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ASEAN Food Handling Project

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Handling of Livestock and Livestock Products in ASEAN 1978 to 1989

A review of the activities and achievements of the livestock components of the ASEAN Food Handling Project of the ASEAN-Australia Economic Co-operation Program

ASEAN Food Handling Bureau
Kuala Lumpur
1990

ASEAN Food Handling Project

Handling of Livestock and Livestock Products in ASEAN 1978 to 1989

by

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University of Tasmania
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* Senior Consultant, ASEAN Food Handling Bureau, 1980-84

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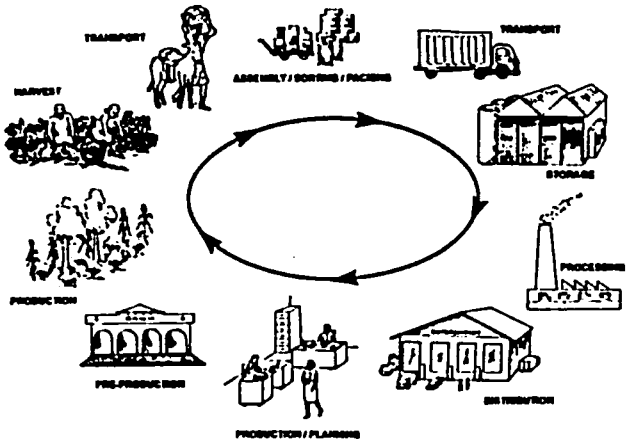
A Commodity Systems Assessment Methodology for Problem and Project Identification

By
Jerry La Gra



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Introduction

1

The countries of the Association of South East Asian Nations - ASEAN: Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand, cover an area of 3,097,948 square kilometres and had a population estimated at 290 million in 1985. The total agricultural land area is 295,593,000 hectares. The region has one of the fastest economic growth rates by world standards.

Livestock production development is a vital aspect of the agricultural policies of the ASEAN countries and plays an important role in national and regional economies. Livestock provide the main source of protein food, generate substantial economic activity and employment opportunities, and exports of livestock and livestock products contribute to foreign exchange earnings.

The population of food animals in ASEAN has increased substantially in the past decade (See Table 1, p 2). For both the producers and the consumers to fully benefit from the increased production, economic losses and hygiene problems in the handling and distribution system for livestock and livestock products must be minimised. Livestock products can be highly perishable and susceptible to losses and contamination. Systems introduced must draw on up-to-date technology while being appropriate to the local conditions.

This review outlines the activities and achievements of the livestock component of the ASEAN Food Handling Project of the ASEAN-Australia Economic Co-operation Program (AAECP). It is based on the various reports submitted to the ASEAN Livestock Working Group (LWG) by consultants and project implementors.

The assistance of the members of the Livestock Working Group and the ASEAN Food Handling Bureau (AFHB) in the compilation of this report is gratefully acknowledged.

1

Table 1. Livestock Population in ASEAN

	Indonesia	Malaysia	Philippines	Singapore	Thailand
Cattle					
Annual Av (000) 1986-88	6,478	617	1,754	0	4,949
% Change Since 1976-78	2	30	(0)	(62)	13
Sheep&Goats					
Annual Av (000) 1986-88	17,674	443	2,134	2	155
% Change Since 1976-78	59	7	51	(10)	139
Pigs					
Annual Av (000) 1986-88	6,120	2,203	7,298	479	4,223
% Change Since 1976-78	108	42	15	(58)	6
Equines					
Annual Av (000) 1986-88	713	5	300	0	20
% Change Since 1976-78	12	1	(3)	x	(24)
Buffaloes					
Annual Av (000) 1986-88	2,977	214	2,913	0	6,085
% Change Since 1976-78	30	(26)	2	(83)	3
Chickens					
Annual Av (000) 1986-88	395	57	55	8	83
% Change Since 1976-78	265	24	11	(41)	45

Notes: Based on Food and Agriculture Organisation (FAO) of the United Nations statistics; 0 = zero or less than half the unit of measure; x = not available; negative numbers are shown in parentheses.

Source: World Resources Institute, *World Resources 1990-91,* OUP, New York 1990, pp 282-283.

ASEAN Food Handling Project

2

The concept of an economic co-operation program between ASEAN and Australia had its beginnings at an informal meeting between the ASEAN Secretaries-General and officials of the Australian Government in Bangkok in January 1974.

This paved the way for the formal inauguration of an ASEAN-Australia dialogue in Canberra in April 1974. In line with the Bangkok initiatives, the Australian Government announced the commitment of an initial $A5 million to an ASEAN-Australia Economic Co-operation Program for the implementation of projects which could be undertaken through the co-operative efforts of the member countries of ASEAN and Australia.

One of the co-operative projects identified was: Development of improved techniques for postharvest handling of grains, horticulture products, livestock and fish - now known as the **ASEAN Food Handling Project .**

Following a series of experts meetings in 1974 and 1975, the **ASEAN Sub-Committee on Food Handling (SCOFH)** was formed and made responsible to the **ASEAN Committee on Food, Agriculture and Forestry (COFAF)** for the Project. Its first meeting was held in Penang, Malaysia on 29 November - 1 December 1976. The meeting discussed and planned the implementation of the Grains and Horticulture aspects of the Project and appointed Singapore to co-ordinate an identification study for the Livestock and Fish aspects.

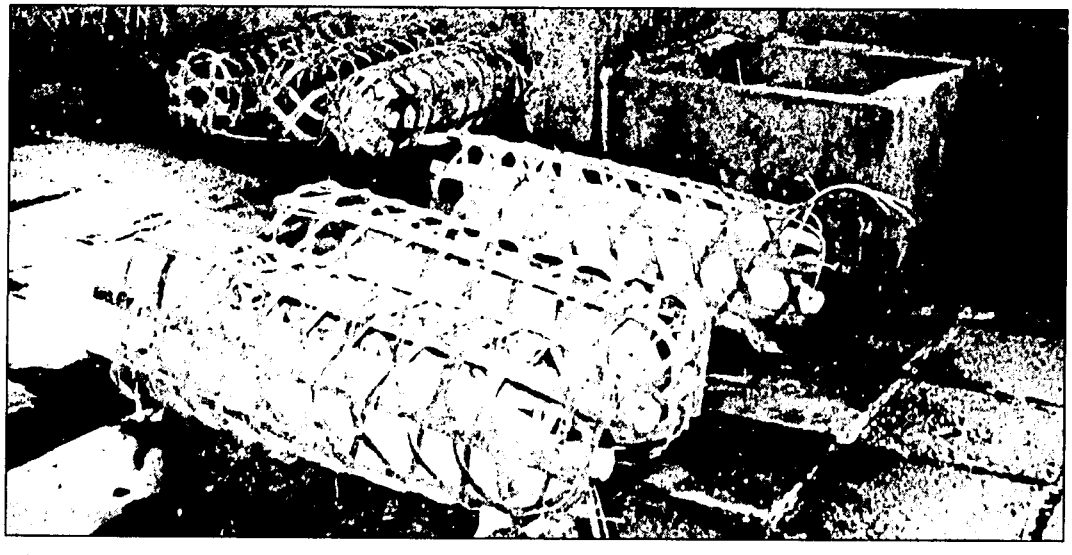
Emphasis in the Project was placed on reducing postharvest and postproduction losses in the handling and distribution of food between producers and consumers; on increasing the quantity and improving the quality of the food supply; and on increasing the return to local food producers.

3 ASEAN-Australian Appraisal Mission

An ASEAN-Australian Team led by Dr Chua Sin Bin (Singapore) and J E Bleasel (Australia) conducted an appraisal mission from 25 April to 13 July 1977 visiting all the ASEAN countries to identify and assess the priorities for solving problems associated with the handling of livestock, livestock products and fish.

The ASEAN-Australian Appraisal Mission found that in 1977:

- The two major impediments to improving the producers' net returns were inefficiencies in the marketing and distribution systems and a general lack of market communications. Improvements were needed to the total livestock system including direct access to larger markets through better transport and improved quarantine stations and abattoirs.
- Livestock production was increasing steadily to meet the domestic requirements and the export demands. Problems and difficulties encountered in the handling of livestock and their products in ASEAN countries were complex in nature.
- Abattoirs were a critical area requiring attention. In Indonesia, Malaysia, the Philippines and Thailand there were numerous abattoirs which were old and unsanitary and which were frequently improperly located due to the growth of the city or town which they served. Livestock were not handled in a manner conducive to producing good keeping-quality meat. Postslaughter contamination of meat pre-disposed this high-value protein food to rapid deterioration and spoilage.



Old and unsanitary abattoir facilities

- The meat industry had a problem in maintaining product quality and reducing losses encountered through spoilage, mortality, injury, shrinkage and condemnation, resulting from the inadequate and unsatisfactory facilities.

- Because of the lack of refrigeration in many areas and the traditional preference for slaughter warm meat, greater care needed to be taken to ensure hygienic handling and that products maintained good keeping-quality suitable for the marketing system.

- An efficient hygiene and quality control system was needed to protect local consumers from inferior quality products and unethical practices.

- The lack of trained personnel in the field of hygiene and quality control in ASEAN countries had hampered the development and improvement of the livestock industry. There was an urgent need to train qualified officers to advise handlers and processors on the methods, and the importance, of maintaining a high standard of hygiene and quality control. There was also a need for officers who could conduct the hygiene inspections and enforce the quality control measures necessary to ensure that the regulatory requirements were being met.

- Traditional quality assessment by means of visual inspection was no longer adequate to meet the challenge of changing animal husbandry practices and other

Dairy cattle shed – poorly laid out and difficult to keep clean

production technology. Conditions which were readily detectable by visual means were rapidly declining. More reliance needed to be placed on laboratory analysis and instrumental aids. It was of paramount importance that basic facilities for hygiene and quality control be provided for in all ASEAN countries to complement the visual inspection system.

- Laboratory tests carried out on livestock products were frequently not standardised. To produce a standard is often a long and difficult job for a national standards association. The lack of testing facilities and uniformity in the testing methodology has resulted in disputes between buyers and sellers, and has created a barrier to the development of trade in livestock products.

- The dairy development policies of the governments of Indonesia, Malaysia, the Philippines and Thailand were based on the approach that effort should be directed towards the development of the industry on a "small farmer" basis. This then improved the standard of living of many farmers and their dependants. These national policies were already showing positive results.

- The wide range of work needed in developing the dairy industry involved numerous personnel trained in a variety of practical fields. To train these people, who would range from farmers to veterinary assistants and extension officers, a nucleus of qualified and experienced practical instructors was required.

- Extension services to farmers required trained staff, as do the management of milk collection and processing centres. Farm or factory inspectors administering local agricultural regulations also required advanced training.

The Appraisal Mission report contained a series of recommendations designed to address the problems identified. A number of these were taken up directly at the national level and an initial series of seven projects were adopted for implementation on an ASEAN basis where a common approach to regional problems could be most effective. The Appraisal Mission report was considered and adopted as the basis for the Livestock and Fish components of the ASEAN Food Handling Project by the Third Meeting of the Sub-Committee on Food Handling held in Manila on 25 - 28 October 1977.

The Team also recommended the establishment of an ASEAN Centre for Appropriate Technology, later to become the **ASEAN Food Handling Bureau**, to provide technical support to projects in the region.

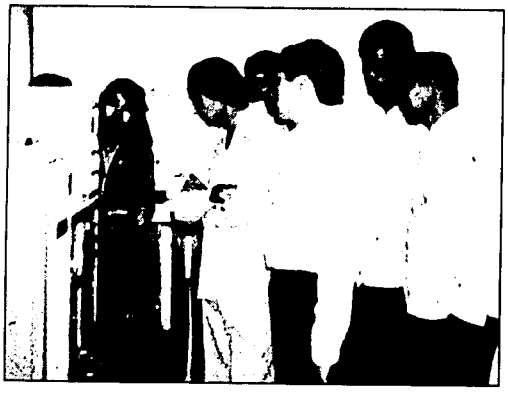
ASEAN Livestock Working Group

4

As the level of activity in the Food Handling Project increased, the need for Working Groups to oversee and provide specialised technical input to the projects was recognised. The inaugural meeting of the **Livestock Working Group** was held on 27 - 28 February 1978 in Indonesia.

The Working Group comprises one delegate each from the ASEAN countries and a Co-ordinator. The office of Co-ordinator is rotated among the ASEAN member countries. Since Brunei joined ASEAN, it has not participated directly in the Working Group as it has no significant livestock industry, but it may participate in future.

The Working Group also had the services of an Australian Consultant, J E Bleasel of the Australian National Materials Handling Bureau (NMHB), from 1978 - 1984. The role of the Working Group Consultant was to provide professional and project management advice to the Working Group in the identification, formulation and implementation of projects. Through him, the Working Group had ready access to Australian experts in specific technical and scientific areas, as well as to an effective channel of communication and co-operation with other relevant organisations and institutions in Australia.



Project visits – a feature of LWG meetings; delegates inspecting the hygiene and quality control laboratory in Thailand

In addition, the ASEAN Food Handling Bureau established in 1980 has provided continuous technical and administrative support to the Working Group.

The members of the ASEAN Livestock Working Group, the dates and venues of its 21 meetings, and its Terms of Reference are given at Appendices A, B and C respectively.

The organisation and management structure of the Food Handling Project emphasizes regional collaboration between the ASEAN countries, and at the same time provides ample opportunities for technical exchanges and co-operation with Australia, particularly at the operating level.

Through the LWG member in each country, the relevant agency has the task of implementing the various components of the Project. The agencies in each country responsible for implementation and the various co-operating agencies in Australia are given at Appendix D.

5 Profile of Projects

The ASEAN-Australian Appraisal Mission recommended seven sub-projects in the livestock sector which were approved for implementation from 1978.

L1 Abattoir Designs and Design Concepts for ASEAN

To produce standard abattoir designs and design concepts which provide for hygienic slaughtering at the lowest possible cost.

L2 Model Hygiene and Quality Control System for Meat

To develop a model quality control system for meat for ASEAN in order to achieve and maintain a high standard of meat quality control.

L3 Hygiene and Quality Control Laboratories

To set up laboratories for the quality control of livestock products in Indonesia, Malaysia, the Philippines and Thailand.

L4 Dairy Development

To assist in the development of national smallholder dairy programs in order to improve hygiene and efficiency in the handling of milk.

L5 Training Course in Hygiene and Quality Control

To establish a training centre in Singapore and to conduct a series of courses on laboratory meat safety and quality control for ASEAN laboratory personnel.

L6 Livestock Transport

To investigate livestock transport systems, both land and sea, and design, acquire and conduct trials of special-purpose livestock vehicles and transport systems.

L7 Meat Refrigeration and Processing Establishments

To prepare design concepts for meat processing establishments which are economical to construct, have low maintenance costs and are easy to clean; and to determine the most economical method for chilling and maintaining chill in livestock products.

A further series of activities was developed by the Livestock Working Group, in conjunction with the ASEAN Food Handling Bureau, to consolidate and build on the results already being achieved. These five sub-projects were endorsed by the Sub-Committee on Food Handling at

its Tenth Meeting on 1 - 5 September 1981 and funding of $A3.5 million was approved at the ASEAN-Australia Forum on 26 - 27 October 1982. Implementation of these sub-projects commenced in 1983.

NL1 Quality Control Program for Livestock Products [Extension of L3]

To consolidate and expand laboratory facilities in order to improve hygiene and quality control services for foods of animal origin.

NL2 Milk Handling [Extension of L4]

To improve the handling and transport of milk from small farms and to ensure the quality and hygiene of the product.

NL3 Livestock Transport [Extension of L6]

To improve the handling of livestock through the conduct of studies and the acquisition of special-purpose livestock vehicles and transport systems.

NL4 Training [Extension of L5]

To provide training in food handling and hygiene for laboratory and inspection service personnel.

NL5 Pilot Abattoirs [Extension of L1]

To apply the ASEAN design concepts and standard designs to abattoirs on a pilot basis.

Between 1978 and 1989, more than $A6 million was applied to the activities of the Livestock Working Group under the ASEAN-Australia Economic Co-operation Program. The breakdown of these funds by sub-project is shown in Table 2, p 10.

Table 2. ASEAN Livestock Sub-Projects as at 30 June 1989

No.	Title	Budget ($A'000)	Location
L1	Abattoir Designs and Design Concepts for ASEAN	80	Indonesia, Malaysia, Philippines, Thailand
L2	Model Hygiene and Quality Control System for Meat	75	Singapore
L3	Hygiene and Quality Control Laboratories	775	Indonesia, Malaysia, Philippines, Thailand
L4	Dairy Development	600	Indonesia, Malaysia, Philippines, Thailand
L5	Training Course in Hygiene and Quality Control	1,040	Singapore
L6	Livestock Transport	90	Indonesia, Malaysia, Philippines, Singapore, Thailand
L7	Meat Refrigeration and Processing Establishments	56	Indonesia, Philippines, Thailand
	Sub-total	2,716	
NL1	Quality Control Program for Livestock Products	1,200	Indonesia, Malaysia, Philippines, Singapore, Thailand
NL2	Milk Handling	937	Indonesia, Malaysia, Philippines, Thailand
NL3	Livestock Transport	575	Indonesia, Malaysia, Philippines, Singapore, Thailand
NL4	Training	618	Indonesia, Malaysia, Philippines, Singapore, Thailand
NL5	Pilot Abattoirs	90	Indonesia, Malaysia, Philippines, Thailand
	Sub-total	3,420	
	TOTAL	6,136	

Abattoirs

6

Background

As abattoirs are at the start of the distribution chain for meat, it is essential that they be as hygienic as possible in order to reduce economic losses due to premature spoilage caused by contamination, and to prevent the spreading of both human and animal diseases. Meat is a vital protein food of high nutritional value for the general population and the cost of providing facilities for hygienic slaughtering should not cause a significant increase in the price of meat.

Project work on abattoirs was conducted in two stages. An initial design study was followed up by a series of pilot projects to test the design concepts at locations throughout the region.

Abattoir Designs and Design Concepts for ASEAN (L1)

Location:

Indonesia, Malaysia, Philippines, Thailand

Objective:

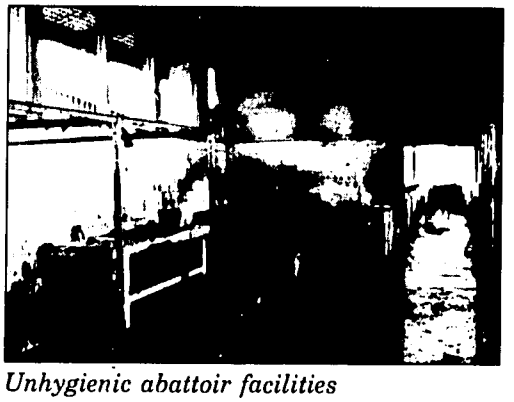
To produce standard abattoir designs and design concepts which provide for hygienic slaughtering at the lowest possible cost.

Description:

A joint ASEAN-Australian team was appointed by the Livestock Working Group to carry out the work. The team comprised: Dr R Darmawan, Director of Production, P D Dharma Jaya (Jakarta Municipal Abattoir), Indonesia; and D J Lyons, Senior Project Engineer, National Materials Handling Bureau, Department of Science and Technology, Australia.

The Team's investigations commenced in late January 1979, initially involving extensive field work and data collection in the region in company with assigned Project Counterparts. The Team reported to the Livestock Working Group prior to and during the preparation of the ASEAN Abattoir Design Handbook.

The Handbook provides those concerned with the design of abattoirs in ASEAN with a comprehensive source of background material and data, design concepts and guidelines, and sample designs which are appropriate for the local political, social, cultural, technological, geographic and, in

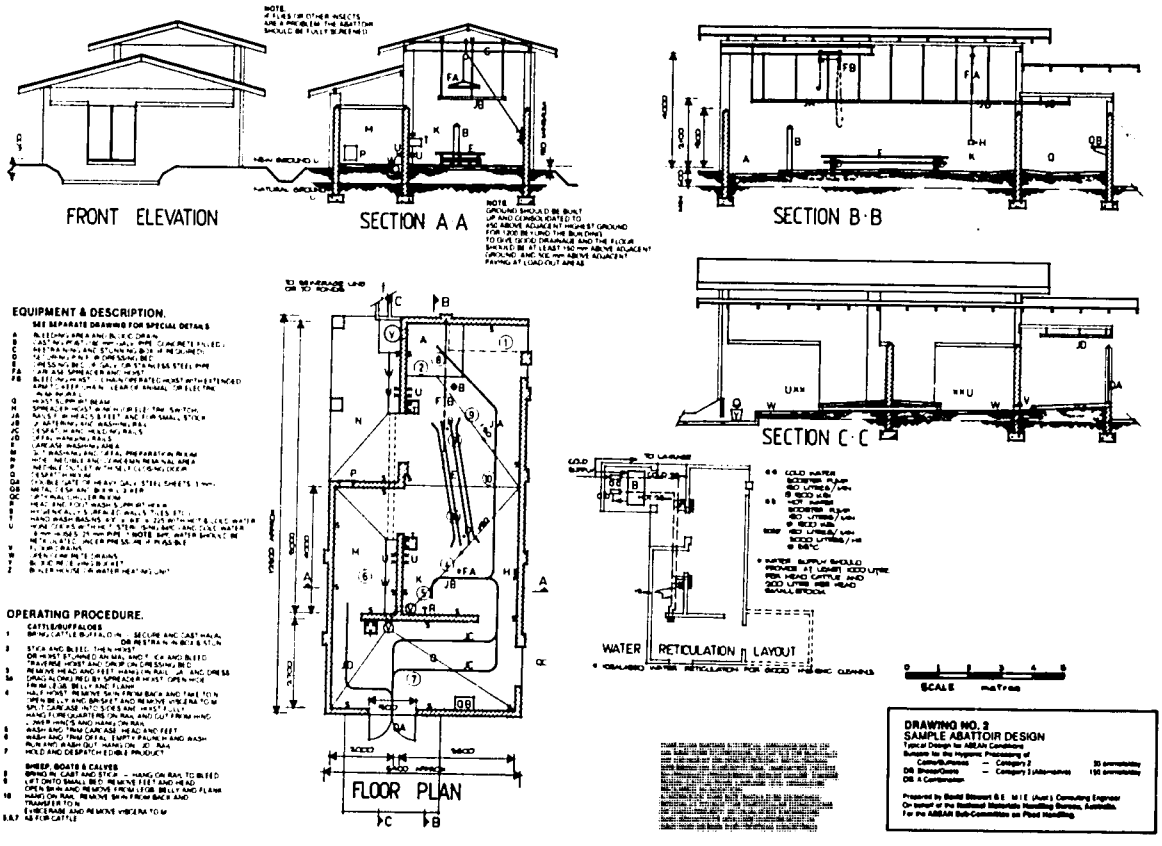


Unhygienic abattoir facilities

particular, economic conditions. This information, when combined with local inputs such as the availability and cost of materials and the capacity and skills of local contractors, will assist in the design of realistic and practical abattoirs. This approach can provide the best facility for an available sum of money or a required standard of hygiene at the lowest possible cost. The study specifically concerned abattoirs for the slaughter of cattle, buffaloes, sheep, goats and pigs, and excluded poultry abattoirs.

The publication was issued by the ASEAN Food Handling Bureau in 1981. To facilitate additions, and the inclusion of local information, it is bound in a loose leaf form and covers the following:

- **Part One - Review of the Abattoir Industry**: Industry Structure, Administration and Regulation; Statistics; Facilities and



Operations; Provision of Utilities; Meat Hygiene and Public Health Aspects; Economic and Financial Aspects; Religious and Cultural Aspects; Industry Problems.

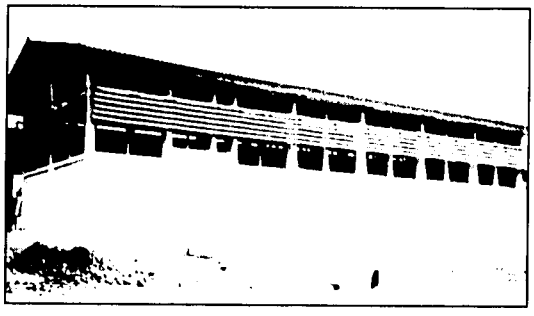
- **Part Two - Design Concepts**: Site; Site Layout; Slaughterhouse Layout; Building Construction and Materials; Water Supply; Waste Disposal; Energy Supplies; Equipment Design and Construction; Operation.

- **Part Three - Sample Designs**: General arrangement drawings of abattoirs for Cattle/Buffaloes, Sheep/Goats and Pigs in four size categories from 2 animals/day up to 2,000 animals/day; and typical Site Plans; Building Construction Details; Equipment Details.

As an addition to the Handbook, an Annex - Regulations Concerning the Construction and Operation of Abattoirs in ASEAN - was subsequently issued.

Output:

The ASEAN Abattoir Design Handbook has been widely distributed and used throughout the region and users have responded favourably to the practical design concepts and standard designs. The Livestock Working Group has promoted its use and has followed up the design study with pilot projects in each country. These pilot abattoirs have demonstrated the hygienic and economical nature of the designs and the objective has been achieved.



Pilot Abattoir at Jambi, Sumatra, Indonesia

Pilot Abattoirs (NL 5)

Location:

Indonesia, Malaysia, Philippines, Thailand

Objective:

To apply the ASEAN design concepts and standard designs to abattoirs on a pilot basis.

Description:

In **Indonesia**, a pilot abattoir was implemented at Jambi, Sumatra. Because of expanding housing and waste disposal problems, the Municipality of Jambi had decided to construct a new abattoir on a site of 3.2 hectares 10 km from the city. The facility was designed in accordance with the ASEAN Abattoir Design Handbook and the building itself was constructed with local government funds. Food Handling Project funds were used to provide equipment, including the rail system, electric scales and hoists, as well as technical assistance. The abattoir site comprises separate cattle and pig

slaughterhalls, livestock market, lairage, offices and housing.

Final installation of equipment was carried out in 1989, followed by a period of training for butchers. The on-rail slaughtering system has been found to be faster and more hygienic, and to reduce meat spoilage.

A new slaughterhouse in Denpasar, Bali has also been constructed in accordance with the ASEAN Abattoir Design Handbook. The hygienic design concepts and designs are being promoted throughout Indonesia.

In **Malaysia**, the sub-project was integrated with the upgrading program for the Taiping Abattoir which began in 1984 in two major phases: pig slaughter facilities - 1984-85; cattle and goat slaughter facilities - 1985-86.

The major input into the upgrading of the abattoir was made by the Department of Veterinary Services which provided funds for the building and infrastructure. Some of the equipment for cattle slaughter, including saws, working tables, bins, cradles and pla'forms was provided out of Food Handling Project funds.

The upgrading of the abattoir involved renovation plus the addition of some new facilities. Changes made were based on the recommendations of the ASEAN Abattoir Design Handbook but the existing building put certain limitations in the way they were adopted. Equipment was installed according to the system of operations recommended.

The pig section of the abattoir was based on Drawing No 7. The cattle section of the abattoir follows Drawing No 3 with modifications for Halal slaughter without the knocking box.

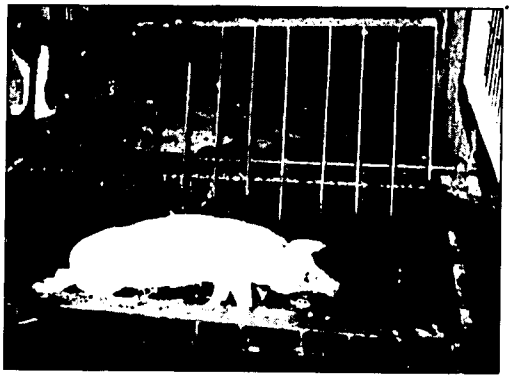
The abattoir has provided a more efficient and hygienic slaughter process and reduced wastage and spoilage of meat.

The Department of Veterinary Services is responsible for all the 220 slaughterhouses in Peninsular Malaysia. Action is being taken in phases to take these over from municipalities and local authorities.

Electric saw at the Taiping Abattoir, Malaysia

Construction of new abattoirs or the renovation of existing ones is proceeding according to the availability of funds and capacity to implement.

Experience with the Taiping Abattoir upgrading provided valuable guidance in the implementation of the national abattoir program which calls for different classes of abattoirs to be located in strategic locations.



Pig dehairing machine at the Bugallon Abattoir, Pangasinan, Philippines

The Municipality of Bugallon, Pangasinan was chosen as the site for the Pilot Abattoir in the **Philippines** because of the willingness of the municipal authorities to co-ordinate with the implementing agencies in the construction of the building and in providing other inputs needed.

The Pilot Abattoir was constructed in accordance with the ASEAN Abattoir Design Handbook for a maximum capacity of 50 pigs and 10 large animals per day. Costs were shared between the Municipality and the Food Handling Project. Locally fabricated equipment included: stunning box, scalding vat, dehairing machine, electric hoist, electric stunner, rollers, gambrels, cattle spreader, water pump and overhead rails for cattle and pigs.

The first slaughtering trial was conducted in December 1988 and adjustments to the system and training of the management and staff has continued to bring the facility up to full capacity.

The new abattoir demonstrates the advantages of modern methods for the hygienic and efficient production of clean, safe and wholesome meat. The facility serves as a model for district abattoirs under the National Abattoir Development Program and has generated local interest in livestock production, by-product utilisation and livestock trading.

The pilot abattoir in **Thailand** was constructed at the Municipality of Loei Province in the northeast. The construction was based on the ASEAN Abattoir Design Handbook. The design work was under the general guidance of the AFHB and the LWG Member for Thailand. The abattoir is able to slaughter 50 cattle/ buffaloes and 30 to 120 pigs per day. The facility consists of the slaughterhall, holding pens, animal loading platform, waste disposal system and biogas producing plant.

The cattle/buffaloes section followed the sample abattoir design drawing No 2, and the pig section used drawing No 6. Some modification was made in both the length and the

width in order to provide larger working areas.

Equipment provided by the Food Handling Proje included: scalding and dehairing machine, stunning tongs, splitting saws, electric hoists, stunning apparatus, dressing frame, skinning bed and knives.

The responsibilities for developing the facility were along the same lines as all the pilot abattoirs:

- Municipality of Loei: Site, building, utilities and local technical supervision.
- AFHB: Technical support, consultancy services, special equipment and steelwork, water tank and waste treatment system, travel costs for Department of Livestock Development staff and training.
- Department of Livestock Development: Overall co-ordination, advice on veterinary and operational aspects, selection and training of staff.

The abattoir is efficient in the slaughter of animals and provides an hygienic process with reduced losses of meat due to spoilage. Improvements in hygiene and efficiency encourage more local people to buy meat from the slaughterhouse. The facility is a model for economic abattoir construction and encourages other municipalities to adopt the design.

Output:

Pilot Abattoirs have been implemented in Indonesia, Malaysia, the Philippines and Thailand in accordance with the ASEAN Abattoir Design Handbook. The abattoirs have provided local benefits in terms of greater efficiency in the slaughtering operation, improved meat hygiene and public health, reduced wastage and spoilage of meat, and reduced environmental problems from the disposal of waste. The Pilot Abattoirs have demonstrated the appropriateness of the Handbook when used in conjunction with local expertise and knowledge. In addition they have a multiplier effect, and serve as demonstration units to encourage wider adoption of improved abattoir designs and systems throughout the region.

Quality Control

7

Background

The lack of hygiene and quality control laboratory facilities and systems was identified by the Appraisal Mission and was addressed through the design of a model system (L2) and the setting up or strengthening of hygiene and quality control laboratories in each country (L3 and NL1).

Model Hygiene and Quality Control System for Meat (L2)

Location:

Singapore

Objective:

To develop a model quality control system for meat for ASEAN in order to achieve and maintain a high standard of meat quality control.

Description:

The Veterinary Public Health Laboratory (VPHL) of the Primary Production Department (PPD), Singapore was the implementing agency.

Laboratory equipment was by necessity a major portion of the budget and represented about three quarters of the total. Priority was given to updating and further developing the analytical capability of the VPHL. This was done by purchasing additional basic equipment and new equipment to replace old or outmoded items. This equipment supplemented the existing instruments and facilities at the VPHL and greatly enhanced the capability of the laboratory.

Output:

Model System - A meat hygiene and quality control system ensuring the supply of safe and wholesome meat was developed as a model for ASEAN, and a paper describing the system was prepared and circulated.

Laboratory Manual - A draft laboratory manual containing a compilation of methods for chemical and microbiological analysis of meat was prepared. The draft manual was incorporated into the two volumes of the Training Manuals prepared by the staff of the School of Food Sciences of the Hawkesbury Agricultural College for use in the ASEAN Training Course on Laboratory Meat Safety and Quality Control held in Singapore. The Training Manuals have been given to all participants of the training courses and members of the Livestock Working Group.

Studies and Surveys - A series of studies and surveys regarding hygiene and quality control of meat, and in some cases other foods, was carried out. These studies and surveys demonstrated the usefulness and the important role of an analytical laboratory in the overall hygiene and quality control program for meat and other primary produce.

These studies included:

- Bacteriological Survey of Meat and Shellfish
- Antibiotic Resistant Patterns of Salmonella Isolates
- Antibiotic Residues in Meat
- Chemical Composition of Imported Canned Pork Luncheon Meat
- Colouring Matter in Meat Products
- Phosphates in Meat Products
- Species Identification in Meat
- Effects of Freezing on the Quality of Meat

Hygiene and Quality Control Laboratories (L3 and NL1)

Location:

Indonesia, Malaysia, Philippines, Singapore, Thailand

Objective:

To set up and expand laboratories in Indonesia, Malaysia, the Philippines, Singapore and Thailand in order to improve hygiene and quality control services for livestock products.

Description:

Service-orientated laboratories for quality control of livestock products are required to:

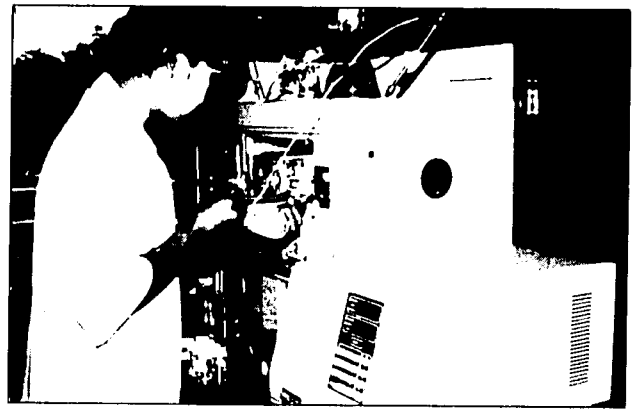
- Develop and promote the use of modern standards of hygiene and quality control for foods of animal origin in ASEAN.
- Strengthen the control and inspection of animal products.
- Identify problems and recommend remedial measures in order that products continue to improve in quality.
- Assist in gathering information from the animal industries that are beneficial for the improvement of veterinary and human health.
- Standardize laboratory procedures and practices within ASEAN for the quality control of livestock products.

In **Indonesia,** equipment was procured for the existing Veterinary Public Health Laboratories of the Provincial Livestock Offices in Java. Quality control extension programs were also conducted for livestock officers in Jakarta, Bogor, Tangerang and Bekasi in April 1989. The quality control equipment provided enables the laboratories to carry out microbiological, chemical, quality and species identification tests on meat, as well as milk quality tests. The laboratories were able to expand and strengthen their services with the new equipment and to contribute to the improvement in meat and milk hygiene in their areas.

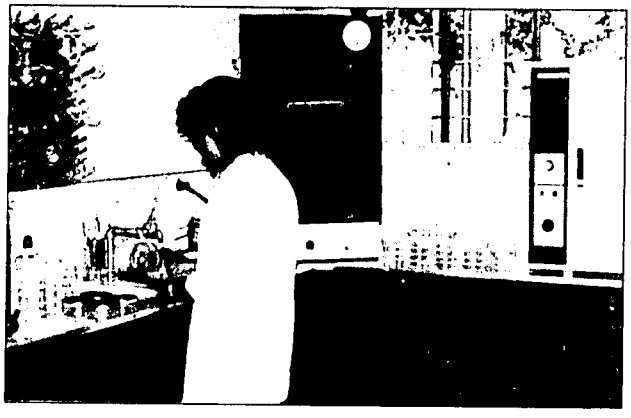
Project funds in **Malaysia** were used to upgrade the equipment of the Veterinary Public Health Laboratory

7

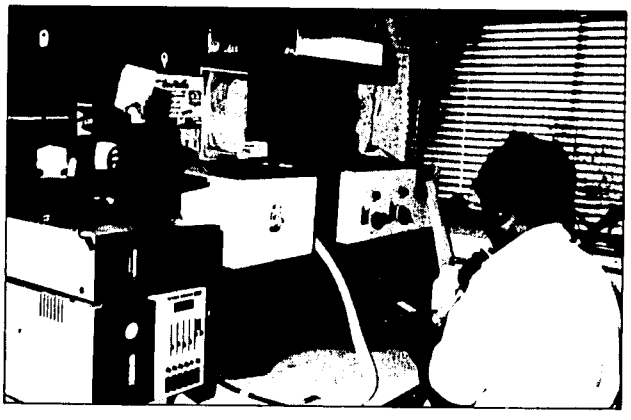
Improved hygiene and quality control services for livestock products



Regional Diagnostic Laboratory, Petaling Jaya, Malaysia



Central Meat Safety & Quality Control Laboratory, Philippines



Veterinary Public Health Laboratory, Bangkok, Thailand

Veterinary Public Health Laboratory, Jakarta, Indonesia

and the Regional Diagnostic Laboratory in Petaling Jaya, Selangor. This now functions both as the Central (Reference) Quality Control Laboratory as well as the local Regional Quality Control Laboratory. Other Regional Quality Control Laboratories are being established at Bukit Tengah, Ipoh, Kuantan, Kota Bahru and Johore Bahru. Purchase and delivery of special equipment was carried out from 1980 to 1983.

The laboratory at Petaling Jaya now has facilities to undertake an extensive range of food tests including microbiology, chemistry, detection of heavy metals, species identification, screening for disease, meat tenderness, and antibiotic and pesticide residues. More than 40,000 tests were conducted in 1988 involving 8,663 samples. Officers of the laboratory also contribute to the drafting of national food regulations and liaise with other counterpart laboratories in the region to establish cross-reference systems.

Project funds have been used in the **Philippines** to purchase equipment for the National Disease and Diagnostic Laboratory of the Bureau of Animal Industry in Manila. The construction of a new quality control laboratory building is planned for 1990. While installed at temporary facilities, the laboratory equipment has been used to conduct a range of microbiological, chemical and other testing. From 1987 to 1989, tests were conducted on 1,125 samples of local and imported products.

Regional Laboratories were also established in Cebu City and Davao City and are playing an important role in meat inspection, disease monitoring and surveillance at a regional level.

The sub-project was successfully implemented to develop the capability of the Veterinary Public Health Laboratory, **Singapore** in the following areas:

- Rapid techniques for detection of bacteria in meat and fish.
- Analytical capability and monitoring programs for additives, contaminants and residues.
- Analytical capability for milk quality control.

The state-of-the-art equipment purchased improved and added to existing analytical capability. The various advanced analytical methods developed can be referred to for adoption as part of the standardization of laboratory procedures and practices within ASEAN.

The laboratory in **Thailand** was developed at the Veterinary Public Health Branch, Department of Livestock Development, Bangkok. The laboratory is now very well equipped as the central meat hygiene and quality control laboratory in Thailand. The services of the laboratory have been expanded over the decade and training has been provided to both Government officers

and officers from the private sector. Improvements in the safety and quality of meat have resulted from the adoption of better slaughtering and processing techniques and better animal husbandry practices at the farm level.

Output:

The output of the sub-project is a network of laboratories in each country with increased analytical capabilities, including food microbiology, meat and milk chemistry, and a range of quality tests.

These laboratories provide a focus for hygiene and quality control improvement programs and promote and develop improved standards of hygiene in food handling systems throughout ASEAN. This results in significant economic and other benefits including reduced wastage of livestock products due to spoilage and disease. In addition, the community benefits from inspection and research programs designed to ensure that products are wholesome and free from health hazards.

The quality control activities have regional benefits as follows:

- The laboratories established in each country are able to co-operate in solving common problems to give more rapid and effective results.
- Advances made in laboratory techniques and operational procedures are shared among ASEAN countries.
- Facilities established in the ASEAN countries are utilised as a medium for exchange of workers, technicians and expertise.
- Having commonly linked facilities in ASEAN has lent itself strongly to develop ASEAN standards of quality control.
- Standardized laboratory procedures and practices have facilitated intra-ASEAN trade in livestock and livestock products.
- Each ASEAN laboratory would be expected, in the long run, to develop as a regional centre of excellence in a particular field of specialization.
- A network of ASEAN laboratories provides a good cross-reference system for the region.

8 Dairy Development

Background

The dairy industry in ASEAN is centred on the production of milk by smallholders whose average herd is between two and five milking animals. Indonesia, Malaysia, the Philippines and Thailand have well established and supported national dairy development programs, with which this ASEAN activity was integrated.

Milk Handling (L4 and NL2)

Location:

Indonesia, Malaysia, Philippines, Thailand

Objective:

To assist in the development of national smallholder dairy programs in order to improve hygiene and efficiency in the handling of milk.

Milk churns transported in open truck exposed to the sun

Description:

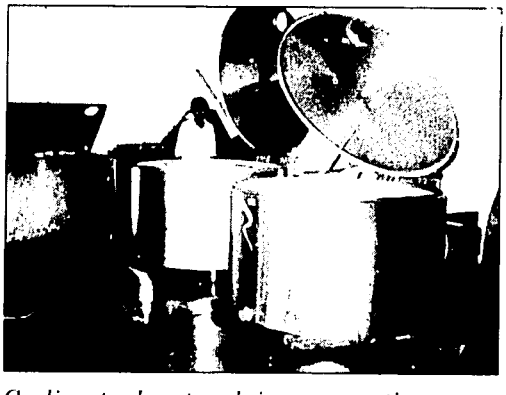
Milk is easily spoiled due to improper handling particularly in tropical climatic conditions. The systems and methods of collecting and transporting raw milk must be carefully developed using appropriate techniques and must be adapted to local conditions, so that the milk is maintained in the best possible hygienic condition in handling from the producer to the consumer.

The Livestock Working Group initiated this sub-project by appointing two consultants to carry out a study of Milk Production and Handling in ASEAN to expand on the work done by the Appraisal Mission. The terms of reference of the study were:

- To study technical refinements required for all stages of milk collection and cooling.
- To consider the development of a model milk collection centre.
- To suggest a simple design for such a centre including full costings of buildings and equipment.
- To propose a model milk processing centre of simple design together with costs for building and plant.
- To consider training needs for operation of the centre and processing plant, extension workers and farmers, relative to milk hygiene.

The two consultants: Dr Hadi bin Dato' Hashim of the Department of Veterinary Services, Department of Agriculture, Malaysia and Dennis Cox of the Victorian Department of Agriculture; conducted field work in Malaysia, Indonesia, the Philippines and Thailand in July - August 1980 and produced their report in 1981. The consultants made specific sub-project recommendations and general recommendations regarding the handling of milk. The report formed the basis for the further formulation and implementation of dairy sub-projects by the LWG, and also contains valuable background and reference information.

In conjunction with the sub-project, the LWG requested the AFHB to arrange for on-the-job training of dairy equipment maintenance technicians. Barry Stewart of the NSW Department of Agriculture (later the NSW Dairy Corporation) was engaged to carry out this work. He visited Indonesia, Malaysia and Thailand in June - August 1982; and the Philippines and Indonesia in



Cooling tanks at a dairy cooperative, Lembang, Bandung, West Java

Barry Stewart training technicians in the Philippines

September - November 1982. These visits were highly successful and achieved the objectives of providing training as well as providing recommendations regarding improvements to equipment, tools, maintenance and training. Follow-up visits made between May and August 1985 also achieved practical results.

It is estimated that 90% of the milk produced in **Indonesia** is collected by the village co-operatives (KUDs) and sold to milk processing plants. Project funds were used to provide equipment such as milk cans, tankers, coolers and steam cleaners to the KUDs in West Java, Central Java, Yogyakarta, East Java and North Sumatra. Improvements in milk handling have resulted in a significant reduction in the milk rejected by the factories.

Malaysia has integrated this sub-project into its national dairy development program started in 1974. Between 1974 and 1985, forty Milk Collection Centres (MCCs) were established in Peninsular Malaysia. Project funds have been used to

Insulated milk tanker for bulk transport of milk in Malaysia

upgrade the MCCs themselves and to purchase small vehicles to pick up milk from farmers and special purpose tankers to transport milk to factories. Equipment purchased for MCCs included cans, tanks, churns, separators, pasteurisers, cold rooms, coolers, pumps and filters.

The following specific aims were adopted by the **Philippines** in implementing this sub-project:

- To ensure that locally produced milk is clean and wholesome for human consumption.
- To improve the milk handling system of the Milk Collection Centres (MCCs).
- To establish MCCs in remote areas.
- To provide expertise, training and specific items of equipment to assist in the development of the dairy industry.
- To improve the overall milk production of the small holder dairy farmers through better quality and cleaner milk.
- To make available more fresh milk for the population.

Equipment and support was provided to the following locations:

- Sta Maria Dairy Plant, Sta Maria, Bulacan
- Cabanatuan Dairy Plant, Nueva Ecija
- Floridablanca Dairy Plant, Floridablanca, Pampanga
- Alabang Dairy Project, Muntinlupa, Metro Manila
- Albay Dairy Plant, Camalig, Albay
- Sorsogon Dairy Plant, Cabid-an, Sorsogon
- Baguio Dairy Farm, Baguio City
- Misamis Oriental Milk Collecting Centre

Significant improvements have resulted in the handling of milk and milk products at the MCCs. Dairy equipment was purchased to augment the existing processing equipment and enabled production of more diversified milk products. Improvements have also resulted

Insulated milk transport fitted to motorbike in the Philippines

from the use of insulated vehicles for collection and marketing of milk and milk products. Audio visual equipment provided effective extension facilities for the dissemination of technology and information to the dairy farmers.

Insulated jeeps and motorcycle vans enable low temperatures to be maintained inside milk cans in transport thus lengthening the shelf-life of milk and milk products. Improvements in the handling of milk by the dairy farmers have increased their incomes because of increased milk sales and lesser milk rejections at the MCCs. The milk consuming public as a whole has benefited from the wholesome milk and the variety of milk products made available to them.

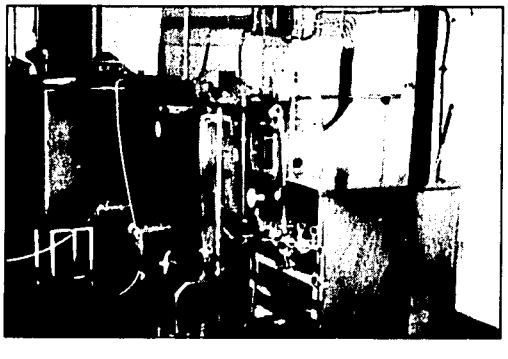
This sub-project was implemented in **Thailand** at the Milk Hygiene Central Laboratory, Veterinary Public Health Branch, Department of Livestock Development, Bangkok and at three Milk Collecting Centres (MCCs) at:

- Amphur Banbueng, Cholburi Province
- Amphur Bangpahan, Ayuthaya Province
- Amphur Muang, Sakolnakorn Province

The Milk Hygiene Central Laboratory has provided testing facilities and services for raw milk since 1983. The Banbueng and Sakolnakorn MCCs have been very successful, with great increases in milk quantity and quality over the period of the sub-project. Management problems have occurred at Bangpahan MCC which are being overcome by providing supervision from the local veterinary station. Consumption of milk is being promoted for nutritional reasons and this will further encourage greater production and the development of higher standards of quality at the MCCs.

Output:

Hygiene and efficiency in the handling and transport of milk have been significantly improved through the sub-project activities. Equipment and expertise have been provided for collecting milk from farmers, for improving milk collection centres and for transporting milk in bulk from the collection centres. Provision of equipment has been complemented by activities under the Quality Control and Training components. The LWG has served as a means of exchanging ideas and solutions to common problems, demonstrating the benefits of a regional approach to the development of the small-farmer based dairy industry.



Milk collection tank and pasteuriser at Banbueng MCC in Thailand

9 Training

Background

This component of the Project was designed to address the need for practically orientated training for senior laboratory technical staff in standardised laboratory procedures and practices, and to facilitate the sharing of operational procedures and advances in laboratory techniques among ASEAN countries. The training of key personnel is complementary to the other parts of the Food Handling Project which provide equipment and infrastructure support.

Training in Hygiene and Quality Control (L5 and NL4)

Location:

Singapore, Australia

Objectives:

To establish a training centre in Singapore in order to conduct a series of courses on laboratory meat safety and quality control for ASEAN laboratory personnel.

To provide training in food handling and hygiene for laboratory and inspection service personnel from the ASEAN countries in the areas of: Veterinary Public Health; Meat Inspection; Dairy Technology; Dairy Laboratory Technology; Meat Hygiene and Meat Science.

Description:

A training centre was established at the Veterinary Public Health Laboratory, Primary Production Department, Singapore. The Centre has been used for the following ASEAN Courses in Laboratory Meat Safety and Quality Control (LMSQC) conducted by the Primary Production Department in conjunction with the School of Food Sciences, Hawkesbury Agricultural College, Australia:

• LMSQC I	25 July to 30 Sept 1983	10 participants
• LMSQC II	8 Oct to 15 Dec 1984	14 participants
• LMSQC III	7 Oct to 14 Dec 1985	15 participants
• LMSQC IV	24 April to 30 June 1989	16 participants

Participants in the Laboratory Meat Safety and Quality Control Course in Singapore

The courses for senior technical personnel from government laboratories, consisted of a series of lectures, practical laboratory sessions, seminars, demonstrations and factory visits. The content concentrated on the composition, quality characteristics, and processing of meat and meat products. Laboratory

programs taught specific skills and familiarised the participants with a broad range of chemical, physical and microbiological tests required to monitor and control commercial and public health standards for meat and meat products.

In addition to the LMSQC series, the following courses were provided to train personnel from the hygiene and quality control laboratory facilities established under the Food Handling Project in each country:

- ASEAN Food Science and Technology Course - 14 Aug to 13 Oct 1984

This course was run by the School of Food Sciences, Hawkesbury Agricultural College and was attended by 15 participants, mostly veterinary officers engaged in food quality control. The course was designed to provide professional personnel in government regulatory health laboratories with an understanding of the processes and principles of food preservation, relating them to the interpretation, scope and practice of chemical and microbiological analytical techniques used in central laboratories for livestock products.

The course comprised two components: lectures, laboratory sessions, demonstrations and seminars plus a practical industry and laboratory experience component. All participants fulfilled the course requirements.

- ASEAN Milk Handling and Quality Control Course - 4 May to 12 June 1983

This course was run by the School of Food Sciences, Hawkesbury Agricultural College and was attended by 14 participants from Indonesia, Malaysia, the Philippines and Thailand. The course had the overall aim of providing the participants with theory and practical knowledge and skills in dairy technology, and some experience in the dairy industry in Australia. All participants performed well in the course and during the industry experience and fulfilled the course requirements.

- High Performance Liquid Chromatography (HPLC) Courses - 29 Sept to 2 Oct 1982 and 5 to 7 October 1983.

These three day courses were conducted by the Singapore Institute of Scientific and Industrial Research (SISIR) for a total of 6 participants from Malaysia, the Philippines, Singapore and Thailand, who all completed the course successfully.

- Master of Veterinary Studies in Meat Hygiene and Veterinary Public Health - 18 July 1983 to 20 July 1984.

Dr Romeo S Capa of the Philippines National Meat Inspection Commission successfully completed this course at the University of Queensland under Food Handling Project sponsorship.

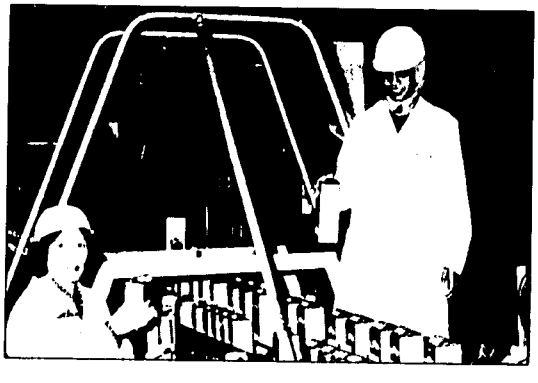
9

Output:

Significant economic and other benefits have resulted from the training of personnel to staff Hygiene and Quality Control Laboratories and Inspection Services for livestock products. The work of these services leads to reduced wastage of livestock products due to spoilage and condemnation. In addition, the community benefits from inspection and research programs designed to ensure that products are wholesome.

Almost all the trainees are now working in quality control laboratories or related positions in the region and have gained the skills required for standardised laboratory procedures and practices. The course participants have in turn been able to train their colleagues and to conduct in-house training based on the knowledge gained in the formal courses.

Participants in the Milk Handling and Quality Control Course in Australia



Livestock Transport

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Background

The transport of livestock including imported dairy, breeding and fattening stock, and local and imported animals for slaughter, is a problem throughout the ASEAN region.

Australia has an extensive livestock transport system and a range of developed technology and equipment for safe and efficient transport of large and small animals. This sub-project was formulated to transfer the appropriate elements of this technology to ASEAN.

Livestock Transport (L6 and NL3)

Location:

Indonesia, Malaysia, Philippines, Singapore, Thailand.

Objective:

To investigate livestock transport systems, both land and sea, and design, acquire and conduct trials of special-purpose livestock crates and transport systems.

Description:

The Appraisal Mission found that livestock handling in ASEAN was generally carried out in an unsatisfactory way and the vehicles used were commonly overcrowded. Most of the transport was by general purpose lorries or utility vehicles poorly adapted for the purpose.

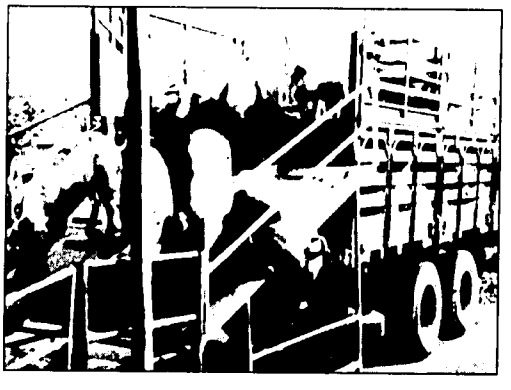
Damage by bruising, broken legs and deaths, due to stress or injury, frequently occur. Animals for slaughter were also subjected to poor handling, which in turn affected the dressing percentage and the tenderness and keeping quality of meat produced.

General purpose vehicles need modifications to load, unload and transport animals properly

Rough handling of pigs in basket can cause severe stress which affects meat quality

10

The standard of livestock transport and handling is particularly important because meat is generally transported "on the hoof", to supply the requirements of areas away from the major centres of animal production. Live animals are transported because of the almost universal consumer demand for slaughter warm meat and because of the lack of refrigerated storage and transport facilities for meat. Refrigerated transport is generally more costly per carcass than livestock transport using general purpose vehicles but as great distances are often covered over poor roads the cheaper transport cost can be more than offset by economic losses due to shrinkage and the high risk of death or bruising and other injuries.



Inadequate ramp facilities can cause serious injury

Ramp for loading buffaloes onto wooden vessel in Indonesia

The direct cost of the damage caused to livestock in ASEAN, due to inadequate and inappropriate transport equipment, is substantial. Apart from the outright losses due to dead and crippled animals, other loss areas include the value of meat trimmed from bruised carcases, hide damage, reduction in meat quality and reduced productivity from dairy cattle.

Studies carried out in Singapore indicate that between 1976 and 1980 the average mortality rate due to transport stress for pigs in transit from farms to abattoirs was 80 heads per 100,000. In 1981, this represented an economic loss in excess of $A100,000 per annum to Singapore. This mortality rate is greater than the rate of condemnation at the abattoirs due to disease. In addition to mortality the average rate of fractures over the same period was 355 per 100,000. The fractured limbs, generally hind legs, are condemned and at present prices are valued in excess of $A80,000 per annum.

It was conservatively estimated that these losses could be halved by the use of special purpose transport equipment.

The use of general purpose vehicles with various payload capacities for transporting livestock is also inefficient in the use of transport resources. A survey has shown that more than 250 vehicles are used for transporting pigs in Singapore. It is estimated that less than one third of this number of larger, properly designed vehicles would be required to carry out the same transport task. Apart from being more economical, purpose-built livestock transport equipment allows more humane handling of the animals.

Various surveys have been undertaken to establish the needs and requirements for livestock transport vehicles in ASEAN. A major workshop, convened by the AFHB in March 1982 in Bali, Indonesia, assisted in determining specifications for transport equipment and in the planning and implementation of trials.

The purpose of the Workshop was:

- To review existing practices and equipment used for the transportation of livestock in ASEAN.
- To acquaint participants with the technology, practices and equipment used for the transportation of livestock in other parts of the world.
- To review general design principles applicable to livestock transport vehicles and equipment.
- To review the economic and financial aspects of the transportation of livestock.
- To establish design and operational criteria for livestock transport equipment suitable for ASEAN conditions.
- To discuss the implementation and monitoring of the Livestock Transport component of the ASEAN Food Handling Project.

Prior to the Workshop, two Livestock Transport Consultants, Dennis Roberts of the Western Australian Department of Agriculture and Bruce Dickinson of Dickinson Transport, Dubbo, Australia, conducted an appraisal visit to provide input to the Workshop.

The Workshop proceedings and findings, and a proposal originated by Malaysia, have been published by the AFHB and have formed the basis for the implementation of the sub-project.

Further visits were made by the LWG Consultant, J E Bleasel and B Dickinson to provide advice during the implementation phase.

In **Indonesia**, this sub-project focussed on sea transport which was identified as the most significant sector requiring assistance. A study was commissioned by the LWG, and carried out by Consultants, D J Lyons and R A Stevens of the Australian National Materials Handling Bureau. The consultants carried out the field work for the study in March 1985 and their report

- Preliminary Study of Livestock Sea Transportation in Indonesia - was produced in July 1985.

The study found, in summary, that:

- Satisfactory transportation of livestock by sea using general purpose vessels can be achieved if the vessels used are in good condition and clean, and good operational and handling practices are used.
- A change to the use of specialised livestock carriers would not be justified operationally or economically under present circumstances.
- There is considerable scope for improvement to the operations and practices currently used for loading and unloading animals and for preparing the on-board accommodation and caring for animals in transit.

The findings and recommendations of this report were accepted by the LWG.

The following activities were undertaken in **Indonesia**:

- A design was prepared for a modified motorized general purpose sailing vessel for inter-island transport of livestock. An Indonesian firm, PT Andipa Aneka Consultant, was engaged to design the modification of a 400 dead weight tonne motorized sailing vessel to carry 200 cattle or buffaloes. Included in the design were livestock pens which were to be installed in the hold and on the deck with feeding and watering facilities, and loading and unloading facilities.
- Trials were conducted on the transport of poultry in various types of plastic crates instead of the traditional bamboo containers. The trials showed that the plastic crates were more economical for long distances.

The following activities have been undertaken in **Malaysia**:

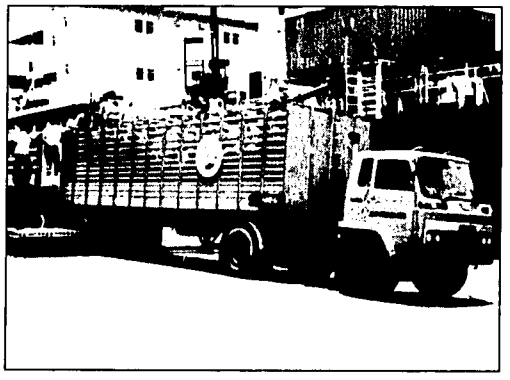
- A specially designed prototype tailgate ramp was fitted to a 5-tonne general purpose vehicle of the Department of Veterinary Services used to transport cattle. This initial unit was designed and built by Dickinson Transport and fitted by Wagon Engineering in Malaysia. The principle component of the unit is a sliding gate which can also be raised and lowered to form a loading and unloading ramp. The sides of the ramp are fitted with folding railings. The ramp can be raised or lowered by means of a winch fitted under the roof of the truck. Steel mesh was also fitted to the floor of the tray of the vehicle to prevent animals slipping. Trials on the tailgate ramp were conducted and modifications carried out to suit the local conditions. The prototype demonstrated the usefulness of having a tailgate-ramp on livestock trucks and the

practicality of installing such a ramp on a general purpose vehicle. A second modified unit was built in Malaysia and fitted to a new Department of Veterinary Services 5-tonne vehicle, together with non-slip flooring mesh. This work was co-ordinated by the Perlis State Department of Veterinary Services. The modifications incorporated in the new unit overcame some of the local operational problems identified with the prototype, and it was found to be practical and easy to operate.

- A purpose-built double-decker stockcrate trailer for transporting pigs was designed and built by Dickinson Transport, through close collaboration between the AFHB and the NMHB. Trial runs were conducted, commencing in March 1984, using a Department of Veterinary Services prime mover, between Leong Sin Nam Farm in Ipoh and Jurong Abattoir in Singapore. These trials have quantified the benefits and demonstrated the advantages of special livestock vehicles over conventional vehicles for transporting pigs.

- A large cattle stockcrate trailer, for use with a prime mover, was designed and built with loading and unloading facilities. A number of trial runs were conducted and several modifications made. The trials indicated that the stockcrate was satisfactory, and currently it is being used for transportation of cattle to all parts of Malaysia. The Department of Veterinary Services uses the stockcrate for transport and transfer of animals destined for farmers.

Pig transport trailer used between Malaysia and Singapore



Cattle transport trailer in Malaysia

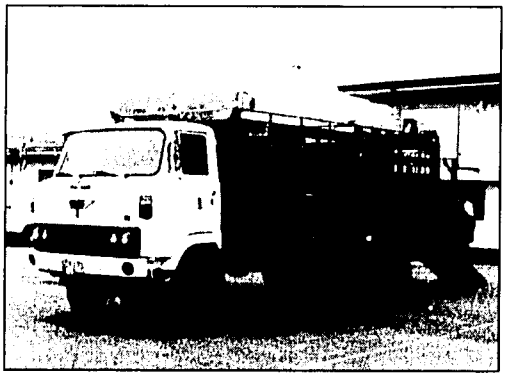
- The design and manufacture of a stockcrate for small ruminants has been completed and trials have been carried out. The two deck unit enables 100 animals to be transported on a 5-tonne truck, instead of 50, and allows greater control of the animals in loading and unloading

For the **Philippines**, a convertible livestock crate was designed and built by Dickinson Transport in Australia following consultation with the LWG and the Bureau of Animal Industry . This was delivered in September 1984 and fitted to a truck chassis purchased under the Project. The convertible livestock crate was designed to carry cattle, buffaloes, sheep and goats or combination of these animals. Its special features include a collapsible top deck and partitions to suit the type of animal to be loaded, as well as a built-in ramp. Based on the trials conducted the livestock crate was found to be a very useful vehicle to reduce stress, shrinkage, bruising and mortality among transported animals.

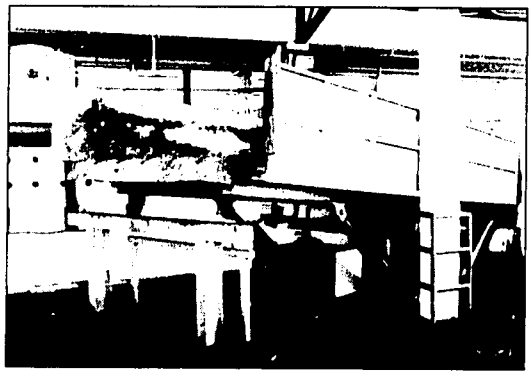
Following the trial of the Australia designed and built stockcrate, two additional livestock crates were fabricated locally. One is specifically made for large animal transport while the other is for combination cattle, goat or pig transport. Minor modifications were incorporated in these two new stockcrates based on the findings of the earlier trials.

Through the Project, four sets of loading and unloading ramp were fabricated. These were attached to Bureau of Animal Industry dispersal trucks. Aside from these two sets of motorcycle trailers and two sets of jeep hauling trailers were also purchased.

A comparative study to evaluate the livestock crate against a conventional truck for animal transport was conducted. The economic viability of the livestock crates has been demonstrated through better animal transport resulting in lower shrinkage, bruising, injury and mortality. Loading and unloading of animals was made easier and more



Convertible livestock crate in the Philippines



Ramps for unloading pigs at Jurong Abattoir

efficient, especially as many places do not have their own loading and unloading facilities.

The original stockcrate was loaned for trials to Monterey Farms Corporation, a private company involved in livestock production. They found the stockcrate to be a very effective vehicle in transporting pigs and cattle, whereby the animals arrived at their destination in better condition. As a result, this private farm intends to manufacture a similar livestock crate.

Singapore collaborated with Malaysia in the road transport trials for pigs between Ipoh and Jurong Abattoir. The trials quantified the benefits and demonstrated the advantages of specially designed livestock vehicles over conventional vehicles for transporting pigs. Unloading facilities at Jurong Abattoir were also upgraded with the construction of special ramps for unloading pigs. Initially a prototype ramp designed by the NMHB Australia was installed. This was followed by the development and fabrication in Singapore of two new hydraulic prototype units modelled after the initial ASEAN ramp.

These new hydraulic ramps have greatly improved the efficiency and speed of livestock handling at the Abattoir and greatly reduced the potential for injury and damage to livestock. For example, with single deck trucks which carry 50-60 pigs the unloading time has been reduced from 3.9 minutes to 2.5 minutes and for double deck trucks unloading time has been reduced from 9 minutes to 4.5 minutes. Many more units of the hydraulic ramp have been fabricated and installed at the Abattoir.

Thailand participated in the study phases of this sub-project and later manufactured and conducted trials of equipment. A stockcrate trailer was built for transportation of pigs from farm to abattoir or saleyard. The unit was designed to carry at least 80 pigs and up to 150, depending on the animals' size and the transport distance. A local firm, PANOCUM,

built the trailer, under the supervision of the Department of Livestock Development, in accordance with the experience already gained with trials in the region. The trailer and prime mover have been used for trials, including shipments of 120 heads of 95 kg pigs from Bangkok to Southern Thailand - a distance of about 1,100 km; and from Nakornpathom province to Lumpoon province - a distance of 780 km. It was found that the pigs generally arrived at the destination in good condition. When compared to all-purpose trucks used to transport to the same place at the same time, these could load only 50 pigs per trip, and the fatality rate is double or higher than the special purpose vehicle.

Output:

Improved livestock transport equipment has been introduced and promoted for general use. Trials have demonstrated reductions in transport costs, reduced losses due to injury and death of animals, and improved meat quality.

Appropriate technology for the transportation of livestock has been successfully transferred from Australia to the ASEAN countries. Prototype vehicles are in operation and design have been modified to suit the local conditions. The implementing agencies are actively promoting the improved equipment for use by government agencies and by the private sector.

Refrigeration and Processing

11

Meat Refrigeration and Processing Establishments (L7)

Location:

Indonesia, Philippines, Thailand

Objective:

To prepare design concepts for meat processing establishments which are economical to construct, have a low maintenance cost, and are easy to clean; and to determine the most economical method for chilling and maintaining chill in livestock products.

Description:

The budget for this sub-project was originally divided equally between Indonesia and the Philippines. Thailand later submitted a proposal to partly support the Pon-Yang-Khram Livestock Cooperative in upgrading the refrigeration system at its slaughterhouse. Since no funds were allocated to Thailand under this sub-project, the AFHB was requested to allocate an additional $A30,000 to Thailand.

This sub-project was implemented in **Indonesia** by the Bogor Agricultural University (IPB). Two studies were completed and published:

- Feasibility Study on Meat Cooling - 1983
- Study on Cheap Method of Meat Chilling - 1985

In addition, prototype refrigeration cabinets for retail outlets were fabricated and tested.

In the **Philippines**, the extension services of the Animal Products Plant (APP), Animal Products and By-Products Research Section of the Bureau of Animal Industry have been effective in disseminating technical information on meat processing and preservation. A pilot livestock products demonstration centre was established under this sub-project to promote improvements in meat processing technology and to provide training facilities.

Sausage maker used at the Animal Products Plant, Philippines

Construction of the new Pilot Livestock Products Demonstration Centre building was delayed, but in the interim the Animal Products Plant Staff have conducted a total of 621 meat processing demonstrations in the existing facilities with 31,029 participants (1984-1989). Training Course programs on meat processing were prepared depending on the target participants to make them

aware of the proper processing techniques, packaging, storage, handling, hygiene and sanitation.

Equipment purchased locally and through the ASEAN Food Handling Bureau have been utilized in the development of new meat products and improvement of meat storage.

In **Thailand**, cold storage and carcass weighing facilities were installed at the Pon-Yang-Khram Livestock Co-operative Abattoir, Sakolnakorn Province to improve the quality of meat produced for market and the financial return to the Co-operative. Meat storage and processing were improved. The losses due to deterioration and spoilage were significantly diminished compared to the losses before the cold store was established. The quality of meat was also improved. Furthermore, the co-operative can slaughter several days per week instead of once a week thus expanding the by-product market.

Output:

Activities and facilities established in Indonesia, the Philippines and Thailand with the modest budget have been generally in line with the objectives of this sub-project.

Summary of Achievements

12

Since its inception in 1978, the livestock components of the ASEAN Food Handling Project have achieved practical results in priority areas in the livestock industry in ASEAN. Facilities and equipment have been substantially improved and qualified people have been trained and given opportunities to gain the experience to meet the needs of the industry.

Sub-projects initially identified by an ASEAN-Australian Appraisal Mission have been implemented and followed-up. The co-ordination and policy guidance provided by the Livestock Working Group and the assistance of the ASEAN Food Handling Bureau in implementation has ensured consistency in approach and direction. The benefits of a regional approach to common problems have been demonstrated, and the contribution of Australian expertise in the livestock sector has been relevant and productive.

The output of the sub-projects has been consistent with the overall emphasis of the ASEAN Food Handling Project in that post production losses in the handling of livestock and livestock products have been reduced, the quality and quantity of food produced has been increased and the return to producers has been enhanced.

Typically, the sub-projects have provided essential equipment and specialist advice, and serve as a model for further application of appropriate systems, equipment and procedures in the livestock industry as a whole.

A number of publications of general interest arising out of the sub-projects have been printed for distribution by the ASEAN Food Handling Bureau (See Appendix E for a sample list). However, the majority of information generated is contained in consultancy, technical, research, testing and progress reports, as well as training and laboratory manuals circulated through the Livestock Working Group to relevant individuals and groups in each country.

Significant achievements have been:

Abattoirs

A comprehensive ASEAN Abattoir Design handbook has been compiled, published and distributed. The Handbook is used extensively in the region as a basis to upgrade abattoir facilities. Pilot projects have been implemented by the LWG in conjunction with the local municipal authorities in Indonesia, Malaysia, the Philippines and Thailand. A general improvement in quality and hygiene of livestock products and reduced economic losses due to wastage and spoilage has been achieved through low cost and appropriate designs.

Quality Control

A network of hygiene and quality control laboratory facilities of a high standard has been established in Indonesia, Malaysia,

the Philippines, Singapore and Thailand to provide testing services for livestock products and to conduct applied research and training. A model hygiene and quality control system for meat in ASEAN has been developed. These laboratory facilities and systems have enabled improvements to be made in the handling and processing of livestock products and in turn to its quality and safety.

Dairy Development

Equipment and advisory support has been provided to develop the dairy industry in Indonesia, Malaysia, the Philippines and Thailand based on smallholder production units. Efforts have concentrated on milk collection centres, transport systems and quality control and testing facilities. Results achieved have been practical and of immediate benefit, and have produced model systems to be adopted throughout the industry. Formal training courses have been conducted in milk handling and quality control, and on-the-job training has been conducted on dairy equipment maintenance.

Training

An ASEAN Meat Laboratory was established in Singapore to conduct formal training courses in Laboratory Meat Safety and Quality Control. Four such courses have been conducted for 55 participants from the region. In addition, Food Science and Technology and Milk Handling and Quality Control courses have been conducted in Australia for 29 participants, High Performance Liquid Chromatography Courses have been conducted in Singapore, and a candidate from the Philippines has completed a Master of Veterinary Studies at the University of Queensland. In-house training in the new facilities established under the Project has also been conducted to multiply the impact of the major courses.

Livestock Transport

A major Workshop was initially held to guide the implementation of this sub-project. Studies have been carried out and prototype equipment has been introduced for road transport of livestock in Malaysia, the Philippines, Singapore and Thailand, and for sea transport in Indonesia. Equipment has been tested and modified to suit local conditions and additional units have been constructed. The special purpose equipment has been found to have economic benefits as well as being more humane. The private sector has been involved in these trials and progressive adoption of the improved technology throughout the industry is an expected long term outcome.

In addition to the direct outputs of

the specific activities, the opportunities for interaction and consultation provided to the personnel involved in the various meetings, workshops, formal and informal training courses and consultants' visits have facilitated co-operation in the livestock sector in the ASEAN region as a whole.

Between 1978 and 1989, the ASEAN Livestock Working Group has implemented a series of practical sub-projects to improve the handling of livestock and livestock products in ASEAN. These sub-projects have provided immediate and tangible results and will continue to set an example and provide significant benefits for years to come.

Appendix A

Members of the ASEAN Livestock Working Group

Coordinators

- Dr A Dahlan
  Directorate General of Animal Husbandry
  Indonesia — 1978 - 1981
- Datuk Dr A Mustaffa Haji Babjee
  Department of Veterinary Services
  Malaysia — 1981 - 1982
- Dr Mohd Yusoff Mohd Noor
  Department of Veterinary Services
  Malaysia — 1982 - 1984
- Mr Jesus B De Guzman
  Bureau of Animal Industry
  Philippines — 1984 - 1986
- Dr Wipit Chaisrisongkram
  Department of Livestock Development
  Thailand — 1986 - 1989

National Representatives

Indonesia

- Dr A Dahlan
  Directorate General of Animal Husbandry — 1978 - 1982
- Dr Girindra
  Directorate General of Animal Husbandry — 1982
- Dr Soedjasmiran Prodjodihardjo
  Directorate General of Animal Husbandry — 1982 - 1985
- Dr Roesli Sukirta
  Directorate General of Livestock Services — 1985 - 1989

Malaysia

- Dato' Dr Osman Din
  Department of Veterinary Services — 1978 - 1980
- Datuk Dr A Mustaffa Haji Babjee
  Department of Veterinary Services — 1980 -1982
- Dr Hawari Hussein
  Department of Veterinary Services — 1982 - 1984
- Dr Mohd Yusoff Mohd Noor
  Department of Veterinary Services — 1984
- Dr Hadi Dato Hashim
  Department of Veterinary Services — 1984 - 1986

- Dr Mohd Nordin bin Hj Mohd Nor
  Department of Veterinary Services — 1987 - 1989

Philippines

- Mr Norberto Maranan
  Bureau of Animal Industry — 1978 -1979
- Mr Rolando R Promentilla
  Bureau of Animal Industry — 1979 -1980
- Mr Jesus B De Guzman
  Bureau of Animal Industry — 1980 - 1984
  1986 - 1988
- Dr Pedro U Dumag
  Bureau of Animal Industry — 1984 -1986
- Mr Norberto Maranan
  Bureau of Animal Industry — 1989

Singapore

- Dr Chua Sin Bin
  Primary Production Department — 1978 - 1986
- Dr Chew Siang Thai
  Primary Production Department — 1986 - 1989

Thailand

- Dr Wipit Chaisrisongkram
  Department of Livestock Development — 1978 - 1986
- Dr Boonpeng Santiwattanatam
  Department of Livestock Development — 1986 - 1989

ASEAN Food Handling Bureau

- Mr Santi Grachangnetara — 1981 - 1983
- Mr David Lyons — 1980 - 1984
- Dr P Kumaraguru — 1982 - 1983
- Dr Mohd Yusoff Mohd Noor — 1984 - 1988
- Mr Raymundo T Gonzalez — 1989

Consultant

- Mr J E Bleasel
  National Materials Handling Bureau
  Australia — 1978 - 1984

Appendix B

Meetings of the ASEAN Livestock Working Group

1.	Jakarta, Indonesia	27 - 28 February 1978
2.	Bangkok, Thailand	15 - 16 April 1978
3.	Jakarta, Indonesia	18 - 19 September 1978
4.	Singapore	11 - 13 June 1979
5.	Manila, Philippines	20 - 24 November 1979
6.	Johor Baru, Malaysia	2 - 4 October 1980
7.	Bangkok, Thailand	22 - 24 July 1981
8.	Jakarta, Indonesia	24 - 26 February 1982
9.	Manila, Philippines	1 - 3 September 1982
10.	Kuala Lumpur, Malaysia	23 - 25 March 1983
11.	Bangkok, Thailand	30 November - 2 December 1983
12.	Manila, Philippines	9 - 11 April 1984
13.	Jakarta, Indonesia	16 - 18 October 1984
14.	Kuala Lumpur, Malaysia	19 - 21 March 1985
15.	Tagaytay City, Philippines	24 - 27 September 1985
16.	Singapore	18 - 20 March 1986
17.	Bangkok, Thailand	23 - 27 September 1986
18.	Yogyakarta, Indonesia	22 - 25 September 1987
19.	Penang, Malaysia	22 - 25 March 1988
20.	Manila, Philippines	6 - 9 March 1989
21.	Jakarta, Indonesia	26 - 27 October 1989

Terms of Reference of the ASEAN Livestock Working Group

1 Working Groups will act as co-ordinating, monitoring and assessing bodies in the implementation of sub-projects of the ASEAN Food Handling Project.

2 The Working Groups will report to the ASEAN Sub-Committee on Food Handling and make recommendations on the implementation of the ASEAN Food Handling Project.

3 The Working Groups shall meet at least twice a year at venues to be decided by each Working Group. In addition, special meetings of each Working Groups may be convened by the Co-ordinator upon request by any two members of the Working Group, with the consent of the Chairman of the Sub-Committee.

4 The Working Groups shall consist of one project leader or his representative from each ASEAN country. A Consultant/Liaison Officer from Australia may be appointed by the ASEAN Sub-Committee on Food Handling on the recommendation of the relevant Working Group. The Co-ordinators shall be appointed initially by the Sub-Committee for 2 years after which time the position shall be filled by the election from among members of each Working Group and confirmed by the Sub-Committee.

5 The Co-ordinator shall represent the Working Group at meetings of the ASEAN Sub-Committee on Food Handling.

6 A Deputy Co-ordinator may be appointed by each Working Group to act in the absence of the Co-ordinator.

7 The Working Groups shall collaborate with national bodies and international agencies in each ASEAN country in the implementation of relevant sub-projects.

8 The Working Groups may formulate and recommend new sub-projects to the ASEAN Sub-Committee on Food Handling.

9 The Working Groups may disseminate relevant technical information on their projects to ASEAN member countries as and when necessary, by various means such as regional seminars, workshops, visits and training programs and contributions to the ASEAN Food Handling Newsletter and other publications.

10 The Co-ordinator may invite Project consultants and sub-project leaders to attend Working Group meetings at Project expense.

11 The Co-ordinator may invite experts or representatives of outside agencies or institutions to attend Working Group meetings at their own expense or at Project expense subject to prior approval from the Chairman.

12 The meeting of each Working Group shall determine the time and place for its next meeting. The Chairman of the Sub-Committee shall advise the national ASEAN Secretariat of the dates and venues of all Working Group meetings and invite the project leaders to attend.

13 These arrangements can be changed only by the Co-ordinator or the host for the meeting with the consent of the Chairman who shall advise the ASEAN National Secretariat of the change. The host shall be responsible for notifying all members of the Working Groups of the venue, accommodation, agenda and other arrangements made for the meeting.

14 Working Groups may be formed or disbanded by resolution of the ASEAN Sub-Committee on Food Handling.

Organisations Involved in the Livestock Working Group Activities

Agencies in ASEAN Responsible for Implementation

Indonesia

Directorate General of Livestock Services
Department of Agriculture

Malaysia

Department of Veterinary Services
Ministry of Agriculture

Philippines

Bureau of Animal Industry
Department of Agriculture

Singapore

Veterinary Public Health Laboratory
Primary Production Department
Ministry of National Development

Thailand

Department of Livestock Development
Ministry of Agriculture and Cooperatives

Cooperating Organisations in Australia

Australian Institute of Food Science and Technology
Australian Meat and Livestock Corporation
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Department of Primary Industry
Hawkesbury Agricultural College
National Materials Handling Bureau
New South Wales Department of Agriculture
Victorian Department of Agriculture
Western Australian Department of Agriculture
Western Australian Overseas Projects Authority

Appendix E

Sample List of Publications of the ASEAN Livestock Working Group

Reports

Bleasel, J E et al (1977), *Report of the ASEAN - Australian Appraisal Mission on the Handling of Livestock, Livestock Products and Fish*, ASEAN Sub-Committee on Food Handling, Singapore.

Hashim, Hadi B and Cox, Dennis A (1981), *ASEAN Dairy Development Project - A Study of Milk Production and Handling*, National Materials Handling Bureau, Sydney, ASEAN Food Handling Bureau, Kuala Lumpur.

Darmawan, R and Lyons D J (1981), *Abattoir Design and Design Concepts for ASEAN*, ASEAN Food Handling Bureau, Kuala Lumpur

Workshop / Conference Reports and Papers

Kumaraguru, K and Lyons D J (1983), 'Swine Transportation and Handling in ASEAN', *Proceedings of the Sixth Annual Conference of the Malaysian Society of Animal Production 1982*, Malaysian Society of Animal Production, Kuala Lumpur.

Lyons, D J (ed) (1982), *ASEAN Livestock Transport Worskhop Report*, ASEAN Food Handling Bureau, Kuala Lumpur.

Unpublished Reports

Stewart, B A (1982), *ASEAN Dairy Development Project - Report on Mission to Indonesia, Malaysia and Thailand, June to August 1982*, NSW Department of Agriculture, Sydney.

Stewart, B A (1982), *ASEAN Dairy Development Project - Report on Mission to Philippines and Indonesia, September to November 1982*, NSW Department of Agriculture, Sydney.

Hawkesbury Agricultural College (1983),*Report on ASEAN Training Course - Laboratory Meat Safety and Quality Control*, Hawkesbury Agricultural College Research and Development Company Ltd, Richmond.

Hawkesbury Agricultural College (1983), *Report on a Course in Milk Handling and Quality Control*, Hawkesbury Agricultural College, Research and Development Company Ltd, Richmond.

Lyons, D J and Stevens R A (1985), *Preliminary Study of Livestock Sea Transportation in Indonesia*, National Materials Handling Bureau, Sydney.