDITIONAL EQUIPMENT REQUEST

1. Column chromatography with accessories in various size for ion exchange, gel filtration, affinity chromatography, fraction collection, peristaltic pump, UV monitor and two channel graphic recorder(LKB or equivalent) for preparation of purified antigens and conjugates.
2. Spectrophotometer (double beam) for measurement percentage of protein
3. Electrophoretic apparatus for SDS-PAGE, electroblot, UV viewer, polaroid camera, power supply, gel dryer and vacuum pump (BIORAD or equivalent) for virus identification and serotyping
4. Microchannel pipettes 8 channel variable speed 5-50 microlitre and 50-200 microlitre, 12 channel variable speed 5-50 microlitre and 50-200 microlitre (Titertek) for microplate technology
5. Shaker adjustable speed, magnetic stirrer, and vortex mixer for preparation of FA conjugates

BACTERIOLOGY rev.

1. DEVELOPMENT OF SERODIAGNOSTIC TECHNIQUE IN MAJOR BACTERIAL DISEASES

Diseases of interest:

Poultry: Fowl cholera, CRD, Paratyphoid, E.coli infection

Swine: Salmonellosis, Colibacillosis, Enzootic pneumonia, Mycoplasmosis

Cattle & buffalo: Haemorrhagic septicaemia

Sheep & goat: Caseous lymphadenitis, Melioidosis

Objectives: To develop coagglutination test, fluorescent antibody (FA), complement fixation test (CF), ELISA and fluorometric technique for detection of bacterial antibodies and antigens.

Methods involved:

- a. Isolation and purification of field isolates
- b. Serotyping of *H.pleuropneumoniae*, *P.multocida* by employing coagglutination test or suitable test.
- c. Detection of antibodies against *P.multocida*, *Mycoplasma* spp. *H.pleuropneumoniae*, *Salmonella* spp., *E.coli*, *C.pseudotuberculosis*, *Ps.pseudomallei* by using the following technique on respectively order:
Fluorometric, CF, tube agglutination test, ELISA technique
- d. Serological survey

Expectations: The prevalence of serotype of *H.pleuropneumoniae* and *P.multocida* in Thailand will be determined which result in easier for control the disease. By using serological monitoring, the elimination of the infection from infected herds is feasible. Since the possibility of prompt detecting the carrier from apparently healthy herd is advantageous. Antibiotic therapy and vaccination programme will be taken into consideration depending on the presence of the reservoirs in the herds, the organisms in the environment and the situation of the farm.

Duration: 3-year period 1986-89

Budget: 1,000,000 Baht

Expert request: Two 6-month expert on FA and ELISA technique

Training request: Four 6-month training in FA, CF, ELISA and fluorometric technique

2. DEVELOPMENT AND/OR IMPROVEMENT OF VACCINES

Diseases of interest: Atrophic rhinitis, Haemorrhagic septicaemia, Fowl cholera and Infectious coryza

Objectives:

- a. To study the use of killed bacteria, attenuated or subunit vaccine prepared from local strain to reduce the shedding of organisms, the septicaemic spread and humoral antibody response to challenge vaccine strain in experimental animals
- b. To evaluate the immunogenicity and safety of the products

Methods involved:

- a. Preparation of vaccines from local strains
- b. Immunization and challenge
- c. Recovery of the organisms
- d. Sero-conversion studies by using tube agglutination test, passive haemagglutination test, fluorometric method or other suitable test
- e. Field trial
- f. Evaluation of the effectiveness

Expectations: Vaccine prepared by this method will provide solid and long lasting protective immunity without any effect to the daily weight gain. The environment will remain clean since the vaccinated animals will not become a carrier. As a whole, the great beneficial contribution of this study is the controlling of the disease which will enhance the animal productivity.

Duration: Five years

Budget: 3,000,000 Baht

Expert request: One 6-month expert on AR vaccine

Training and study request:

- Two 12-month training in fowl cholera vaccine, infectious coryza vaccine
- Two persons for master degree in veterinary bacteriology and immunology

3. AN APPROACH FOR CONTROLLING ENTERIC DISEASES CAUSED BY BACTERIA

Objectives:

- a. To study the use of caecal content, fecal materials or other proper materials for prevention of animals from enteric infection
- b. To study the use of "oral rehydration solution" or other preparation to be developed in treating animals with diarrhoeal problem

Method involved:

- a. Preparation of the protective materials from caecal content or fecal materials
- b. Preparation of "oral rehydration solution (ORS)"
- c. Animal administration and challenge exposure
- d. Recovery of organisms and environmental contaminations
- e. Evaluation of the effectiveness

Expectations: Results from these findings will identify the type of preparation which give the protective effect against the establishment of the pathogens and therefore reduce the incidence of the infection. The oral rehydration solution (ORS) has great superiority quality to the antibiotic with no side effect and toxic residue.

Duration: Five years

Budget: 500,000 Baht

Training request: Two 6-month training in anaerobic bacteria

4. INVESTIGATION ON THE IMPORTANT EXOTIC AND EMERGENCY BACTERIAL DISEASES AND ZOOZOSES

Diseases of interest: Exotic diseases (caprine and bovine pleuropneumoniae, etc.), zoonoses and other bacterial diseases

Objectives: To study the methodology of diagnosis and preventive and control measures.

Expectations:

- a. Rapid diagnosis and better control.
- b. Detection of carrier and/or infected animals.

Duration: Five years

Budget: 500,000 Baht

B U D G E T (Baht)

T o p i c s	1986-87	1987-88	1988-89	1989-90	1990-91
1. Serodiagnoses	300,000	400,000	300,000		
2. Vaccines	400,000	600,000	600,000	600,000	800,000
3. Enteric diseases	50,000	150,000	100,000	100,000	100,000
4. Emergency diseases		100,000	200,000	200,000	100,000
	750,000	1,250,000	1,200,000	900,000	1,000,000

EXPERT AND TRAINING REQUEST

	1986-87		1987-88		1988-89		1989-90		1990-91	
	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
1. Serodiagnosis	exp.	1 6			1	6				
	tr.	2 12	2	12						
2. Vaccines	exp.	1 6								
	tr.	1 12	1	12						
	study	1 24	1	24						
3. Enteric diseases	tr.	1 6	1	6						

ADDITIONAL EQUIPMENT REQUEST

1. Equipment for ELISA
2. Equipment for fluorometric method (FIAX)
3. Column chromatography with accessories
4. Fraction collector
5. Spectrophotometer
6. Shaker with adjustable speed
7. Lyophilizer
8. Accessories for anaerobic method

PARASITOLOGY rev.

1. CONTROL MEASURES OF COMMON LIVER FLUKE

Objectives: To determine the proper preventive control measure of liver fluke as to Thailand ecological condition

Methods involved:

- a. Study on species, biology, seasonal and geographical distribution of snails as intermediate host of liver fluke in cattle and buffalo
- b. Study on the longevity of metacercariae of liver fluke
- c. Studies on (1) snail control and (2) effective anthelmintics

Expectations: Effective control measures both on intermediate host and the fluke will be developed and implemented. Snail control will be applicable to the control of other kinds of fluke which their life cycles need the same snail intermediate host.

Duration: Five years

2. DEVELOPMENT OF SEROLOGICAL TESTS FOR IMPORTANT PARASITIC ZOOSES OF SWINE IN THAILAND

Diseases of interest: Trichinosis, Toxoplasmosis

Objectives: To facilitate epidemiological survey, control and surveillance of these diseases in Thailand effectively

Methods involved: Prepare antigens from local strain of *Trichinella spiralis* and *Toxoplasma gondii* for different sensitive serological tests (IHA, CFT, FA, ELISA)

Expectations: Routine testing of swine sera both at raising and at the slaughter using these developed test will be meaningful in preventing the epidemic of these zoonoses.

Duration: Five years

Training request: Two 6-month training in immuno-parasitology

3. CULTIVATION OF HEMOPROTOZOA OF CATTLE FOR SEROLOGICAL TESTS AND VACCINE PRODUCTION

Diseases of interest: Piroplasmosis, Trypanosomiasis

Objectives:

- a. To facilitate epidemiological survey of these diseases and study on immunosuppression of Trypanosomiasis
- b. To produce Piroplasmosis vaccine for the control of disease in imported purebred or high-blood crossbreed

Methods involved:

- a. Cultivate the organisms
- b. Prepare and standardise antigens for serological tests
- c. Produce vaccine for Piroplasmosis

Expectations: Prevention and control measures of these diseases will be more efficient based on the serological tests developed and vaccine produced

Duration: Five years

Expert request: One 1-year expert in immuno-parasitology

4. CATTLE TICK CONTROL

Objectives: To determine effective control measure of cattle tick which is the vector of parasitic diseases

Methods involved:

- a. Survey on cattle ticks endemic in Thailand
- b. Study intensively on biology of tick which is the vector of parasitic diseases
- c. Study on control measures

Expectations: Effective control of ticks is possible after thoroughly study on biology of ticks, which in turn will control the tick-borne diseases

Duration: Five years

Training request: One 1-year training in acarology

5. ANTHELMINTIC ACTIVITY FOR INTERNAL PARASITIC INFECTIONS IN ANIMALS

Objectives: To conduct trials on the efficacy of anthelmintics available in Thailand

Methods involved: Field tests, critical tests (if possible)

Expectations: Results will be the reference for field veterinarians and farmers in the control of parasites.

Duration: Depends on the number of imported anthelmintics which have not been studied in Thailand

Training request: One 6-month training in veterinary helminthology

B U D G E T (Baht)

T o p i c s	1986-87	1987-88	1988-89	1989-90	1990-91
1. Liver fluke	120,000	100,000	150,000	140,000	140,000
2. Zoonoses in swine	300,000	280,000	250,000	250,000	200,000
3. Haemoprotozoa	300,000	300,000	250,000	250,000	200,000
4. Cattle tick	150,000	120,000	120,000	150,000	140,000
5. Anthelmintics	100,000	100,000	100,000	100,000	100,000
	970,000	900,000	870,000	890,000	780,000

EXPERT AND TRAINING REQUEST

		1986-87		1987-88		1988-89		1989-90		1990-91	
		nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
1. Immunoparasitol.	exp.	1	12								
	tr.	1	6	1	6						
2. Vet. helminthology	tr.			1	6						
3. Vet. protozoology	exp.			1	12						
4. Acarology	tr.	1	12								

ALTERATION OF ROOM FUNCTION

1. LB-302G (special study) for piroplamosis vaccine production
2. LB-304G (epidemiology) for research data compiling, documents, files, mini-library

ADDITIONAL EQUIPMENT REQUEST

1. Aquaria tank
2. Culture dish
3. Photography set to be attached to dissecting microscope
4. Dissecting instrument set
5. Column chromatography
6. FA microscope
7. ELISA apparatus (including reader)
8. Water bath
9. Magnetic stirrer
10. Digital pH meter
11. Lyophilizer
12. Freezer (-70°C)
13. Vortex mixer
14. McMaster apparatus set
15. Electronic top-loading balance
16. Mobile weighing scale of 500kg minimum
17. Refrigerators 1 in Lab 1, 2; 1 in Lab 4
18. Still camera for outside use, including zoom lens, macro lens, wide-angle lens and flash light.

PATHOLOGY rev.

1. DEVELOPMENT OF AN IMMUNOPEROXIDASE TECHNIQUE OF ANTIGENS IN FORMALIN-FIXED AND PARAFFIN-EMBEDDED TISSUES

Diseases of interest: Swine fever, Pseudorabies, Transmissible gastroenteritis, Colibacillosis, Foot-and-mouth disease

Objectives: To develop an immunoperoxidase technique which will be useful for diagnosis of certain diseases particularly in tissues that have been fixed and processed as usual for histopathology.

Methods involved:

- a. Preparation of primary antibody
- b. Preparation of secondary antibody
- c. Conjugation of secondary antibody with peroxidase enzyme
- d. Standardization of tests

Expectations: An immunoperoxidase technique which will be useful for diagnosis of certain diseases especially those tissues that have been fixed by formalin and sent from the rural areas. The technique will also be useful for further researches about the particular diseases.

Duration: Four-year period 1986-88.

Budget: 500,000 Baht

Expert request: One 3-month expert on immunoperoxidase.

Training request: One 6-month period training on immunoperoxidase technique

2. DEVELOPMENT OF IMMUNOGOLD TECHNIQUE FOR THE DETECTION OF ANTIGENS IN
GLUTARALDEHYDE-FIXED TISSUES AT THE ELECTRON MICROSCOPY LEVEL

Diseases of interest: Swine fever, Pseudorabies, Transmissible gastroenteritis

Objectives: To develop an immunogold technique which will be useful for future
research on that particular disease.

Methods involved:

- a. Preparation of specific antibody
- b. Preparation of immunogold conjugates
- c. Standardization of the procedure

Expectations: An immunogold technique will be useful for future research on
the particular diseases especially at the ultrastructural levels.

Duration: Two-year period 1988-90

Budget: 100,000 Baht

3. COMPARATIVE PATHOLOGY OF IMPORTANT DIARRHEAL DISEASES OF SWINE

Diseases of interest: Transmissible gastroenteritis, Porcine epidemic diarrhea, Colibacillosis, Swine dysentery, Coccidiosis

Objectives: To better understand the pathology and pathogenesis of important diarrheal diseases of swine

Methods involved: Employing gross and subgross lesions, histopathology, and scanning and transmission electron microscopy in studying lesions induced by various agents causing diarrheal diseases in swine.

Expectations: Better understanding of the pathology and pathogenesis of the diseases. The information obtained will help to facilitate the diagnoses of certain diseases by pathologists.

Duration: Four-year project 1987-91

Budget:

Animals	45,000 Baht
Animal feed	10,000
Chemicals, etc.	625,000
Miscellaneous	40,000
Total	720,000

Expert request: One 6-month expert on veterinary gastroenterology. The expert should be excellent in English and have good experience on gastrointestinal research.

Training request: Two 1-year training on morphologic pathology and gastrointestinal research, both light microscopy and ultrastructure.

4. PATHOGENESIS OF FIELD AND ATTENUATED (CHINA) STRAINS OF SWINE FEVER

Objective: To better understand the differences between the behaviour and distribution of these two strains of viruses

Methods involved: Chronological investigation of the distribution of and pathology caused by field and attenuated strains of swine fever virus using histopathology, immunoperoxidase, and transmission electron microscopy.

Expectations: The information obtained from this investigation will be useful for the differentiation of diseased pigs from non-diseased one.

Duration: Two-year period 1987-89

Budget:

Animals	36,000 Baht
Animal feed	10,000
Chemicals, etc.	360,000
Miscellaneous	26,000
Total	432,000

Expert request: One 6-month expert on swine fever

Training request: Two 1-year training on morphologic pathology and pathological research

5. INVESTIGATION ON INFECTIOUS DISEASES AND OTHER DISEASE OUTBREAKS CAUSING ECONOMIC LOSSES

Methods involved: Employing histopathology and electron microscopy in the investigation of certain diseases

Expectations: Understanding of the pathology and nature of the particular diseases which will lead to more effective control of the disease.

Duration: Five-year period 1986-91

Budget: 200,000 Baht per year

6. COMPARATIVE PATHOLOGY OF IMPORTANT RESPIRATORY DISEASES OF SWINE

Diseases of interest: Haemophilus pneumonia, Mycoplasma pneumonia, Swine influenza, Pasteurella pneumonia

Objective: To better understand the pathology and pathogenesis of important respiratory diseases of swine

Methods involved: Employing gross and subgross lesions, histopathology, and electron microscopy in studying lesions caused by different agents.

Expectations: Better understanding of the pathology and pathogenesis of the disease

Duration: Two-year period 1990-91

Budget:

Animals	40,000 Baht
Animal feed	10,000
Chemicals, etc.	400,000
Miscellaneous	20,000
Total	470,000

Expert request: One 1-year expert on respiratory pathology of swine

Training request: Two 1-year training in the area of general and respiratory pathology

7. ESTABLISHMENT OF NORMAL HEMATOLOGIC VALUES FOR CATTLE, BUFFALO AND SWINE

Methods involved: Hematocrit, hemoglobin, RBC count, WBC count, differential white count

Duration: Three-year period 1986-89

Budget: 100,000 Baht

B U D G E T (Babt)

Topics	1986-87	1987-88	1988-89	1989-90	1990-91
1. Immunoperoxidase	100,000	100,000	200,000	100,000	
2. Immunogold			50,000	50,000	
3. Diarrheal diseases		200,000	160,000	180,000	180,000
4. Swine fever		216,000	216,000		
5. Immediate problems	200,000	200,000	200,000	200,000	200,000
6. Respiratory diseases				200,000	270,000
7. Hematology	40,000	30,000	30,000		
	340,000	746,000	856,000	730,000	650,000

EXPERT AND TRAINING REQUEST

	1986-87		1987-88		1988-89		1989-90		1990-91	
	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
1. Immunoperoxidase exp.	1	3								
tr.	1	6								
2. Gastroenterology exp.					1	6				
(morphol. pathol.) tr.			1	12	1	12				
3. Swine fever exp.			1	6						
(morph. pathol.) tr.	1	12	1	12						
4. Respiratory exp.							1	12		
tr.							1	12	1	12
5. Hematology tr.	1	6								

ADDITIONAL EQUIPMENT REQUEST

1. Ion sputtering device
2. Critical point dryer
3. Stereomicroscope
4. Pressurized laboratory oven
5. Specimen rotator
6. pH meter
7. Balance
8. Magnetic stirrer with heater
9. Ultrasonic cleaner
10. Air-conditioner for EM room

BIOCHEMISTRY rev.

1. COORDINATION OF RESEARCH ON DISEASE DIAGNOSIS

Analyze the samples for diagnosis of animal disease from virology, bacteriology, pathology and parasitology sections. The analysis will be on:

- a. Blood analysis: Protein, electrolyte, enzyme, vitamins, etc.
- b. Urine examination: both physical and chemical
- c. Kidney and liver function test
- d. Examination of blood and urine for hormones
- e. Detection of heavy metals in blood and tissues
- f. Screening test for insecticides, mycotoxins, drugs
- g. Determination of the antibodies for specific animal diseases
- h. Improvement and development of biochemical diagnostic procedures

Expectations: Rapid and precise diagnosis of animal diseases

Duration: 5 years

Budget: 2,066,000 Baht

Expert request: Three (18-man · month) experts on clinical diagnosis

Training request:

Two (18-man · month) training on clinical diagnosis: blood analysis technique and electrolyte, enzyme, hormone analysis

One 3-month training on laboratory research management and organization

2. IMPROVEMENT OF TECHNIQUES OF ANALYZING FEED ADDITIVES

Feed additives of interest: Drugs, vitamins, minerals, antioxidants etc.

Methods involved:

- a. Preparation of standard chicken and pig feed with different concentrations of feed additives
- b. Checking the recoveries of feed additive concentrations by comparing the techniques of various methods
- c. Select the best methods
- d. Rechecking the selected methods for repeatability and reproducibility

Expectations:

- a. To compare the different techniques of analysis
- b. To find out and modify the most suitable and economical techniques of feed additives analysis for Thailand

Duration: 5 years

Budget: 1,550,000 Baht

Expert request: Two (6-man · month) experts on feed additives

Training request: Three (9-man · month) training on vitamins, hormones and HPLC techniques

3. RESEARCH ON DRUG RESIDUES IN POULTRY PRODUCTS -- MEAT, FAT, BLOOD AND LIVER

Drugs of interest: Drugs which widely used in the markets

Objectives: To study the drug residues in poultry products

Methods involved:

- a. Prepare the standard chicken feed with different concentration of drugs
- b. Feed the prepared feed to one day chicken until broiler (about 56 days)
- c. Withdrawal period 7 days before slaughter
- d. Slaughter the poultry at age 56 days and collect the specimen (meat, fat, blood and liver)
- e. Detect the drug residue in specimen

Expectations:

- a. To clarify the drug residues in poultry products
- b. To study the maximum drug residue limit for broiler
- c. To accumulate data for future research

Duration: Two years

Budget: 934,600 Baht

Expert request: One 3-month expert on drug residue in animal products

Training request: Two (6-man-month) training on drug residue analysis technique

4. STUDY OF TOXIC ELEMENTS IN FARM ANIMALS

Toxic elements of interest: Cu, Fe, Zn, Se, Mo, Hg, As, Pb, etc.

Objectives: To study the toxic elements in problem farm animals

Methods involved: Soils, grasses, water and serum of problem animals will be collected to analyze for the suspected toxic elements. The methods of toxic element analysis will follow the direction of atomic absorption spectrophotometer.

Expectations:

- a. To clarify the quantities of the toxic mineral contents in soils, plants, water and serum of the problem animals
- b. To study the relationship of toxic elements in soil-plant-animal system
- c. To accumulate the data and informations for solving the toxic element problems

Duration: 5 years

Budget: 5,250,000 Baht

Expert request: Two(12-man-month) experts on mineral in soil-plant-animal system

Training request: Two(12-man-month) training on trace mineral analysis in soil, plant and serum

5. RESIDUE ANALYSIS OF ORGANOCHLORINE PESTICIDES IN FEED, ANIMAL PRODUCTS AND TISSUES

Pesticides of interest:

- a. Organophosphate compound: Malathion, Parathion, Ethion, etc.
- b. Organochlorine compound: Dieldrin, Heptachlor, DDT group, etc.
- c. Carbamate group: Carbaryl, Methomyl, Metakamate, etc.
- d. Polychlorinated biphenyl group (PCBs): Arochlor 1221, 1232, 1016, etc.

Methods involved:

Sample collection: Feed and water samples of certain farms will be collected to analyze for pesticide residues. Animal products and animal tissues of the same farms will be collected later at the slaughter house. Determine the pesticide residues from the samples collected by following the methods of analysis of AOAC, etc.

Expectations:

- a. To clarify the types and quantities of pesticide residues
- b. To study the relationship of pesticide residues between feed, animal products and animal tissues
- c. To accumulate the data for future controlling, preventing and researching on pesticide residues

Duration: 3 years

Budget: 3,570,00 Baht

Expert request: Two (6-man-month) experts on toxicology

Training request: Five (30-man-month) training and studying in veterinary toxicology and toxic substance analysis technique

6. IMPROVEMENT OF THE DETERMINATION OF AFLATOXIN IN FEED AND ANIMAL TISSUES

Feed and animal tissues of interest:

Feed: peanut oilmeal, soybean oilmeal, corn, etc.

Animal tissues: liver, kidney, muscle, etc.

Methods involved: feed and animal tissue samples are collected from the markets and analyze for aflatoxin by using Stubblefield and Shotwell methods (by HPLC)

Expectations:

- a. To improve the method of determination on aflatoxin contamination more concisely and efficiently
- b. To protect consumers against aflatoxin
- c. To know the economic loss of the farmers and the country
- d. To know how to control and prevent aflatoxicosis

Duration: 5 years

Budget: 4,050,000 Baht

Expert request: One 6-month expert on veterinary mycology

Training request: Three(18-man-month) training and studying of veterinary mycology and mycotoxin analysis technique

B U D G E T (Baht)

T o p i c s	1986-87	1987-88	1988-89	1989-90	1990-91
1. Clin. biochem.	262,000	346,000	430,000	514,000	514,000
2. Feed additives	310,000	310,000	310,000	310,000	310,000
3. Drug residues		761,000	173,600		
4. Toxic elements	880,000	1,030,000	1,080,000	1,130,000	1,130,000
5. Organochlorine	1,120,000	1,190,000	1,260,000		
6. Aflatoxin	810,000	810,000	810,000	810,000	810,000
7. Extra research				2,000,000	2,000,000
	3,382,000	4,447,000	4,063,600	4,764,000	4,764,000

EXPERT AND TRAINING REQUEST

		1986-87		1987-88		1988-89		1989-90		1990-91	
		nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
1. Clin. chem.	exp.	1	6			1	6			1	6
	tr.			1	5	1	5	1	5		
2. Feed additives	exp.	1	3	1	3						
	tr.	1	3			1	3	1	3		
3. Drug residues	exp.	1	3								
	tr.			1	6			1	6		
4. Toxic elements	exp.	1	6			1	6				
	tr.			1	6			1	6		
5. Organochlorine	exp.			1	3			1	3		
	tr.	1	6	1	6	1	6	1	6	1	6
6. Aflatoxin	exp.	1	6								
	tr.			1	6			1	6	1	6
7. Biochemistry	exp.	1	12	1	12	1	12	1	12	1	12

ACCESSORIES REQUESTED

1. Amino acid analyzer: 835-10 Hitachi [1]

Data processor

Heating block with hydrolysis tubes for hydrolyzing samples

2. Atomic absorption spectrophotometer: AA-640, Shimadzu [2]

Graphite furnace atomizer

Hydride generator for As and Se

Mercury reduction vapor

Hollow cathod lamp: Ca, Mg, Na, K, Cu, Fe, Zn, Se, Mo, Hg, As, Pb, F, Cd, Cr

Nitrous oxide burner head

Nitrous oxide tank

Nitrous oxide gas regulator with heater

3. pH meter: F-8DB Horiba [5]
 - Combined electrode, 3 sets
 - Buffer salt pH 7, 2 bottles
 - Buffer salt pH 4, 2 bottles
4. Gas chromatograph: GC-9APF Shimadzu [6]
 - Flame photometric detector
 - Electron capture detector
 - Data processor Model C-R3A
 - Gas filter (for removing gas impurity)
 - Oxygen scrubber
5. Liquid chromatography apparatus: 655A Hitachi [10]
 - Double beam spectrophotometer Model 150-20 (ordering No.150-0027) with liquid chromatograph flow cell (Part No.210-2131) (to cover the wavelength range over the given 195-350nm)
 - Fluorescence detector Model F1100 (ordering No.050-0063)
 - Sample injector assembly
 - 655A data processor
 - Chart paper
6. Thin layer chromatography apparatus: HC-20 Tokyo Kagaku Sangyo [11]
 - Glass plate (size 200x200mm) 24 pcs, (size 200x50mm) 12 pcs
 - Silica gel 60 HR extra pure for thin layer: 6x500g
 - Silica gel 60 for column chromatography 70-230 mesh 6 x 1 kg
7. Spectro-fluorometer: 650-10 Hitachi [13]
 - Fluorescence free cell, 4 cells
8. Calorimeter: 1013-H Yoshida Seisakusho [14]
 - Sample pellet pressing machine
9. Rotary evaporator: RE-46A Yamato Scientific [19-1]
 - 500ml evaporating flask, 6 pcs
 - 250ml evaporating flask, 6 pcs
 - 100ml evaporating flask, 6 pcs
 - 1 litre reservoir flask, 6 pcs
10. Digesting apparatus: QDS-20M Mitamura Riken Kogyo [21]
 - Resolution tube $\phi 40 \times 350$ mm 300ml, 60 pcs
11. Bioassay analyzer: ZA-FM Oriental Instruments [27]
 - Pipet dispenser Model 8100 Nichiryo, 2 sets
 - Blender "waring" or similar type 11, 1 set

B U D G E T (1,000 BaK) rev.

<u>VIROLOGY</u>	'86-	'87-	'88-	'89-	'90-	TOTAL
1. Immunodiagnoses		600	500	400	400	1,900
2. Herpesvirus vaccine	300	400	400	400	400	1,900
3. Viral diarrhoea	150	200	200	300	300	1,150
4. Emergency diseases	100	150	150	150	150	700
	550	1,350	1,250	1,250	1,250	5,650
<u>BACTERIOLOGY</u>						
1. Serodiagnoses	300	400	300			1,000
2. Vaccines	400	600	600	600	800	3,000
3. Enteric diseases	50	150	100	100	100	500
4. Emergency diseases		100	200	200	100	600
	750	1,250	1,200	900	1,000	5,100
<u>PARASITOLOGY</u>						
1. Liver fluke	120	100	150	140	140	650
2. Zoonoses in swine	300	280	250	250	200	1,280
3. Haemoprotozoa	300	300	250	250	200	1,300
4. Cattle tick	150	120	120	150	140	680
5. Anthelmintics	100	100	100	100	100	500
	970	900	870	890	780	4,410
<u>PATHOLOGY</u>						
1. Immunoperoxidase	26	26				52
2. Immunogold			20	20		40
3. Diarrheal diseases		200	160	180	180	720
4. Swine fever		216	216			432
5. Immediate problems	200	200	200	200	200	1,000
6. Respiratory diseases				200	270	470
7. Hematology	40	30	30			100
	266	672	626	600	650	2,814
<u>BIOCHEMISTRY</u>						
1. Clin. biochem.	262	346	430	514	514	2,066
2. Feed additives	310	310	310	310	310	1,550
3. Drug residues	761	173.6			934.6	
4. Toxic elements	880	1,030	1,080	1,130	1,130	5,250
5. Organochlorine	1,120	1,190	1,260			3,570
6. Aflatoxin	810	810	810	810	810	4,050
7. Extra research				2,000	2,000	4,000
	3,382	4,447	4,063.6	4,764	4,764	21,420.6
T O T A L	5,918	8,619	8,009.6	8,404	8,444	39,394.6

EXPERT REQUEST rev.

	1986-87		1987-88		1988-89		1989-90		1990-91	
	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
<u>VIROLOGY</u>										
1. Immunodiagnoses			1	6	1	6	1	6		
2. Herpesvirus vac.	1	12			1	12			1	12
3. Viral diarrhoea			1	6			1	6		
<u>BACTERIOLOGY</u>										
1. Serodiagnosis	1	6			1	6				
2. Vaccines			1	12			1	6		
3. Enteric diseases							1	6	1	6
<u>PARASITOLOGY</u>										
1. Immunoparasitology	1	12								
2. Vet. protozoology			1	12						
<u>PATHOLOGY</u>										
1. Immunoperoxidase	1	3								
2. Gastroenterology					1	6				
3. Swine fever			1	6						
4. Respiratory dis.							1	12		
<u>BIOCHEMISTRY</u>										
1. Clin. biochem.	1	6			1	6			1	6
2. Feed additives	1	3	1	3						
3. Drug residues					1	3				
4. Toxic elements			1	6			1	6		
5. Organochlorine			1	3			1	3		
6. Aflatoxin					1	6				
7. Biochemistry	1	12	1	12	1	12	1	12	1	12
<u>F&M DISEASE</u>										
1. Biochemistry							1	12	1	12
2. Quality control	1	12	1	12						
3. Quality improvement	1	12								
4. Oil adjuvant vaccine	1	6								
<u>EPIDEMIOLOGY</u>										
			1	4			1	4		
<u>EXPERIMENTAL ANIMALS</u>										
			1	3						
<u>TRAINING</u>										
	1	6								
<hr/>										
T O T A L	11	90	12	85	8	57	10	73	5	48

(nr : total number of persons; mo : total number of man x months)

TRAINING REQUEST rev.

	1986-87		1987-88		1988-89		1989-90		1990-91	
	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
<u>VIROLOGY</u>										
1. Immunodiagnoses	1	6	1	6	1	6	1	6		
2. Herpesvirus vac.			1	12			1	12		
(study	1	24			1	24)				
3. Viral diarrhoea	1	6			1	6				
4. Emergency diseases	1	6								
<u>BACTERIOLOGY</u>										
1. Serodiagnosis	1	6	1	6	1	6	1	6	1	6
2. Vaccines			1	12	1	12				
(study					1	24)				
3. Enteric diseases							1	6	1	6
<u>PARASITOLOGY</u>										
1. Immunoparasitology	1	6	1	6						
2. Vet. helminthology			1	6						
3. Acarology	1	12								
<u>PATHOLOGY</u>										
1. Immunoperoxidase	1	6								
2. Gastroenterology			1	12	1	12				
3. Swine fever	1	12	1	12						
4. Respiratory dis.							1	12	1	12
5. Hematology	1	6								
<u>BIOCHEMISTRY</u>										
1. Clin. chem.	1	5			1	5			1	5
2. Feed additives	1	3	1	3			1	3		
3. Drug residues			1	6			1	6		
4. Toxic elements					1	6	1	6		
5. Organochlorine	1	6	1	6	1	6	1	6	1	6
6. Aflatoxin	1	6			1	6				
<u>F&M DISEASE</u>										
1. Biochemistry					1	12				
2. Quality control	1	6	1	6	1	6				
3. Improvement	1	6					1	6		
4. Preservation	1	3								
5. Genetic engineering			1	13			1	13		
<u>EPIDEMIOLOGY</u>										
					1	4			1	4
<u>EXPERIMENTAL ANIMALS</u>										
	1	4					1	4		
<u>TRAINING</u>										
			2	6	2	6	2	6	2	6
<u>T O T A L</u>										
	17	105	15	112	14	93	14	92	8	45
(study	1	24			2	48)				

ADDITIONAL EQUIPMENT REQUEST

VIROLOGY

1. Column chromatography with accessories in various size: ion exchange, gel filtration, affinity chromatography and fraction collection (LKB or equivalent) for preparation of purified antigens and conjugates.
2. Spectrophotometer (double beam) for measurement percentage of protein
3. Electrophoretic apparatus for SDS-PAGE, electroblot, UV viewer, polaroid camera, power supply, gel dryer and vacuum pump (BIORAD or equivalent) for virus serotyping
4. Microchannel pipettes 8 channel variable speed 5-5 microlitre and 50-200 microlitre, 12 channel variable speed 5-50 microlitre and 50-200 microlitre (Titertek) for microplate technology
5. Shaker adjustable speed for preparation of FA conjugates

BACTERIOLOGY

1. Equipment for ELISA
2. Equipment for fluorometric method (FIAX)
3. Column chromatography with accessories
4. Fraction collector
5. Spectrophotometer
6. Shaker with adjustable speed
7. Lyophilizer
8. Accessories for anaerobic method

PARASITOLOGY

1. Aquaria tank
2. Culture dish
3. Photography set to be attached to dissecting microscope
4. Dissecting instrument set
5. Column chromatography
6. FA microscope
7. ELISA apparatus (including reader)
8. Water bath
9. Magnetic stirrer
10. Digital pH meter
11. Lyophilizer
12. Freezer (-70°C)
13. Vortex mixer
14. McMaster apparatus set
15. Electronic top-loading balance
16. Mobile weighing scale of 500kg minimum
17. Refrigerators 1 in Lab 1, 2; 1 in Lab 4
18. Still camera for outside use, including zoom lens, macro lens, wide-angle lens and flash light.

PATHOLOGY

1. Ion sputtering device
2. Critical point dryer
3. Stereomicroscope
4. Pressurized laboratory oven
5. Specimen rotator
6. pH meter
7. Balance
8. Magnetic stirrer with heater
9. Ultrasonic cleaner

BIOCHEMISTRY (accessories only)

1. Amino acid analyzer: 835-10 Hitachi [1]
 - Data processor
 - Heating block with hydrolysis tubes for hydrolyzing samples
2. Atomic absorption spectrophotometer: AA-640, Shimadzu [2]
 - Graphite furnace atomizer
 - Hydride generator for As and Se
 - Mercury reduction vapor
 - Hollow cathod lamp: Ca, Mg, Na, K, Cu, Fe, Zn, Se, Mo, Hg, As, Pb, F, Cd, Cr
 - Nitrous oxide burner head
 - Nitrous oxide tank
 - Nitrous oxide gas regulator with heater
3. pH meter: F-8DB Horiba [5]
 - Combined electrode, 3 sets
 - Buffer salt pH 7, 2 bottles
 - Buffer salt pH 4, 2 bottles
4. Gas chromatograph: GC-9APF Shimadzu [6]
 - Flame photometric detector
 - Electron capture detector
 - Data processor Model C-R3A
 - Gas filter (for removing gas impurity)
 - Oxygen scrubber
5. Liquid chromatography apparatus: 655A Hitachi [10]
 - Double beam spectrophotometer Model 150-20 (ordering No.150-0027) with liquid chromatograph flow cell (Part No.210-2131) (to cover the wavelength range over the given 195-350nm)
 - Fluorescence detector Model F1100 (ordering No.050-0063)
 - Sample injector assembly
 - 655A data processor
 - Chart paper
6. Thin layer chromatography apparatus: HC-20 Tokyo Kagaku Sangyo [11]
 - Glass plate (size 200x200mm) 24 pcs, (size 200x50mm) 12 pcs
 - Silica gel 60 HR extra pure for thin layer: 6x500g
 - Silica gel 60 for column chromatography 70-230 mesh 6 x 1 kg
7. Spectro-fluorometer: 650-10 Hitachi [13]
 - Fluorescence free cell, 4 cells
8. Calorimeter: 1013-H Yoshida Seisakusho [14]
 - Sample pellet pressing machine
9. Rotary evaporator: RE-46A Yamato Scientific [19-1]
 - 500ml evaporating flask, 6 pcs
 - 250ml evaporating flask, 6 pcs
 - 100ml evaporating flask, 6 pcs
 - 1 litre reservoir flask, 6 pcs
10. Digesting apparatus: QDS-20M Mitamura Riken Kogyo [21]
 - Resolution tube $\phi 40 \times 350\text{Lmm}$ 300ml, 60 pcs
11. Bioassay analyzer: ZA-FM Oriental Instruments [27]
 - Pipet dispenser Model 8100 Nichiryo, 2 sets
 - Blender "warning" or similar type 11, 1 set

EXPERT

Fields		'86-87		'87-88		'88-89		'89-90		'90-91		TOTAL	
		nr	mo	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
Virology	L	1	12										
Bacteriology	S	2	6										
Parasitology	L	1	12										
Pathology	L	1	12										
Biochemistry	S	2	6										
FMD	L	1	12										
	S	2	12										
Coordinator	L	1	12										
Team leader	L	1	12										
T o t a l	L	6	72										
	S	6	24										
T O T A L		12	96										

TRAINING

Fields		'86-87		'87-88		'88-89		'89-90		'90-91		TOTAL	
		nr	mo	nr	mo	nr	mo	nr	mo	nr	mo	nr	mo
Virology		2	12										
Bacteriology		1	6										
Parasitology		1	6										
Pathology		1	12										
Biochemistry		2	12										
FMD		1	12										
Others		1	6										
T O T A L		9	66										

Experimental Animal Unit

1. Maintain breeding stock of lab. animals

- mice
- rats
- guinea pigs
- rabbits
- chickens
- ducks

2. Supply experimental animals for research work

- lab. animals
- poultry
- swine
- cattle
- buffalo
- sheep
- goat

3. Taking care of experimental animals

4. Cooperate with other divisions to plan the providing of facilities in the unit

Topics	Budget(Baht)				
	1986-1987	1987-1988	1988-1989	1989-1990	1990-1991
Purchasing animals	100,000	200,000	200,000	200,000	200,000
Purchasing animal feed	200,000	350,000	350,000	350,000	350,000
Supplementary materials	100,000	200,000	200,000	200,000	200,000
Total	400,000	750,000	750,000	750,000	750,000

Expert and Training Request

	1986-1987	1987-1988	1988-1989	1989-1990	1990-1991
Expert	-	1 (3m/m)	-	-	-
Training	1 (4m/m)			1 (4m/m)	

(4m)

Training

Training activities

The principal activities of training section are training and extension of livestock development technology for animal health personnel. Training activities for the first five years are planned and listed in table 1.

a) Training of researchers

- On job training at research laboratories of each division e.g. using electron microscope in research work and diagnosis.

b) Training of livestock officers and personnel concerned with livestock

- In-service training of vet and livestock field officers so that they will be able to recognise the signs of a possible exotic disease outbreak as well as to collect and dispatch of samples for laboratories diagnosis.

- In-service training of vet and livestock field officers on animal health care and endemic animal diseases diagnosis/prevention/control.

c) Technical cooperation and joint research with guest researchers from aboard

- Joint research on animal health and/or production at research laboratories of each division.

d) Exchange of information and technology through scientific convention among ASEAN countries and other international meetings

- Symposiums, seminars, or workshops on animal health and/or production will be held.

e) Conventional meeting of livestock officers and personnel concerned with livestock

- Symposiums, seminars, or workshops on animal health and/or production will be held.

f) Technology transfer through printing matters and other educational media

- Produce printing matters, slides, video tape, etc. to transfer technology on animal health and production.

- Organise individual instruction.

Table 1 Training activities plan for the first five years

Activities	Year (times/audience)					Budget (baht)
	1 st	2 nd	3 rd	4 th	5 th	
a) Training researchers	1/15	2/20	5/50	5/50	5/50	185 x 5000=925,000
b) Training of livestock officers and personnel concerned with livestock	1/50	2/100	2/100	2/100	2/100	450 x 5000=2,250,000
c) Technical cooperation and joint research with guest researchers from aboard	-	2/2	5/5	5/5	5/5	17 x 10,000=170,000
d) Exchange of information and technology through scientific convention among ASEAN countries and other international meetings	1/100	2/200	2/200	2/200	2/200	900x2,000=1,800,000
e) Conventional meeting of livestock officers and personnel concerned with livestock	1/50	2/100	2/100	2/100	2/100	450x1,000=450,000
f) Technology tranfer through printing matters and other educational media	n.a.	n.a.	n.a.	n.a.	n.a.	

Expert request

A six man-month expert in agricultural extension or adult education with livestock background.

Training request

Twenty-four man-months training on subjects which are related to agricultural extension(livestock).

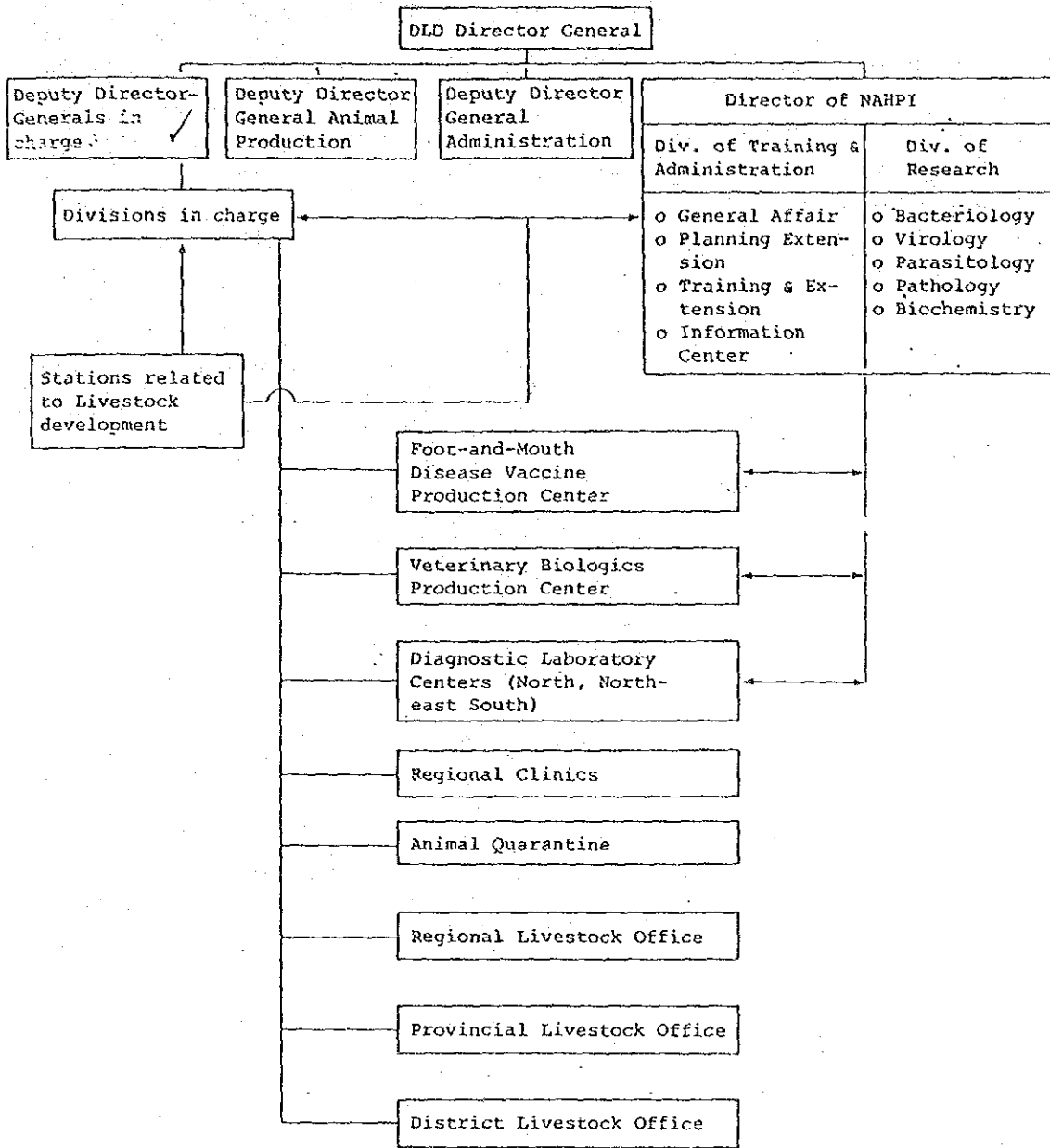
Table 2 Expert and training request

	Year											
	1986-87		1987-88		1988-89		1989-90		1990-91		Total	
	no	m/m	no	m/m	no	m/m	no	m/m	no	m/m	no	m/m
Expert request	1	6	-	-	-	-	-	-	-	-	-	-
Training request	-	-	2	6	2	6	2	6	2	6	8	24

Additional equipment request

1. micro bus(30 seats)
2. camera accessories: flash, copy stand, tripods
3. offset plate maker
4. offset press
5. combination punching and plastic binding unit
6. wire binding machine
7. laminator
8. collators
9. paper cutting machine
10. slide dissolve control
11. pull down screen
12. portable combination of mike and speaker
13. thermofax machine
14. display boards
15. day-light type screen

Organization Chart of DLD after Establishment of NAHPI



Remarks:

← Technical transfer, distribution of information, training and collaboration

→ Supply of information, technical problems, research results and collaboration

Project Staffing

DIVISION	SECTION	ROOM	NUMBER OF STAFF MEMBERS					TOTAL
			RESEARCHER Ph.D., M.S. D.V.M.	TECHNICIAN B.S.	ASSISTANT (Para-Vet)	WORKER	ADMIN STAFF	
RESEARCH	BACTERIOLOGY	o BACTERIOLOGY	10	10	6	7	-	33
			7 + (3)	7 + (3)	4 + (2)	5 + (2)	-	23 + (10)
	VIROLOGY	o VIROLOGY	10	9	5	6	-	30
			5 + (5)	2 + (7)	2 + (3)	4 + (2)	-	13 + (17)
	PARASITOLOGY	o PARASITOLOGY	8	9	5	6	-	28
		o SPECIAL STUDY	5 + (3)	2 + (7)	2 + (3)	1 + (3)	-	12 + (16)
	PATHOLOGY	o PATHOLOGY	7	7	4	4	-	22
o ELEC. MICROSCOPY o PHOTOGRAPHY o AUTOPSY		5 (2)	3 (4)	2 (2)	3 (1)	-	13 + (9)	
BIOCHEMISTRY	o TOXICOLOGY o CLINICAL BIOCHEM. o IMMUNOCHEN. o FEED QUALITY CCNT.	15	15	8	10	-	48	
		10 + (5)	11 + (4)	6 + (2)	5 + (5)	-	32 + (16)	
	SUB TOTAL	50	50	28	33	-	161	
		32 + (18)	25 + (25)	16 + (12)	20 + (13)	-	93 + (68)	
ADMINISTRATION	GENERAL AFFAIRS	o GENERAL AFFAIRS o PERSONNEL AFFAIRS o ACCOUNTING o PROCUREMENT, MAINTENANCE, WASHING, STERILIZATION MATERIAL SUPPLY, POWER AND WATER SUPPLY	3	11	-	20	8	42
			(3)	(11)	-	(20)	(8)	93 + (42)
	PLANNING & COORDINATION	o PLANNING o COORDINATION	2	3	1	3	3	12
			(2)	(3)	(1)	(3)	(3)	(12)
	TRAINING & EXTENSION	o TRAINING o EXTENSION	-	2	1	1	2	6
			(-)	(2)	(1)	(1)	(2)	(6)
	INFORMATION	o Statistics o Public Relations o Epidemiology o Publications o Library	1	4	-	4	5	14
		(1)	(4)	(-)	(4)	(5)	(14)	
Experimental Animal		5	20	2	28	18	74	
	Sub Total	(6)	(20)	(2)	(28)	(18)	(74)	
	TOTAL	56	70	30	61	18	235	
		32 + (24)	25 + (45)	16 + (14)	20 + (41)	(18)	93 + (142)	

235 — ①
33 + (142)
② ③

- Remarks: 1: Total number of staff members
2: Number of staff members transferred from the existing research division of the DLO
3: Number of staff members drafted from the outside of the DLO's research division
4: Staff will be readjusted as the approval of Civil Service Commission in later

Division	Section	Group	Activities	
ADMINIS- TRATION	GENERAL AFFAIRS	General affairs Personnel affairs Accountancy Procurement, Maintenance & Preparation	General affairs, personnel affairs, accounting, procurement, maintenance, washing and sterilization, and supply (materials, power, water, etc.)	
	PLANNING & COORDINATION	Planning	1) Layout of research theme 2) Allocation of research budget 3) Summarization and evaluation of research activities	
		Coordination	1) Reception of diagnosis specimens 2) Settlement of field testing 3) Contact and coordination with other government offices and other organizations	
	TRAINING	Training	1) Planning and implementation of training (Trainees are senior administrators and researchers in DLD.) 2) Individual and mass training	
		Extension	1) Training of Thai veterinarians and researchers 2) Contract and arrangement with foreign countries on technical cooperation 3) Care of visitors	
	INFORMATION	Statistics	Statistics on animal health livestock production.	
		Public relations	Collection, analysis and distribution of animal health information. Emergency information on special outbreaks of animal diseases	
		Epidemiology	Collect livestock information, disease surveillance interpretation of epidemic disease situation and recommendation of disease control measures.	
		Publication	Preparation of training text-books, research reports, and audio-visual teaching materials.	
		Library	Collection, maintenance and lending of books, journals and reference materials.	
		Experimental animal	Experimental animal	Maintenance breeding stock of Lab. animal and supply exp. animal

Remarks:

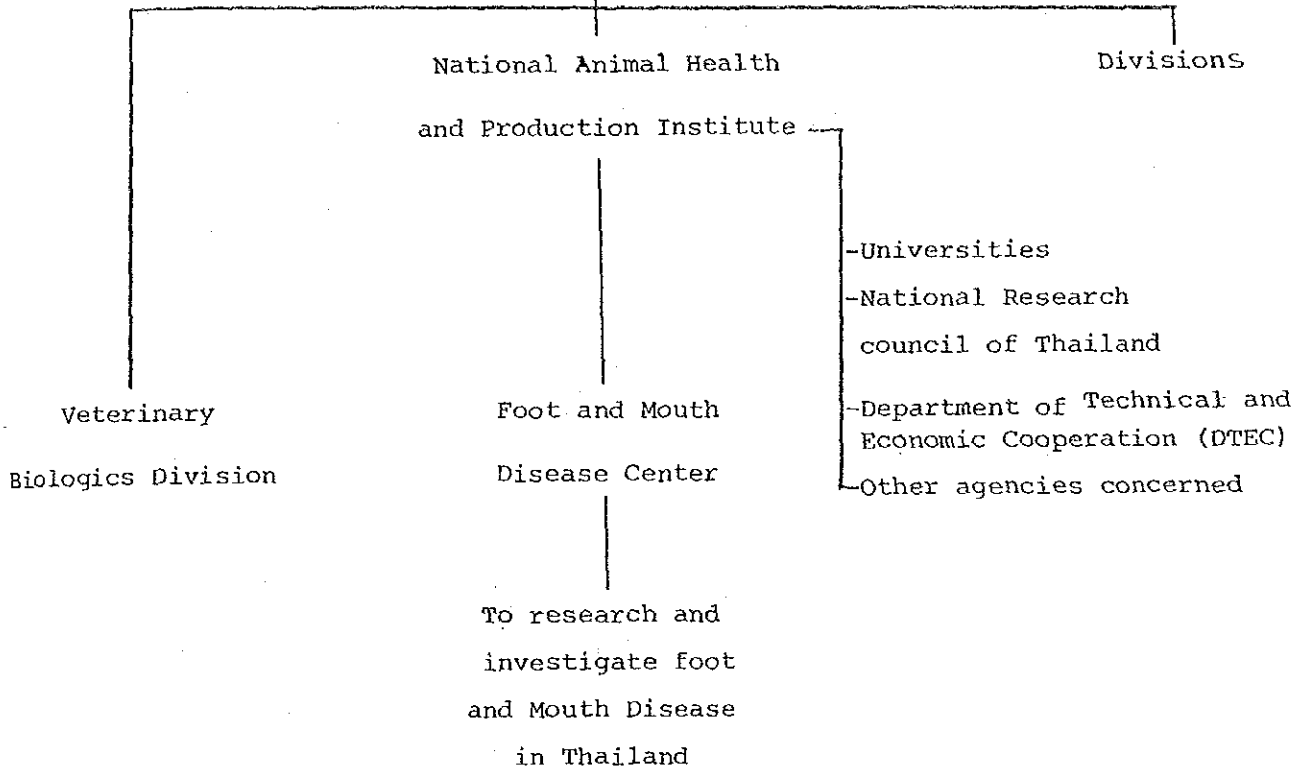
- 1) "Division level" is equivalent to the level of an existing Division of the DLD.
- 2) "Section level" is equivalent to the level of an existing subdivision of the DLD.
- 3) "Group level" is equivalent to the level of an existing section of the DLD.

Counterpart fund (Baht)

Item	Year					Remark
	1	2	3	4	5	
Salary	5,570,700	7,451,940	7,899,840	8,380,680	8,861,880	
Library		3,000,000	3,200,000	3,500,000	3,800,000	
Maintenance	3,219,200	3,541,120	3,895,232	4,284,756	4,713,232	
Land and Construction	7,746,700	1,000,000	1,100,000	1,210,000	1,331,000	
Expendable materials	1,250,000	2,000,000	2,200,000	2,300,000	2,500,000	
Training	575,000	1,120,000	1,300,000	1,300,000	1,300,000	
Experimental animal	400,000	750,000	750,000	750,000	750,000	
Total	18,761,600	18,863,060	20,345,072	21,725,436	23,256,112	

Ministry of Agriculture and Cooperatives

Department of Livestock Development



Expert requested and training

	Total		1		2		3		4		5	
	No	m/m	No	m/m	No	m/m	No	m/m	No	m/m	No	m/m
Expert												
1. Expert leader	1	60	-	12	-	12	-	12	-	12	-	12
2. Expert coordinator	1	60	-	12	-	12	-	12	-	12	-	12
3. Training	3	2 $\frac{1}{2}$	1	$\frac{1}{2}$	1	1	-	-	1	1	-	-
4. Extension	2	2	-	-	-	-	1	1	-	-	1	1
5. Statistics	2	6	-	-	1	3	-	-	1	3	-	-
6. Library	2	4	1	1	1	3	-	-	-	-	-	-
7. Epidemiology	3	12 $\frac{1}{2}$	1	6	-	-	1	6	-	-	1	$\frac{1}{2}$
8. Maintenance engineering	5	18	1	6	1	3	1	3	1	3	1	3
9. Experimental animal	3	4	1	3	-	-	1	$\frac{1}{2}$	-	-	1	$\frac{1}{2}$
Total	22	169	5	40$\frac{1}{2}$	4	34	4	34$\frac{1}{2}$	3	31	4	29
Fellowships for												
1. Observation Study	5	2 $\frac{1}{2}$	1	$\frac{1}{2}$	1	$\frac{1}{2}$	1	$\frac{1}{2}$	1	$\frac{1}{2}$	1	$\frac{1}{2}$
2. Offset printing, printing and Press	2	1	-	-	1	$\frac{1}{2}$	-	-	1	$\frac{1}{2}$	-	-
3. Vedio-tape and Movie Producing Audeo Visual Aids	2	1	1	$\frac{1}{2}$	-	-	1	$\frac{1}{2}$	-	-	-	-
4. Planning and Script Writting Technique	1	1	-	-	1	1	-	-	-	-	-	-
5. Education and Training Technique	2	1	1	$\frac{1}{2}$	-	-	1	$\frac{1}{2}$	-	-	-	-
6. Epidemiology and computerization	2	6	-	-	1	3	-	-	1	3	-	-
7. Library	2	1 $\frac{1}{2}$	1	1	-	-	1	$\frac{1}{2}$	-	-	-	-
8. Experimental animal	2	2	1	1	-	-	1	1	-	-	-	-
Total	18	16	5	3$\frac{1}{2}$	4	5	5	3	3	4	1	$\frac{1}{2}$

Ⅲ ま と め

昭和60年12月11～20日の間タイ国に派遣されたタイ王国畜衛生・生産研究協力計画事前調査団の報告に基づき、当調査員は当初滞在期間40日の予定で訪タイ、まず、

① 12月以降の法的措置の進展状況並びに、予算・人事上の手続状態を聴取するとともに

②未提出であった Pakchong の口蹄疫ワクチンセンターで行う予定の口蹄疫関係の協力についての要請書の早期提出（おそくとも6月末まで）を求め、更に、

③ Bangkok の新施設 National Animal Health and Production Institute（以下 NAHPI と略称）において実施する予定の業務についてのより細部にわたる検討を依頼した。

現地到着後10日間を前期、月末までを中期、その後の期間を取り纏め時期として作業を進め、できればこの間に Tungsong, Khonkaen, Lampang の診断センターを訪れることとした。その後7月11日に滞在期間2週間の延期が認められ、この間にもかなりの重要な情報が得られ、また、帰国後も新たな展開についての連絡を受けることができたのは幸いなことであった。

①については、当初、12月の状態からそれほど進展はなく、CSOも一応了承したというものの人員枠の獲得は極めて難しい模様で、それに対応するために将来の機構・組織が定まらないという状態であった。しかし、帰国後に入手した NAHPI の機構図や人員配置予定からすれば、法的措置はさておき、10月1日の新年度を目指し、当面150名程度の人員を NAHPI に配置して活動を開始するために全力を尽くしていることは明らかで、日本側としてもこれを側面から援助するため、今後できるだけ速やかに R/D に持ち込む方針で手続を進めるべきであろうと考えられる。

②については Pakchong への再度訪問にもかかわらず、結果的に当初滞在期間の実質的最終日に、その内容をようやく入手するという状態で、正式文書の日本政府への発送は帰国日に至るも行われていないが、内容的に問題となる点はほとんどなく、今後手続を進めていく上に支障を生ずることはほとんどないものと思われる。

③については、特に NAHPI における実験室関係の研究課題のつめには、Dr. Praphad のもと、準備委員会メンバーの全面的な協力が得られ、細部にはいろいろ問題もあるが、各自の希望、期待につき相当量の資料を得ることができた。今後この資料をもとに R/D の内容をつめていくことはできるものと考えられる。

なお、NAHPI の所掌として、研究及び3地方（北部、東北部、南部）家畜衛生センターのリファレンス業務のほか中部地方の病性鑑定に直接当たることが明確に示されたことは特に注目しなければならない点であろう。

一方、管理面の検討は、研修関係を除いて、あまり行われておらず、特に研究・管理のはざまに取り残された疫学・情報（図書室を含む）関係については、担当者がいなかったため実質

的なつめはほとんどできなかった。この面の弱さは、ドイツ獣医師 Dr. Krudener の報告書にも一部指摘されており、Dr. Vises にその意義を再三にわたり強調したが、十分な理解が得られたとは思われない。

この間、奇異に感じられたのは、NAHPI の基本設計計画書を尊重するあまり、将来の運営に支障となることの明らかな点の改変さえなかなか行おうとしなかった点である。これは、施設・機材引渡しまでの事項と、当調査員の関知するそれ以降の話が混乱したために起こった現象とみられ、7月23日に来タイされた本橋氏の現地での説明により納得されるものと期待している。これも任期延長の賜であり、御配慮を感謝する次第である。

現在のところ NAHPI の予算・人事要求とからんだ極めて流動的な要素があるため、管理面はもちろん実験室関係についてもその組織・機構・分掌などが確定するのは8月中旬以降になるものと思われるが、今後 R/D 署名までの期間には相当の進展がみられるものと予想される。

タイ国内における旅行は、Tungsong から Hadyai 周辺への南部地方、Khonkaen を中心とした東北地方の2回が実現したが、それぞれに貴重な収穫があった。Dr. Krudener と面談できたことも幸いであった。

最後に、この長期調査につき種々御配慮をいただき、御協力を賜った多くの関係者の方々に對し、厚く感謝の意を表します。

Request for Additional New Technical Assistance Project

Project Title : National Animal Health and Production Institute

Requesting Agency : Department of Livestock Development
Ministry of Agriculture and Cooperatives

Proposed Source of Assistance : The Government of Japan

1. Background information and justification for the Project

The related project "Animal Health Improvement Project" which was a technical cooperation between the Government of the Kingdom of Thailand and the Government of Japan, was satisfactorily terminated in March 1, 1986. However, a part of the project, foot and mouth disease vaccine production was achieved, some related problems associated with vaccine quality and strains used to manufacture remained for elucidation.

Diagnosis Typing and subtyping of FMD (foot and mouth disease) virus by complement fixation test and serum neutralization test have long been utilized at Foot and Mouth Disease Center. These two methods have some disadvantages such as insensitivity anti complementary, time consuming and non reproductivity. New methods such as ELISA or determination of viral protein which are more sensitive and specific should be studied on approaching for better methods.

Purification and concentration of vaccine

The conventional method of FMD vaccine preparation makes it

impossible to prepare concentrated antigen and that cannot prepare poly - vaccine in a small dose that is acceptable in field condition. If the antigen is concentrated and purified before incorporating into vaccine, vaccine quality will be ultimately improved. Besides, the adverse side effect is greatly reduced, since much of the foreign protein is removed in the process of concentration and purification.

Preparation of oil adjuvanted vaccine.

More antigen is needed to immunize pig against foot and mouth disease utilizing aqueous vaccine than in cattle. Recently, many workers pointed out that immunization of pig against FMD is much improved by injection of oil vaccine. Study in this topic is needed.

Alternative methods for FMD vaccine potency.

Direct method to assess potency of FMD vaccine is of course the challenged of destined species following vaccination with homologous vaccine. The method is costly, risky of spreading virulent virus at the time of challenge, and difficulty of seronegative animal procurement. Alternative methods, such as determination of viral protein mass, or utilizing lab animal can be used to replace the challenge method

FMD(Foot and Mouth Disease) is a threat to the sound livestock development, causing loses of animal resources and lowering of the productivity. Animal health services is, therefore, quite a basic and important upgrading element.

In order to establish an efficient support service in DLD, research work is necessary to consider the priority activity of the national livestock development. However, an effectiveness and advanced technology of livestock production, animal health and production ought to be parallely improved. Research work can be accomplished by experts in respective fields. The field service relies on an active research function within the department to find solutions to technical problems and to develop new technology applicable to the field. Strengthening of research functions require upgrading of research facilities in Foot and Mouth Disease emphasis on diseases surveillance diagnosis, disease control and preventive measures, vaccines assay and FMD investigation.

All such research activities should be pragmatic, realistic, applied and directly connected to routine services. Sine the Department of livestock Development has operated. The research works have not progress as well as the world wide countries have done. And according to Thailand is a tropical country. Moisture and climatic condition are suitable for the growth of micro-organism, parasites and disease vectors. There were highly frequency of disease outbreak among animals (Livestock, domestic and wild animal). It is very difficult to control or eradicate the infectious diseases that often cause the economic loss. Another present problems that are appearing in the most of population is the animal protein. The population of consumers is increasing rapidly and causes the big demand of consumption but the livestock production is still not enough supply and also the quality of protein concerned is still needed for improvement. Both principal problems have been solved but the solution

has still not progress as well. Because the result of research work has not been parallely done as well as the development of livestock has. Moreover, the imported vaccines for animal disease control are increasing in local market in Thailand annually. They caused a lot of immunity problems after used. Some were good immunity but some were not. The imported vaccines have not been tested or analyzed before using in the public.

In accordance with the government of Japan's grant contribution contributed to build the National Animal Health and Production Institute on the purpose of serving as a national center for effective implementation of the research work for the improvement and development and for providing service activities in the fields of animal health and production transfer of the improved and developed technology to various organizations of support services. And the grant has excluded laboratory equipment, technical assistance and other facility concerned. In order to obtain the supreme benefit from this grant aid (after the completion of all facilities construction) technical cooperation should be operated in form of packaged project which is much helpful for continuous conduction of advance technology. But due to the limited ability of financial support of Royal Thai Government, the request for additional new technical assistance project from the government of Japan is; therefore; considered very necessary.

2. Detailed of the project

2.1 Project goal

To find out the best solution of FMD vaccine production technique in safety use, best quality and best economy. It will increase the productivity of livestock and income of traditional village livestock owners in Thailand by means of animal diseases control in high standard of disease diagnosis and genetic upgrading in high technology.

2.2 Project objectives:

To research and investigation of Foot and Mouth Disease (FMD) in

1. developing research on diagnosis
2. conducting investigation and research on epidemiology
3. developing assay technique on FMD vaccine
4. developing preservation technique of FMD vaccine

2.3 Condition expected at completion of project or end of project status.

In the five years period of the project operation, the new technique will be introduced to FMD center meanwhile the transfer technology to Thai counterparts and joined research are carrying out. At the end of project status, it expects that FMD center will be changed the technique of vaccine production to new economic procedure. The effective vaccine production will be conducted continuously. The status of FMD center at the completion of project will have work in research and vaccine production parallelly. And also expects that the vaccine production will be up grade technique in the future.

2.4 Recommended sources of information and data related to the project, available for project verification are listed as follows:

- a. Annual Statistic Report, Department of Livestock Development 1985.
- b. Basic design of National Animal Health and Production Institute, Feb. 1985

2.5 Duration of the Project : There are 5 years period.
Starting from October 1986
to September 30, 1992.

2.6 Project site This project will be implemented in Foot and Mouth disease Center, Pakchong District, Pakornrachshima Province

2.7 Project work plan and activities

2.7.1 Detailed work plan or project activities and scope of work study to improve typing and subtyping method of FMD will start from the study of viral protein of FMD field isolates. Utilizing various means such as electrophoresis etc. to check the antigenic variation of viral protein. Techniques of choice are isoelectrofocussing and ribonuclease T₁ mapping.

Improvement of vaccine quality.

Improvement of vaccine quality includes separation of BHK cell before virus infection by sedimentation or centrifugation, concentration of virus by chemical or mechanical and preservation of inactivated and concentrated antigen at ultra low temperature.

Besides, experiment on preparation of oil adjuvanted vaccine for pig with subsequent scaling up to industrial scale.

Vaccine quality assessment.

Various alternative methods such as estimation of 140 S by SRID, UV absorbance specific hyperimmune serum or ELISA should be studied and evaluated for the choice of replacing the challenge method of potency determination.

2.7.2 Time schedule of project activities in

October 1, 1986 to September 30, 1991

	1st year Oct.1,1986-Sept.30,87	2nd year Oct.1,87-Sept.30,88	3rd year Oct.1,88-Sept.30,89	4th year Oct.1.89-Sept.30 90	5th year Oct.1.90-Sept.30,91
Activities	Oct.1,1986-Sept.30,87 Oct.1,87-Sept.30,88 Oct.1,88-Sept.30,89 Oct.1.89-Sept.30 90 Oct.1.90-Sept.30,91				
1. Purification and Concentration of FMD Vaccine	→	→	—	—	—
2. Oil adjuvanted vaccine	↔	↔	—	—	—
3. Quality control	↔	↔	↔	↔	↔
4. Viral protein	—	—	—	↔	↔

3. Details of the implementing/operating agency

3.1 Institutional framework (including coordination with other agencies concerned).

Institutional framework of the Institute

The National Animal Health and Production Institute will be organized under the DLD and will stand in position to assist technically the related various organizations particularly to Foot and Mouth Disease Center, Veterinary Biologics Division. The Institutional framework of the Institute could be described in the chart of Institutional framework of the proposed Institute (page 10)

Thai counterparts of FMD center

Director	- Dr. Thinakorn Chandakeaw
Deputy-director	- Dr. Ab Kongtone
Administrative section	- Dr. Thinakorn Chandskeaw - Mrs. Aimorn Aranwanone - Miss. Achra Somkraw
Vaccine Production section	- Dr. Pichit Makasane - Dr. Payone Sinsuwongwatana - Dr. Panant Thanacharoenwatch - Dr. Nonglakana Cholsin - Dr. Wachreree Sinsuwongwatana - Dr. Wongchun Kun-In - Mr. Chareomsark Pinratana
Quality Control and Experimental Animal Section	- Dr. Suneechit Kongtone - Dr. Tarika Pramoonsinsarbp - Dr. Nopporn Pattanaprasit - Mr. Chaiyapat Karndee
Laboratory Supply section	- Dr. Thinakorn Chandakeaw - Mr. Tongdee Keontha - Mr. Chanasongkarm Chaiyarat - Mr. Somyote Angkar
Tongue epithelium and Serum Collection section	- Mr. Niran Supreeyawanachai
Research and Diagnosis section	- Dr. Ab Kongtone - Dr. Wilai Sinchongsubongkoie - Dr. Sonchai Kamolsiripichaiporn - Dr. Charunee Sastra - Dr. Suchad Suttirut
Machanic and Constructive section	- Mr. Somsark Baewchaye

Ministry of Agriculture and Cooperatives

Department of Livestock Development

National Animal Health
and Production Institute

Divisions

Veterinary
Biologics Division

Foot and Mouth
Disease Center

- Universities
- National Research
council of Thailand
- Department of Technical and
Economic Cooperation (DTEC)
- Other agencies concerned

To research and
investigate foot
and Mouth Disease
in Thailand

3.2 Organization

Section	Function
1. FMD Center	To produce the foot and mouth disease vaccine.
2. Vaccine production	To culture the viral cell by Tissue culture and Frankel methods.
3. Quality control	To test the potency, safety, purity, etc, of the vaccine before distributing to the field service.
4. Experimental animal	To takecare, breed, control sanitary condition and control disease infection.
5. Laboratory supply	To clean glassware and laboratory instruments, then sterile them for laboratory supplied.
6. Tongue epithelium and serum collection	To collect and look for the cattle tongue with membrane for culturing the viral cells by Frenkel Method.
7. Research and Diagnosis	To look for the advanced technique and apply to center. To find out the problem concerned and solve it. To identify FMD field samples.
8. Administrative	To manage the manpower, facilities and organize the process within the center. To co-ordinate with the Livestock Department and other official concerned.
9. Mechanical and Constructive	To machine, electricals, water and other effeciency concerned.

3.3 Number of Thai staff of FMD Vaccine Production Center.

Year	Head and veterinarians	Assistant	Machanic	Workers	Administratives	Total
1984-85 (Already available)	27	29	6	147	20	209
1985-86 (to be requested)	29	33	7	153	21	243

Head and veterinarian : at least D.V.M.
 Assistant : at least B.Sc. or Certified Veterinarian
 Machanic : at least certified machanic
 Administrative : at least certified clerk

4. Assistance requested

4.1 Expert

Field of operation/activity	Total		1987		1988		1989		1990		1991	
	No.	m/m	No.	m/m	No.	m/m	No.	m/m	No.	m/m	No.	m/m
1. Biochemistry	2	24	-	-	-	-	-	-	1	12	1	12
2. Quality control	2	24	1	12	1	12	-	-	-	-	-	-
3. Purification & conc. of vaccine	1	12	1	12	-	-	-	-	-	-	-	-
4. Oil adjuvanted vaccine (MDP)	1	6	1	6	-	-	-	-	-	-	-	-

4.1.1 Justification for requesting experts.

By the strong effort of Thai and Japanese scientists in the collaborative work on the project of strengthening foot and mouth disease vaccine production capability for 8 years, the project was successfully terminated in 1986. However, some small points are being left for future study. These include, in particular, study of viral protein for virus strain comparison, evaluation of vaccine potency by alternative methods, cryopreservation of inactivated virus, preparation of oil adjuvanted vaccine. Experts in these field are still necessary in helping the FMD center to properly function.

4.1.2 Job description of experts requested are described below.

Post title : expert in biochemistry.

Duration : Twelve (12) months each of two (2) experts in 1990 and 1991.

Duty station : Research section ; FMD center Pakchong Nakhon Ratchasima.

Duties : To give advice on :

- (a) separation of viral proteins.
- (b) study of polypeptide.

(c) conducting isoelectrofocussing.
 (d) conducting ribonuclease T₁ mapping.
 (e) sequencing amino acid and nucleic acid.

Qualification : (a) Ph. D. in Biochemistry.
 (b) Experience at least 10 years in protein,
 amino acid, nucleic acid.

Age : Between 30 to 45 years.

Language : Good in English.

Background information : Protein or enzyme.

Post title : Expert in vaccine quality control.

Duration : Twelve (12) months each of two (2) experts
 in 1987 and 1988.

Duty station : Quality control section, FMD center,
 Pakchong, Nakhon Ratchasima.

Duties : To advise, establish and evaluate alternative
 methods for efficacy assessment of FMD
 vaccine.

Qualification : Ph.D.

Age : Between 35-46 year old.

Language : Good in English.

Background information : Background with D.V.M., biologist or
 scientist.
 Experience in FMD at last 1 year.
 Experience in vaccine quality control at
 least 10 years.

4.2 Fellowship

Field of study/training	Total		1987		1988		1989		1990		1991	
	No	m/m	No	m/m	No	m/m	No	m/m	No	m/m	No	m/m
1. Biochemistry	1	12	-	-	-	-	1	12	-	-	-	-
2. Quality control	3	18	1	6	1	6	1	6	-	-	-	-
3. Purification & concentration technique	2	12	1	6	-	-	-	-	1	6	-	-
4. Maintenance & con- trol of the fermentor	1	3	1	3	-	-	-	-	-	-	-	-
5. Genetic engineering	2	26	-	-	1	13	-	-	1	13	-	-

4.2.1 Justification for requesting fellowship.

One fellowship for training in biochemistry.

Antigenic variation of foot and mouth disease virus is one of the most important factors influencing potency of vaccine under field condition. Complement fixation and serum neutralization tests had been widely used for the purpose. However, differentiation of FMD virus strains is recently concentrated in viral protein capsids. To be acquainted with techniques concerning the study of characteristics of protein, amino acid nucleic acid, expert in biochemistry is really needed.

Three fellowships for training in quality control.

Quality of vaccine is one of the most important factors in controlling disease outbreak by means of vaccination. Potency of FMD vaccine is equally to be considered with the vaccination coverage of susceptible animals in the area. To establish minimum requirement for FMD vaccine quality, various sophisticated methods and techniques have been carried out, but the results are not satisfactory. Knowledge of alternative methods for evaluation of FMD vaccine is needed. Though Japan is free from the disease, but Japan is still the good source to search for this kind of technology, from which it will be applied to the assessment of FMD vaccine quality.

4.3 Equipment

Description of equipment item	amount requested for each item	unit price (US \$)	Total cost (US \$)	1987 (US \$)	1988 (US \$)	1989 (US \$)	1990 (US \$)	1991 (US \$)
1. Horizontal gel electrophoresis (20x25 cm)	1	1,600	1,600	-	-	1,600	-	-
2. Horizontal gel electrophoresis (11x14 cm)	1	600	600	-	-	600	-	-
3. Vertical gel electrophoresis	1	1,100	1,100	-	-	1,100	-	-
4. Sequencing gel electrophoresis system model SO	1	1,450	1,450	-	-	1,450	-	-
5. Sequencing gel electrophoresis system model SI	1	1,600	1,600	-	-	1,600	-	-
6. Micropipette								
0-2 µl	2	18	36	-	-	36	-	-
0-20 µl	2	18	36	-	-	36	-	-
0-200 µl	2	18	36	-	-	36	-	-
1000 µl	2	18	36	-	-	36	-	-
7. Slap gel dryer	1			-	-		-	-
8. Protein double slab electrophoresis	1							
9. Electrophoresis power supply (c-2000 U)	2	1,200	2,400	-	-	2,400	-	-
10. Polaroid camera with UV light setting	1	3,600	3,600	-	-	3,600	-	-
11. Film case (Kodak)	1	65	65	-	-	65	-	-
12. Tank and reagent for developing film	1	65	65	-	-	65	-	-
13. Microcentrifuge (refrigerated)	1	2,400	2,400	-	-	2,400	-	-

4.3 (Cont.)

Description of equipment item	amount requested for each item	Unit price (US \$)	total cost (US \$)	1987 (US \$)	1988 (US \$)	1989 (US \$)	1990 (US \$)	1991 (US \$)
14. Microcentrifuge with vacuum dryer	1	3,000	3,000	-	-	3,000	-	-
15. UV lamp	1	300	300	-	-	300	-	-
16. Geiger counter	1			-	-		-	-
17. Redioactive counter machine	1			-	-		-	-
18. Electrofocussing electrodes	1			-	-		-	-
19. Aecessories for Hitachi 100-40 series spectro-								
19.1 auto Zero Unit	1	6,300	6,300	6,300	-	-	-	-
19.2 Digital Printer	1	8,550	8,550	8,550				
20. Automatic Sampling system model 611	1	18,000	1,800	1,800	-	-	-	-
21. Clean bench, Hitachi SCV-1301 ECII	1	17,000	17,000	17,000	-	-	-	-
22. FA. microscope VFD-TR with camera	1	26,000	26,000	26,000	-	-	-	-
23. Deep freezer (Forma) (-85 C)	1	18,500	18,500	18,500	-	-	-	-
24. Ultrafiltration (amicon)	2	14,800	19,600	19,600	-	-	-	-
25. Refrigerated centrifuge Hitachi 18 RF-52	1	55,555	55,555	55,555	-	-	-	-
26. Filter holder (millipore)	1				-	-	-	-
27. Jet sucker, JS 75A	2	4,100	8,200	8,200	-	-	-	-
28. Refrigerator(Sanyo)	1				-	-	-	-
29. pH meter(Beckman)	1	3,700	3,700	3,700	-	-	-	-
30. Filter holder (soutorius)	3	370	1,110	1,110	-	-	-	-
31. Stand	5	75	375	375	-	-	-	-

4.3 (Cont.)

Description of equipment item	amount requested for each item	Unit price (US \$)	total cost (US \$)	1987 (US \$)	1988 (US \$)	1989 (US \$)	1990 (US \$)	1991 (US \$)
32. Mixer TM-300	2	850	1,700	1,700	-	-	-	-
34. Multichannel pipette 5.5 ul	1	1,185	1,185	1,185	-	-	-	-
35. Single pipette (Exel) (5-75 ul)	2	1,100	2,200	2,200	-	-	-	-
36. Microwasher (Flow)	1	60	60	60	-	-	-	-
37. Microincubator (Flow)	1	770	770	770	-	-	-	-
38. Microprocessor controlled CO ₂ incubator (Flow)	1	3,555	3,555	3,555	-	-	-	-
39. Motorized multipipetter (Titer-trex autodrop)	1	14,800	14,800	14,800	-	-	-	-
40. Multidiluter (Titer-trex)	1	5,350	5,350	5,350	-	-	-	-
41. Plastic bottle with stopper and pipe	300	14.8	4,440	4,440	-	-	-	-
42. Aluminum case for GP	50	65	3,250	3,250	-	-	-	-
43. Grass cutter	1	1,600	1,600	1,600	-	-	-	-
44. Balance (200 kg)	1	2,600	2,600	2,600	-	-	-	-
45. Amicon hollowfiber cartridge type H 53	16	3,500	56,000	-	3,500	-	-	-
46. Polypropylene bottle (12 L. with rubber stopper)	70	142.85	9,995	5,714	-	-	2,857	1,428.5
47. Stereomicroscope & accessory (Olympus, VMZ)	1	110,000	110,000	110,000	-	-	-	-
48. Ultrafiltration	1	2,000	2,000	2,000	-	-	-	-
49. Four-well multidisc (2.2 ml/well)	500	35	17,500	10,500	-	3,500	-	3,500
50. Octapette & accesrocy (complete set)	1	250	250	250	-	-	-	-

4.3 (Cont)

Description of equipment item	amount requested for each item	Unit price (US \$)	total cost (US \$)	1987 (US \$)	1988 (US \$)	1989 (US \$)	1990 (US \$)	1991 (US \$)
51. Digitalthermometry with thermocouple	1	250	250	-	-	-	-	-
52. Ultrasonic cleaner with built in timer and heater	1	1,428.75	1,428.75	1,428.75	-	-	-	-
53. Homogenizer (Laboratory scale)	1	1,000	1,000	1,000	-	-	-	-
54. Ultrasonic homogenizer	1	600	600	600	-	-	-	-
55. System fermentor	1	15,000	15,000	15,000	-	-	-	-
56. Ultraviolet sterilization	1	17,500	17,500	17,500	-	-	-	-
Total			48,052.25	72,192.75	56,000	21,824	2,857	4,923.5

4.4 Other

Item requested	Total US\$	1987 US\$	1988 US\$	1989 US\$	1990 US\$	1991 US\$
1. Laboratory material supplies, media, antigen, spare parts, special glass ware etc.	1	0.40	0.15	0.15	0.15	0.15

4.4.1 Justification

In accordance with the limitation of each fiscal budget, some spare parts of imported equipments, some laboratory material supplies such as chemicals, media for culturing organisms, special glass wares, antigen etc. are to import from Japan. Those are needed to supply to the urgent case of diagnosis services and applies research. For carrying out smoothly, it is necessary to request the kindness present from the Government of Japan.

4.5 Conclusion the assistance requested.

Item requested	Total cost US\$	Sub Total Cost				
		1987 US\$	1988 US\$	1989 US\$	1990 US\$	1991 US\$
1. Equipment	0.4347	.37	0.056	0.021	0.028	0.049
2. Laboratory supplies, media, antigen, spare parts, special glass wares etc.	1	.4	.15	.15	.15	.15
Grand Total	1.4547	.77	.206	.171	.1528	.1549

Note: Grand Total cost in this project excludes the expenses of fellowships and experts.

5. Royal Thai Government Counterpart Contribution will contribute to the project (in baht)

Description of Government Counterpart Contribution	Total Contribution		Year					
	Already available	To be requested	1986-1987	1987-1988	1988-1989	1989-1990	19	
			5,411,900	7,440,180	7,887,240	8,367,240	8	
1. Project personnel		37,955,000						
1.1 Professional staff								
1.2 Administrative								
2. Land, construction and non-expendable materials	63,710,000	19,205,200	14,564,200	1,000,000	1,100,000	1,210,000		1
3. Expendable materials	-	16,450,900	2,802,000	2,940,00	3,235,000	3,559,000		3
4. Miscellaneous		228,900	21,900	39,820	47,760	53,760		
Sub Total	63,710,000	73,840,000	22,800,000	11,420,000	12,270,000	13,190,000		14
Grand Total	137,420,000							

6. Related projects/activities

6.1 Previous assistance received in fields related to the project.

- a. Animal Health Improvement Project, under Colombo Plans.
The technical assistance of the Government of Japan.
- b. The Establishment of Northeast Regional Veterinary Diagnostic Laboratory Center. The technical assistance of the Government of Republic of Germany.
- c. North Regional Veterinary Diagnostic Laboratory Center.
The technical assistance of the Government of Australia.

6.2 Present complementary or supplementary project.

- a. National Animal Health and Production Institute, Grant in aid of the Government of Japan.
- b. as the same as 6.1.

7. Future work plan

It is confidentially expected that after the termination of the project, the FMD center will carry out in economic procedure effectively, both activities of vaccine production and research projects will be up grade parallelly. Moreover, both Japanese and Thai researchers will be obtained in much deeper experience in diagnosis, assay and preservation of FMD. And also expected that the further collaboration in research work between Thai and Japanese researchers will be extended unbimittedly.

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