3　クエスチョネア主要項目集計表

RESULTS OF THE MAJOR ITEMS IN THE QUESTIONNAIRE

	SEMINAR (12)					SPECIALIZED COURSE (7)				
	1	2	3	4	5	1	2	3	4	5
(1) Course is useful to your country?	9		2	1		6				1
(2) Were your expectations of this course met?		2	3	3	1			2	4	1
(3) To what extent you aquired new knowledge and skill?		2	5	3	1			1	4	2
(4) To what extent you improve your technique?	1	2	3	4	1			4	1	2
(5) To what extent you change your attitude to your duties	2		6	2	1			3	2	2
(6) To what extent you utilized the knowledge acquired?		1	5	4	1			2	3	
(7) To what extent you spread the knowledge acquired?		2	5	3	1		2	1	3	
(8) In what way you spread the knowledge?	8	3	5	3	1	4	1	1		
(9) What are the obstacles in utilizing you aquired?	1=3	2=4	3=2	4=4	5=3 6=2 7=1 11=1	1=4	3=1	4=3	5=3	9=1 10=1
(10) Have you found any improvement in your job/duties?	5	5	----------			4	1	----------		

4　帰国研修員所属機関へのヒアリング回答（抜粋）

インドネシア

・セミナーで得た知識は実務に役立つものであった。インドネシアでは医薬品品質管理の第三国研修を実施しており、比較のためにも右テーマでの講義の追加を希望する。

フィリピン

・伝染性ファブリキウス嚢病への正しい対策（特に診断、管理）を知ることができた。しかし、研究設備が整っていないため十分に活用できないのが現状である。

・高額な機器を必要としない実用的な検査方法を教えてほしい。

・合併症の診断方法についての講義も加えてほしい。

タイ

・研修に参加した職員は、他国研修員との交流により業務上の問題点解決や改善のためのアイデアがもたらされ、よりクリエイテイブな仕事をするようになった。またAGP手法によるウイルス分離などの具体的な診断技術にも向上がみられた。今後同様な研修が行われれば喜ばしいし、将来的には家禽病理学に重点をおいた研修を希望する。

・鶏の問題を解決するのに有益な、疾病による合併症についての研修が役立っている。

・研修に参加し、日本人専門家や他国の研究者と交流することにより、彼等と協力しながら自国の家禽病対策に取り組むことについて考えることができた。

・今後、アセアン家禽病セミナーがアセアン各国の研究発表の場となり、共同研究が行われていくことを希望する。

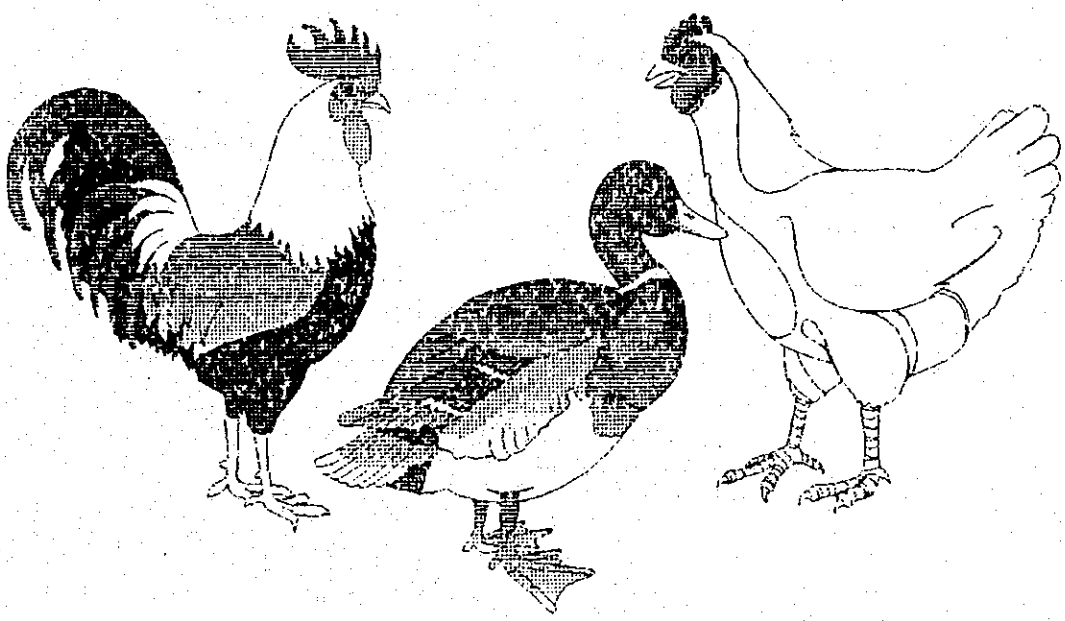
・この研修で本人の専門分野である家禽サルモネラ感染症に対する新しい知識を得ることができ、その後の研究に役立っている。技術研修では、特別な技術コースを設定し、より深い技術研修の実施を望む。

・セミナーに参加し、電子顕微鏡、特に組織病理学、細胞病理の電子顕微鏡的解析に係る知識を病理研究室にて活用している。

・短い期間のセミナーに参加しただけでは直ぐに目立った有効性はないし、また期待することも無理ではないか。また、短期間の研修において通り一遍のセミナーではなく課題を絞って実施する必要があると思われる。

・NIAH（タイ家畜衛生研究所）プロジェクト実施当時は、家禽病の専門家育成までは至らなかったが、このコースのおかげで研究官の鶏の病原性に関する解析技術に進歩が見られ、同研究所の技術力向上に貢献している。今後も課題に特徴を持たせた研修を希望する。

ANNUAL REPORT
of the
ASEAN POULTRY DISEASE RESEARCH
and
TRAINING CENTRE



1993

Veterinary Research Institute
Department of Veterinary Services
Ministry of Agriculture MALAYSIA

ANNUAL REPORT
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1993

APDRTC, Veterinary Research Institute, 59 Jalan Sultan Azlan Shah, P O Box 369, 30740 Ipoh, Perak, Malaysia

CONTENTS

Editor : Nor Aidah bt abdul Rahim
Contributors : Lim Kean Teik
Mahani Abdul Hamid
Azizah Darus
Lip Lim Lock

September 1994

ABBREVIATIONS

Abbreviations used in this report:

AE	avian encephalomyelitis
AI	artificial insemination
ALT	alanine aminotransferase
APDRTC	ASEAN Poultry Disease Research and Training Institute
ASAT	aspartate aminotransferase
ASEAN	Association of South East Asian Nations
BF	bursa of Fabricius
C/O	chicken cell susceptibility/susceptible to all subgroups A to E
C/E	chicken cell susceptibility/susceptible to all subgroups except subgroup E
CAA	chicken anaemia agent
CEF	chicken embryo fibroblast
CPE	cytopathic effect
CY	cyclosphosphamide
dpi	day(s) post infection
DNA	deoxyribonucleic acid
DVE	duck virus enteritis
ELISA	enzyme linked immunosorbent assay
EDS	egg drop syndrome
FA	fluorescent antibody
FITC	fluorescein isothiocyanate
GOT	glutamic oxaloacetic transaminase
JICA	Japan International Cooperation Agency
HAd	haemadsorption
Hpg	*Hemophilus paragallinarum*
HVT	herpes virus of turkey
IgG	immunoglobulin G
IFA	indirect fluorescent antibody
IB	infectious bronchitis
IBD(V)	infectious bursal disease virus
ILT	infectious laryngotracheitis
J1	Japanese strain 1
kDa	kilo Dalton
LKT	Lukert
MDCC-MSB1	Marek's disease cell culture - chicken line (MSB1)
MD(V)	Marek's disease (virus)
MSL	master seedlot
MTCP	Malaysian Technical Cooperation Programme
ND(V)	Newcastle disease virus
NP	non producer
R & D	Research and Development
RE	reticuloendotheliosis
RSV	Rous sarcoma virus
SE	*Salmonella enteritidis*
SEM	scanning electron microscope
SHS	swollen head syndrome
SN	serum neutralisation
SPF	specific pathogen free
$TCID_{50}$	tissue culture infective dose
TCTP	Third Country Training Programme
TEM	transmission electron microscope
UPM	Universiti Pertanian Malaysia

1993 ANNUAL REPORT
ASEAN POULTRY DISEASE RESEARCH AND TRAINING CENTRE

DIRECTOR'S REPORT

The Technical Cooperation provided by the Japanese Government ended officially on 16 April, 1993. The JICA Expert Team Leader, Dr. Chikara Kuniyasu and Project Coordinator, Mr. Shigeyuki Oya left the Centre for Japan in the same month. This marked the end of seven years of Technical Cooperation with the Japanese. However, the Third Country Training Programme (TCTP) will continue until 16 April, 1996.

The main activities of the Centre for 1993 were research and training. A total of 29 projects were conducted. The Parasitology Divsion did not report any projects as the researcher is presently away on further studies in the United Kingdom.

Research

Research has been focused on the production of a live infectious bursal disease (IBD) vaccine, establishing and upgrading diagnostic tests for poultry diseases.

Work on the production of a live IBD vaccine was incited by the incidence of the disease nationwide in 1991/1992 and the problems encountered by farmers despite vaccination. It is still in its developmental stage where the seed virus to be used in the vaccine production is yet to be identified.

A great number of the other projects were related to diagnostic techniques for IBD, duck virus enteritis (DVE), swollen head syndrome (SHS), Newcastle disease and chicken anaemia. Not all the work were new, however, they were important to provide bases for further work in the areas mentioned.

Training

The ASEAN Seminar on Poultry Diseases and their Control and the ASEAN Course on Specialized Diagnostic Techniques of Poultry Diseases under the TCTP were conducted as scheduled. To ensure the smooth running of the training programmes ,JICA offered the services of a Training Advisor and Dr C Kuniyasu performed that duty from 12 - 19 October 1993. He gave guidance and advice on future training programmes for the TCTP until its termination in March 1996.

Training was also provided for laboratory personnel from the Regional Veterinary Laboratories and participants of the Malaysian Technical Cooperation Programme (MTCP) for short periods in all the disciplines.

Funding

Running costs for the Centre were borne entirely by the Malaysian Government. Research projects were also funded by the Malaysian Government either through development or R & D funds of the department and the Ministry of Science respectively.

Staff

There has been no increase in the number of staff at the Centre. Two officers are still overseas undergoing postgraduate studies in parasitology and microbiology. Mr Yap Hon Choong, a senior technician who worked in the Electron Microscope Unit, retired. His duties were taken over by Mr Ganeson from the same Unit.

New challenges

There are major areas and opportunities which require attention. The opportunities provided by the developments in molecular biology and immunology must be taken not only to provide new and better methods of control and prevention of older diseases but alaso to provide methods for prevention and control of new diseases which emerge from time to time.

The Centre must certainly take up the opportunities and keep abreast with the rapid developments in molecular biology. This is imperative as development of novel vaccines using recombinant DNA has to be ventured into for the Centre to remain viable in the poultry industry.

Nor Aidah Abdul Rahim

SCIENTIFIC REPORT: Virology

Activites of the section were focused on research and studies on infectious bursal disease (IBD) vaccine development, duck virus enteritis (DVE) serological responses, infectivity of non producer (NP) cells, antigenicity of MDCC-MSB1 cells, establishment of haemadsorption test and indirect fluorescent antibody (IFA) procedure for the detection of swollen head syndrome (SHS) antibodies and serological monitoring of poultry farms vaccinated against Newcastle disease (ND) and IBD and SHS infection.

INFECTIOUS BURSAL DISEASE

Development of a live IBD vaccine

Two cell culture-adapted IBD virus strains were evaluated for pathogenicity and immuno-suppression in SPF chickens. Results showed that both strains were not pathogenic and immuno-suppressive. They were then plaque-purified and three master seedlot (MSL) clones were established and stocked. The optimal multiplicity of infection, propagation time and harvesting conditions were established for each clone. The infectivity titres obtained for the three IBD MSL clones were 5.6×10^6 and 3×10^6 $TCID_{50}$ per ml. A pathogenic IBD virus strain was also established for use in the challenge test. The procedure for the challenge test was established based on a fixed challenge dose and route in 4-week old chickens. Consistent parameters of this local challenge strain were:

Mortality	: 65%
Bursal swelling index (at 3 days pi)	: 3.5
Bursal atrophy index (at 15 days pi)	: 0.9
Bursal antigen detection (at 4 days pi)	: 100%

Experimental vaccination trials carried out on J1 clones showed the lack of immunogenicity as evidenced by poor serological post vaccination responses and total susceptibility challenge. The LKT clone performed better than the J1 clones. Vaccinated chickens responded with low antibody titres and were protected in the challenge test. However, since the minimum dose required per chick was 5×10^3 $TCID_{50}$, and the dose at release should be $\geq 5 \times 10^4$ $TCID_{50}$, the cost of the vaccine may be a problem. In view of this, isolation of a virulent IBDV from an unvaccinated poultry farm was carried out. The isolate was stocked for evaluation as a potential vaccine seed.

K.T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D. Ku

Monitoring of IBD vaccination titres for Dindings Poultry Farm

Moderate levels of IBD maternal antibodies were detected in 2-day old chicks. These levels declined to below 200 at 10 to 15 days of age to allow IBD intermediate vaccines to break through. In view of this, IBD intermediate vaccine (Bursine-2) may be recommended for chicks at the age of 10 to 15 days old. Precautions on vaccine storage, handling and supervision over vaccination logistics were also advised to the farm.

K.T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D. Ku

DUCK VIRUS ENTERITIS

Detection of DVE antibodies by IFA test

Experimental vaccination and challenge studies on DVE were carried out in susceptible Khaki Campbell ducklings. Results indicated that once, twice or thrice vaccinated ducklings of various ages failed to develop IFA and serum neutralisation (SN) antibodies at 1 to 4 weeks post vaccination although all were resistant to challenge over this period and survived as apparently healthy ducklings. All unvaccinated controls died within four days post challenge. Antibodies against DVE in the vaccinated survivors were detected by the IFA test as early as one week post challenge. The persistence of DVE antibodies post challenge was studied over a period of 4½ months. Results showed that in the first few weeks post challenge, the majority of survivors seroconverted. However, the percentage of reactors declined with the duration post challenge. In the three times vaccinated ducks, a reactor rate of 43% persisted at 14 weeks post challenge, whereas, in the once vaccinated group, antibodies persisted no longer than 5½ weeks post challenge. In the field, antibodies were detected in three (3) out of 20

serum samples (15%) taken from a duck farm in which an outbreak of DVE was confirmed 4½ months earlier.

The laboratory IFA test procedure for detection of DVE antibodies was established and introduced to the technical staff of various laboratories through training courses conducted by this section.

K.T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D.Ku

SWOLLEN HEAD SYNDROME

Establishment of the IFA procedure for screening of poultry sera against SHS

SHS virus was propagated in vero cell cultures. Following appearance of CPE, the culture fluids were harvested and stocked as seed lots at -80°C as well as lyophilised at a titre of $3x10^6$ $TCID_{50}$/ml. The vero cells were stocked in liquid nitrogen. Monospecific antisera against SHS were prepared by immunising two (2) groups of 5- week old SPF chickens by the natural (intranasal + intra-tracheal) or parenteral routes. The intramuscular route of immunisation generally yielded higher antibody titres (IFA titre of 640) than the natural routes.

The IFA screening test was carried out using SHS virus-infected vero cells showing 50% CPE and reacting them with test sera diluted 1/160. Following incubation and washing, FITC conjugated anti-chicken IgG was reacted with the cells, followed by washing. Positive control sera gave good cell-associated specific fluorescent staining with infected cells. No fluorescent staining was seen in uninfected cell controls reacted with positive sera. Non-specific or positive staining reactions were not seen with numerous sera obtained from SPF chickens at various ages up to 36 weeks old. The IFA procedure for screening of chicken sera for SHS antibodies was established and introduced to technical staff from various laboratories through training courses conducted by this section.

K.T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D. Ku

Detection of swollen head syndrome (SHS) infection in a poultry farm

A poultry farm with complaints of respiratory problems, facial swelling and 20% drop in egg production was monitored for antibodies. Results revealed the presence of IB, ILT and SHS infections and the absence of MG and MS in the farm. Reactor rates against SHS in affected birds were 64% and 82% in two (2) flocks. Random screening of other flocks revealed reactor rates of 12 - 39%. IB and ILT reactor rates of 42%/62% and 36% respectively were detected in severely affected 35- and 50-week old birds. ILT virus was isolated from the affected birds. (SHS virus isolation is in progress.) Serological reactors against infectious coryza were detected. However, these reactors were probably due to vaccinations against *H. paragallinarum* carried out in the farm.

K. T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D. Ku

CHICKEN ANAEMIA

Studies on the suitability of MDCC-MSB1 cells for use in the detection of chicken anaemia agent (CAA) antibodies by IFA

MDCC-MSB1 cells have been reported by some authors as being suitable for the IFA test for detection of CAA antibodies. At the time of this study, CAA virus was not available. However, the cell culture system was evaluated instead. CAA virus-free MDCC-MSB1 cells were reacted by the IFA procedure with SPF, HVT and MD antisera at dilutions of 1/40, 1/100 and 1/500 which were similar to those used for CAA antibody detection procedure. Results showed strong staining reactions with HVT and MD antisera at all serum dilutions. No staining reactions were seen with SPF sera at all dilutions. Such results indicated that CAA antibody detection using CAA infected MDCC-MSB1 cells may be possible if the test sera and control sera are also simultaneously reacted with MDV- or HVT- infected CEF cells as well and both IFA test procedures are carried out at the same time. If control sera react specifically in both cell types, test sera may be considered positive for

CAA antibodies when FA reactions are seen in MDCC-MSB1- infected cultures but not in MDV- or HVT-infected CEF cultures.

K.T. Lim, W.N. Wan Kamil, N.Y. Cheah, S.S. Lim and B.D. Ku

NEWCASTLE DISEASE

Monitoring of ND vaccination titres for Dindings Poultry Farm

ND maternal antibody levels in the chicks were found to be variable, depending on chick batches. Some batches had good levels of maternal antibodies with HI titres of 4 to 64. Live ND spray vaccination was routinely carried out at hatch. Booster vaccinations were recommended at 8 to 14 days of age.

K. T. Lim, W.N.Wan Kamil, , N.Y.Cheah, S.S.Lim and B.D. Ku

LABORATORY TESTS

Establishment of the haemadsorption (HAd) test

The HAd test procedure was established for the detection of haemagglutinating viral contaminants in cell cultures. The test was found to be more sensitive than the HA test for detection of HA viral contaminants.

K. T. Lim, W.N.Wan Kamil, , N.Y.Cheah, S.S.Lim and B.D. Ku

Investigations on the nature of non-producer (NP) cells

Results of the above investigations showed the presence of infectious RSV subgroup E. The NP cells were RSV (O) type and the SPF embryos were mixtures of C/O and C/E types.

K. T. Lim, W.N.Wan Kamil, , N.Y.Cheah, S.S.Lim and B.D. Ku

SCIENTIFIC REPORT: Pathology

Studies were focused on infectious bursal disease (IBD) and duck viral enteritis (DVE). A total of 10 experimental studies were conducted on IBD and DVE. These included pathogenicity of eight (8) IBD field virus isolates, detection of the virus in frozen and fixed tissues and the effect of different titres of IBDV on gross and histological lesions in chicks. Ducks and chicks were used in experiments involving DVE virus. These studies were mainly on liver function tests and the effect of cyclosphosphamide in DVE infected birds. In addition, experiments on the effect of cyclosphosphamide in young ducklings and use of the direct FA on frozen and paraffin sections for detection of Newcastle disease (ND) virus were carried out.

INFECTIOUS BURSAL DISEASE

Pathogenicity of eight (8) IBD field viruses in specific pathogen free (SPF) chickens.

Four (4) out of 8 field isolates of IBDV were pathogenic to four-week-old SPF chickens. These isolates caused clinical signs such as depression, ruffled feathers, anorexia and diarrhoea. Oedema and severe haemorrhages of the bursa of Fabricius (BF), necrosis of the spleen and thymus were observed in dead birds while the mortality ranged from 30-100%. The surviving birds had severe atrophied BF but no significant changes in other organs.

A. H. Mahani, S.H. Sharifah, W.N. Wan Kamil

Detection of IBD virus in chicken tissue using the immunoperoxidase test

Results showed that IBDV field isolate (No 6511) did not cause overt clinical signs or mortality in 3-week-old commercial broiler chickens. Histologically, lymphocyte necrosis of the BF, spleen and caecal tonsil were prominent at 3 and 5 days post infection (dpi). The IBDV antigens were detected as brown granules in the cytoplasm of reticular cells and macrophages in the BF, spleen, thymus and caecal tonsil by immunoperoxidase test. It was concluded that IBDV antigens could be specifically localised on formalin-fixed, paraffin-embedded sections by this test.

A.H. Mahani, A. Zuraidah, Ganesan

Effect of different virus titres in IBDV infection

Clinical signs and mortalities that ranged from 0 to 60% were observed in chickens inoculated with 10^{-1}, 10^{-2} or 10^{-3} BF homogenate of IBDV (field isolate). Examination at 5 dpi showed that the size, presence of haemorrhages and oedema or gelatinous substance in the BF did not correlate with the titres of IBDV. However, the group which received higher titres of the virus showed more severe BF atrophy. Histologically, 100% of the follicles in all the BF examined were affected.

A.H. Mahani, A. Zuraidah, S. Ganesan

Distribution of a vaccine strain of IBD virus in the bursa of Fabricius of chicks

No clinical signs, mortality or gross lesions were observed in 12-day-old chicks inoculated with a vaccine strain and then challenged with a IBDV field isolate. The lymphoid organs of the chicks vaccinated once or twice did not show significant histological changes. However, the BF of chicks challenged with the IBDV field isolate exhibited up to 60% affected follicles and was positive by the immunoperoxidase test. Failure to detect the vaccine virus may be due to a low virus titre present, nature of the virus (propagated in tissue culture) or inadequate sampling period (2, 4, & 7 dpi). Further work will be done to verify this matter.

A.H. Mahani, S.H. Sharifah, A. Zuraidah, S. Ganesan

Application of the indirect FA on frozen and paraffin sections for detection of IBDV

Frozen and formalin-fixed, paraffin-embedded sections of the BF, spleen, thymus and spleen of 4-week-old SPF chickens previously infected with a field IBDV were examined (2 dpi). Positive reactions were observed mostly in the necrotic cells of the medulla, cortex and interstitial tissues of the BF made from frozen and paraffin sections. Only a few fluorescent spots were seen in the spleen, thymus and caecal tonsil. It was deduced that both

frozen and paraffin sections of BF and spleen gave satisfactory results for detection of IBDV by indirect FA.

A.H. Mahani, A. Zuraidah, S. Ganesan

Monitoring of chickens after IBD vaccination (Dindings Poultry Farm)
Vaccination caused mild lymphoid depletion and necrosis of the BF at 5 dpi and no significant changes at 14 dpi. Results showed that all chicks autopsied (30 birds) were with normal lymphoid organs (control).

A..H. Mahani, S.H. Sharifah, W.N. Wan Kamil

DUCK VIRUS ENTERITIS

Light and electron microscopic studies on ducks experimentally infected with duck virus enteritis.
Six-week-old ducklings were inoculated intramuscularly with DVE virus. Characteristic lesions of haemorrhages and necrotic foci were present in the digestive tract and visceral organs. Lesions of diffuse osteomyelitis accompanied by intranuclear inclusion bodies occured in the bone marrow. The inclusions were observed in culled and dead ducklings at 2 - 5 dpi. Scanning and transmission electron microscopy examinations of the oesophageal mucosa revealed ballooning and desquamation of cells and disseminated necrosis in epithelial layers. Histopathological changes in the oesophageal mucosa corresponded with the presence of numerous virus particles in the epithelial cells.

A. H. Mahani, M. Narita, S.Ganesan

Liver function tests on chicks experimentally infected with DVE virus
Intramuscular inoculation of 20 two-week-old SPF chickens with DVE virus caused minor gross and histological lesions at 2 - 3 dpi. No intranuclear inclusion bodies were observed. Liver function tests showed no significant changes in all parameters examined. This further showed that only chicks less than a week old were susceptible to DVE virus.

A.H. Mahani, A. Zuraidah, S. Ganesan

Liver function test on ducks after inoculation with DVE virus
Serum samples from fifteen 3-month-old ducks infected with DVE virus were examined daily until 7 dpi. Microscopical changes were seen earliest in the lymphoid organs. This was followed by liver necrosis at 4 - 5 dpi. Results showed that alkaline phosphatase level had declined while the ASAT/GOT and ALT were elevated between 2 - 7 dpi. Although the alteration of the enzymes was much earlier than appearance of microscopical lesions especially in the liver, these enzymes could not be used to indicate specific liver lesions. This was because these enzymes were also present in other damaged tissues. Therefore, the usefulness of the liver function test to access liver damage in DVE infection is very limited.

A.H. Mahani, M. Ramlan, A. Zuraidah, S. Ganesan

Experimental DVE infection in week-old ducklings treated with cyclosphosphamide
Inoculation of cyclosphosphamide (CY) into week-old ducklings caused severe lymphoid depletion of the lymphoid tissues. The CY-DVE virus inoculated group showed mortality at 2 dpi compared with 3 dpi in the group infected with DVE only. Early appearance and more severe gross and histological changes in the lymphoid tissues, gastrointestinal tract and liver were also observed in the CY-DVE group. It confirmed that the DVE virus has multiple predilection sites for replication other than lymphocytes.

A.H. Mahani, A. Zuraidah, S. Ganesan

Susceptibility of cyclophosphamide (CY) treated chicks to DVE virus
No clinical sign or mortality was observed in 2- and 14-day-old SPF chicks previously inoculated intramuscularly with CY and DVE virus. Intramuscular inoculation of CY-DVE virus caused subcutaneous oedema of the neck and thigh region in 2-day-old chicks only. However, gross lesion of liver haemorrhages and necrosis were seen in

chicks from both age groups. It was concluded that CY could increase susceptibility of chicks of 2 weeks old to DVE virus resulting in necrosis and production of intracellular inclusion bodies in the liver.

A.H. Mahani, A. Zuraidah, S. Ganesan

OTHER STUDIES

Application of the direct FA on frozen and paraffin sections for detection of NDV

Frozen sections or formalin-fixed, paraffin-embedded sections were obtained from 3-week-old SPF chickens sacrificed at 3 dpi with NDV field virus. Positive reactions were observed in the epithelium and cellular debris of the trachea, epithelial layer and connective fibre cells of the lung, caecal tonsil and proventriculus. The direct FA gave satisfactory results for detection of NDV on frozen and paraffin sections from these tissues.

A.H. Mahani, A. Zuraidah, S. Ganesan

Effect of cyclosphosphamide in two-day-old Khaki Campbell ducklings (preliminary study).

No clinical sign or mortality was observed in two-day-old ducklings inoculated intramuscularly with CY (2mg/bird for 3 consecutive days). However, it caused acute leucopenia at 3-5 dpi and severe lymphocyte depletion in the spleen, thymus and BF. The CY effect was most noticeable in the BF and thymus at 3 - 7 dpi.

A.H. Mahani, A. Zuraidah, S. Ganesan

SCIENTIFIC REPORT : Bacteriology

Work on infectious coryza and mycoplasmosis continued. They were efficacy of infectious coryza vaccines, protein analysis of *Hemophilus paragallinarum* and isolation of mycoplasma from field cases. Other studies included comparison between chicken and duck serum immunoglobulins, development of a simple method for the preparation of chicken and duck immunoglobulin-G from egg yolk and analysis of *Salmonella enteritidis* by electrophoresis.

INFECTIOUS CORYZA

Efficacy of coryza vaccines

Three batches of chickens were used to compare the efficacy of a Japanese commercial alum hydroxide vaccine and two experimentally prepared vaccines (alum hydroxide and dextran-sulphate inactivated).

Each batch was divided into four groups- a group of five birds each vaccinated intramuscularly with the different vaccine and the fourth group as control. The third batch used 10 birds for each group. The first and second batches were vaccinated at 10 and 12 weeks and the third batch at 4 and 6 weeks. They were then challenged with virulent *Hpg* 221 type A three weeks after the second vaccination.

The birds were observed daily for clinical signs of coryza and necropsied three weeks after challenge. Serum samples were taken prior to vaccination and then weekly until the end.

Results showed that antibodies developed two weeks after vaccination. The experimental alum hydroxide vaccine provided 80% protection in one batch and 44% in another. Results of the second batch were not considered since no clinical signs were seen in the controls.

D. Azizah, L.J. Tan

Protein analysis of *Hemophilus paragallinarum* (*Hpg*) by two-dimensional gel electrophoresis

Analysis of proteins on twelve isolates of *Hpg* started in April using the two-dimensional gel electrophoresis method. Two of the isolates were types A and C, brought in previously by a Japanese expert and the remaining ten were local isolates.

Repeated testing did not produce satisfactory results as most of the samples did not produce protein spots. The study was terminated at the end of the year.

D. Azizah, L.J. Tan

MYCOPLASMOSIS

Isolation of mycoplasmas from chickens - a survey

This survey was initially started by Dr. Kishima, a short term Japanese expert. Oropharngeal swabs from chickens with respiratory signs and healthy chickens were taken. Two farms chosen for the survey were in Chemor (A) and Sungai Siput (B). Ten samples from farm A were with respiratory signs while those of farm B were healthy chickens. Mycoplasmas were isolated from all ten samples of farm A while none from B.

Subsequently, 23 oropharyngeal swabs from a farm in Bidor were taken and eight were positive for mycoplasmas and two for L-forms.

M. Kishima, D. Azizah, L.J. Tan

OTHER STUDIES

Analysis of proteins of *Salmonella enteritidis* (*SE*) isolated from chickens by electrophoresis

This study was aimed at finding the correlation between phage-types of *SE* strains and the electrophoretic patterns of the proteins.

Eleven field strains (phage types 1, 4 and 13a) isolated from chickens in the country were analysed by two-dimensional gel electrophoresis. More than 150 protein spots were detected in the gels and molecular mass of the proteins ranged from 14 kDa or less to 60 kDa. However, significant differences in protein spot patterns among the strains were not detected. Inseparable ghost-like spots were detected in the acidic area in all gels. Therefore, methods involved in solubilization of samples should be improved for two-dimensional protein spot patterns.

M. Kishima, D. Azizah, L.J. Tan, A.R. Nor Aidah

Comparison of chicken and duck serum immunoglobulins

Anti-chicken immunoglobulins are commercially available but not anti-duck immunoglobulins. This study was to establish capabilities to produce anti-duck immunoglobulins for use in ELISAs.

The analysis showed that the immunoglobulins of chicken and duck are completely different. The only protein that shared common antigenicity is albumin which is not an immunoglobulin.

D. Azizah, C. Kuniyasu, L.J. Tan

Development of a simple method for preparation of chicken and duck immunoglobulin G from egg yolk.

The purpose of this study was to develop a simple method for preparing chicken and duck IgG from egg yolk which can be used in epidemiological surveys especially in the determination of maternal egg antibodies.

Results showed that IgG of chicken serum and yolk were similar. However, in the duck they were slightly different.

D. Azizah, C. Kuniyasu, L.J. Tan

Comparison of antibody titres of antisera frozen at -20°C and -80°C

Antisera frozen at -80°C is known to be a good storage temperature. It is said to cause less fluctuations in antibody titres after storage for a period of time.

The purpose of this study was to compare antibody titres in antisera stored at -20°C and -80°C. The study will continue for two years.

D. Azizah, C. Kuniyasu, L.J. Tan

SUPPORT SERVICES

SPECIFIC PATHOGEN FREE UNIT (SPF)

The Unit was established with the aim of providing researchers with SPF eggs and chickens for their experimental trials and production of biologics. It was designed to constantly produce 200 eggs or chicks per week . Main activities of the Unit were:

- **Hatching of imported eggs**
- **Artificial insemination**
- **Production and supply of SPF eggs chicks**
- **Flock health monitoring**
- **Production and supply of chicken feeds.**

Hatching of imported eggs

A total of 400 SPF eggs imported from the Nippon Institute of Biological Science (Nisseiken), Japan on 17 March 1993 were incubated on 19 March and hatched on 8 April .Fertility was 90%, mortality 5% and hatchability 84.44%. This constituted the seventh batch of of the SPF flock. (The sixth batch was culled on 26 August).

A total of 304 chicks was obtained from the eggs of which 20 males and 68 females were finally selected for the breeding stock.

Artificial Insemination

Artificial insemination (AI) was conducted every Tuesday and Friday. AI on the seventh SPF flock commenced on the 4 Oct. 93 when the flock attained a 53% egg production level.

Production and supply of SPF eggs and chicks

A total of 14 366 SPF eggs were produced of which 14 011 eggs were uitilised for various purposes. The percentage usage of SPF eggs for the year was 97.53% (Table 1).

Out of 2 288 SPF eggs incubated 1 875 chicks were obtained (81.95% hatchability rate). Table 1 shows the supply of eggs and chicks to the various units.

Table 1. Supply of SPF eggs and chicks

UNIT	NO. OF EGGS	NO.OF CHICKS
Bacteriology (APDRTC)	90	125
Pathology (APDRTC)	613	331
Virology (APDRTC)	4 402	233
Virology (VRI)	1 015	-
Biologics	7 361	760
Regional Veterinary Lab. P.J.	530	426
TOTAL	14 011	1 875

Flock health monitoring

To ascertain that the chickens were constantly free of pathogens, monitoring of the flocks for bacteria, viruses, parasites and post mortems were conducted; thrice for the sixth batch and twice for the seventh batch.

The chickens were screened for IB, IBD, AE, Celo, avian influenza, Reo, RE, fowlpox, ILT, MD, ND, EDS, avian leukosis , swollen head syndrome, *M. gallisepticum, M. synoviae, S. pullorum*, infectious coryza, blood protozoa, coccidia, helminths and leucocytozoon. Both batches were found to be free of all these pathogens.

Production and supply of feed

The Unit mixed its own feed for its use and also for other units of the Institute which required them. A total of 7 440.5 kg of feed was produced and 7265.6 kg utilised. Feed produced included starter and grower mash.

SUPPORT SERVICES

ELECTRON MICROSCOPY AND PHOTOGRAPHY UNIT

This Unit provided services not only to the staff of APDRTC and VRI but also to other staff of the Department who required the use of the transmission electron microscope (TEM) and the scanning microscope (SEM).

For the year reported, the TEM was only in service until March because of a faulty electrical circuit in the microscope. Repairs could not be done during the year since the supplier was reluctant to evaluate the damage and make the necessary repairs.

Number of cases processed for the year is as follows:

TEM :	Cases received	56
	Cases examined	36
	Micrographs	71
	Epon blocks	109
	Micrograph reprints	100
SEM:	Cases recieved	28
	Micrographs	58

TRAINING

Training under the Third Country Training Programme (TCTP) consisted of the 'ASEAN Course in Specialized Diagnostic Techniques' and the 'ASEAN Seminar on Poultry Diseases and their Control' funded by JICA. The Centre was also involved in other training programmes organized by the DVS and the School for Veterinary Laboratory Technology, VRI.

THIRD COUNTRY TRAINING PROGRAMME

ASEAN Seminar on Poultry Diseases and their Control, 17 - 21 January 1993

This was the sixth seminar held since 1988. A total of 18 participants attended the seminar which was focused on 'Infectious Bursal Disease'.

Two Japanese experts; Drs Yusaburo Ohtaki and Kenji Tsukamoto gave a lecture each. Dr Ungku Chulan from Universiti Pertanian Malaysia (UPM) and Mr Lim Kean Teik from this Centre also lectured on topics related to the theme. Five country reports were also presented.

ASEAN Course on Specialized Diagnostic Techniques of Poultry Diseases, 11 July - 8 August 1993

Two modules, Bacteriology and Virology were offered in this third specialized course. However, pathology was also included into the Virology module. They were basically techniques in preparation of antigens and antisera for specific poultry diseases.

Seven participants took part in the course and they were taught preparation of primary and secondary cell cultures, maintenance of cell lines and suspension cultures, preparation of EDS, HVT, IBD, IB, AI and ILT antigens and antisera, purification of antigens, quality control tests and introduction to microscope slide cultures. In addition, they also covered pathogenicity tests on local IBDV isolates, histopathology examinations, preparation of frozen sections, fluorescent antibody technique and differential diagnosis of IBD.

The Bacteriology module offered the preparation of antigens for mycoplasma and *Hemophilus paragallinarum.*

Table 2. Participation of ASEAN member countries in the TCTP

Programme	Participants						
	B	I	M	P	S	T	Total
Course	0	3	2	2	0	0	7
Seminar*	0	4	8	3	1	2	18

*1992 Japanese Fiscal Year
B:Brunei, I: Indonesia, M: Malaysia, P: Philippines, S: Singapore, T: Thailand
List of names is in Annex 1

MALAYSIAN TECHNICAL COOPERATION PROGRAMME (MTCP)

Basic Course in Pathology

Three (3) participants from Mozambique (1), Bangladesh (1) and Thailand (1) attended a one-month (November) course in the preparation of histoslides, fluorescent antibody technique, special staining and introduction to electron microscopy.

Virology Techniques

Two participants (Indonesia and Bangladesh) were attached to the section in November to learn virology techniques on DVE, SHS and IBD.

Bacteriolgy and Parasitology

Two of the MTCP participants attending the basic bacteriology course (VRI) also spent about 1½ days at the Bacteriology Section and another spent a day at Parasitology.

TRAINING IN LABORATORY TECHNIQUES FOR DEPARTMENTAL STAFF

This programme organised by the School for Veterinary Laboratory Technology, VRI provided tarining of the Regional Laboratory staff in specific techniques. The involvement of the APDRTC staff were in:

1. Cryostat and fluorescent antibody techniques (Pathology)
2. Fluorescent antibody test for DVE, IBD and Marek's disease (Virology)
3. Isolation and identification of *Hemophilus paragallinarum* (Bacteriology)

GENERAL REPORT

JOINT EVALUATION OF APDRTC
(3 - 17 February 1993)
Prior to the end of the extended two-year period (1990-1992) of the Technical Cooperation, JICA organized a Japanese Evaluation Team headed by Dr Noburu Yuasa. Together with the Malaysian Team led by Dr Abdul Rahman b Mohd Saleh, they conducted an overall review and evaluation of the performances of the APDRTC. The Team members were:

Japanese Team

Dr Noboru Yuasa	Chief, Lab of Microbiological Diagnosis, Systematic Diagnosis Res Div, NIAH
Dr Toshiaki Taniguchi	Chief, Second Lab of Path Third Res Div, NIAH
Dr Kameo Shimura	Chief, Third Section Poultry Dis Res Lab, NIAH
Mr Kiyotaki Kawakami	Senior Tech Officer International Cooperation Div, MAFF
Mr Nabuo Kato	Dep Director, Livestock Tech Cooperation Div, Agric Dev Cooperation Dept, JICA

Malaysian Team

Dr Abdul Rahman b Mohd Saleh	Dep Dir Gen II, Dept of Vet Services, Min of Agric Kuala Lumpur
Dr Mohd Yusoff b Mohd Noor	International Desk, Dept of Vet Services, Min of Agric, Kuala Lumpur
Dr Mohamad Azmie b Zakaria	Planning & Evaluation Dept, Dept of Vet Services, Min of Agric Kuala Lumpur
Dr N Krishnan	Director, Regional Vet Lab Bkt Tengah, Penang
Dr J M Zamirdin	Director, Poultry Dev Inst Johor Bahru, Johore

SHORT TERM EXPERTS

Dr Masato Kishima (16 Dec '92 - 7 Mar '93)	Bacteriologist (NIAH)
Dr Naotoshi Tsuji (16 Dec '92 - 7 Mar '93)	Parasitologist (NIAH)
Dr Minoru Narita (15 Feb - 16 Apr '93)	Pathologist (NIAH)

TRAINING ADVISOR

Dr Chikara Kuniyasu (12 - 19 Oct 1993)	JICA (Tokyo)

COUNTERPART TRAINING

Management of Research Organizations
(7 - 18 June 1993), Japan
Dr Nor Aidah bt Abdul Rahim

PERSONNEL TRAINING & DEVELOPMENT

Computer Course on Lotus 123 and Wordstar 7
(26 April - 4 May 1993), VRI
Dr Wan Kamil Wan Nik
Mdm Cheah Ngan Yok
Mdm Tan Lin Jee

Nation Building Course for Officers of the Ministry of Agriculture
(14 - 18 May 1993), Pulau Langkawi
Dr Nor Aidah bt Abdul Rahim

Basic Horticulture and Landscaping
(5 - 9 July 1993), Universiti Pertanian Malaysia
Dr Mahani Hamid

LECTURES

Dr Nor Aidah Abd Rahim gave the following lectures to participants (Herd Health Unit) of the course on 'Control and Eradication of Specific

Diseases 20-22 Dec '93':

- Control of salmonellosis in poultry
- Epidemiology and control of caseous lymphadenitis in sheep and goats

TECHNICAL EXCHANGE VISIT TO SABAH AND SARAWAK

(28 Mar - 1 Apr '93)

A five-member team headed by Dr C Kuniyasu made a visit to Sabah and Sarawak to exchange views and discuss areas of common interest and also to see laboratory facilities available. A seminar was also held at the Animal Disease Research Centre, Sabah by the APDRTC staff. They were:

Dr Nor Aidah	The APDRTC from 1986 -1992
Dr Mahani	Pathogenicity of & IBDV field isolates in 4-week-old SPF chickens
Mr Lim Kean Teik	IBD diagnosis
Mr Yap Hon Choong	Microscopy

SCIENTIFIC PUBLICATIONS & PRESENTATIONS

PUBLICATIONS

Cheah, N. Y., Lim, K. T., Wan Kamil, W. N., Lim, S. S. and Ku, B. D. (1994): Virology Manual for the detection and quantitation of antibodies against Marek's disease and herpes virus of turkey in chickens and quails. *Technical Report No. 16*

Lim, K. T.; Lim, S. S.; Zabidah, A. and Wan Kamil, W. N. (1993): Studies on Newcastle disease maternal antibodies in three-day old chicks. *J. Vet. Malaysia* **5**: 7-13

Mahani, A. H. Narita, M, and Ganesan, S.(1993): Light and ultrastructural studies of duck oesophagus after infection with duck viral enteritis virus. *J. Vet. Malaysia* **5(2)**:21-25

Mahani, A. H. and Narita M. (1993):Detection of Marek's Disease virus antigens using an immunohistochemical staining. *J. Vet. Malaysia* **5(2)**:45-48

Ohta, H., Wan Kamil, W. N., Chai, K. K., Cheah, N. Y., Fujii, H., Komine, K. I. and Gan, C. H. (1993): Haemagglutination factor extracted from normal chicken kidney cells. *Jap. Poult. Sci.* **30**: 196-202

Article accepted by Journal Veterinar Malaysia:

Sharifah, S. H, Mahani, A. H, Taniguchi, T. and Salmah, M.: Outbreaks of duck virus enteritis (duck plague) in Malaysia.

PRESENTATIONS

Sharifah, S .H*, Ong, G. H, Wan Kamil, W. N, Mahani, A.H and Aini, I.: Characterization of the structural polypeptides and immunogens of infectious bursal disease virus isolates in Malaysia. *Seminar Program Bioteknologi, Kebangsaan Kelima 13 - 14 Dec 1993 Port Dickson.*

Wan Kamil, W. N.*, Lim,K.T., Cheah, N. Y., Lim, S. S. and Ku, B. D.: An indirect immunofluorescent test for detection of duck virus enteritis infection. *5th Scientific Congress Vet Assoc Malaysia, 1-3 Oct 1993 Malacca*

* Presenter

MEMBERS OF STAFF

ADMINISTRATION

Director:	Nor Aidah Abdul Rahim, DVM, MSc
Clerk:	Noor Khadijah Baharom (Resigned in May)
Typist:	Nor Azian Daud
Worker:	Suraya Ramli

BACTERIOLOGY DIVISION

Head:	Zaini Mohd Zain, BSc (Away on post graduate studies) Azizah Darus, DVM
Technician:	Tan Lin Jee
Worker:	Zahari Othman

VIROLOGY DIVISION

Head:	Lim Kean Teik, BSc Wan Kamil Wan Nik, DVM
Technicians	Cheah Ngan Yok Lim Siew Sam Ku Bi Di
Worker:	Jalilah Ismail

PATHOLOGY DIVISION

Head:	Mahani Abdul Hamid, DVM
Technicians	S. Ganesan Zuraidah Ahmad
Worker:	Norizan Hamid

PARASITOLOGY DIVISION

Head:	Rahmat S M Sheriff, DVM (Away on postgraduate syudies)
Technician:	S Parameswaran
Worker:	Shahril Aznil Mohd Yusof

SPF UNIT

Head:	Lip Kim Lock
Veterinary Assistant:	Peter Mangalam
Worker:	A Korandasamy

ANNEX 1

PARTICIPANTS OF THE THIRD COUNTRY TRAINING PROGRAMME

ASEAN Seminar on Poultry Diseases and their Control (17- 21 Jan 1993)

Dr Arlene Asteria Villa Vytiaco
Bureau of Animal Industry, Visayas Ave, Diliman, Quezon City PHILIPPINES

Dr Sylvanna Rivadelo Sison
National Animal Disease Diagnostic Laboratory Visayas Avenue, Diliman, Quezon City PHILIPPINES

Dr Rainelda Dela Cruz Pena
Philippine Animal Health Centre, BAI Cmpd., Visayas Avenue, Diliman, Quezon City PHILIPPINES

Mdm Tan Hui Cheng
Central Veterinary Laboratory, Jalan Seranggong Kechil SINGAPORE 1954

Mr Uthit Musigo
Div of Vet Services, Dept of Livestock Dev, Phyathai Road, Bangkok 10400 THAILAND

Dr Jumriang Orawannukul
Poultry Diseases Section, Div of Vet Services, Dept of Livestock Dev, Phyathai Road, Bangkok 10400 THAILAND

Dr Harry Besar Sosiawan
Pusat Veterinaria Farma, Jl A Yani 68-70, Surabaya INDONESIA

Dr Endang Susanto
Balai Pengujian Mutu dan Sertifikasi Obat Hewan, Gunung Sindur, Bogor 16340 INDONESIA

Dr Ketut Santhia Adhy Putra
Balai Pusat Penyelidikan Hewan Wilayah IV Denpasar, P.O. Box 332, Jl Sesetan, Pegok, Bali INDONESIA

Dr Hariono
UPT, Labotorium Kesehatan Hewan, Di Tuban, Jl Majopahit, No 100 Tuban, East Java INDONESIA

Dr Asiah bt Naina Mohd Alim
Regional Veterinary Laboratory, Jalan Dato Kumbar, 05300 Alor Setar, Kedah MALAYSIA

Dr Krishnan Nookaya
Regional Veterinary Laboratory Bukit Tengah P.O. Box 63, 14000 Bukit Mertajam, Seberang Prai, MALAYSIA

Dr Norlida bt Othman
Regional Veterinary Laboratory, Jalan Kebun Teh, 80200 Johor Bahru, Johore MALAYSIA

Dr N Narayanasamy
Sinmah Breeders Sdn Bhd, Ag - 5730, Alor Gajah Industrial Estate, 78000 Alor Gajah, Malacca MALAYSIA

Dr Hair Bejo
Faculty of Vet Med and Animal Sc, Universiti Pertanian Malaysia, 43300 Serdang, Selangor MALAYSIA

Dr Sharifah bt Syed Hassan
Veterinary Research Institute, 59, Jlan Sultan Azlan Shah, P.O. Box 369, Ipoh, Perak MALAYSIA

Dr P Loganathan
Veterinary Research Institute, 59, Jlan Sultan Azlan Shah, P.O. Box 369, Ipoh, Perak MALAYSIA

ASEAN Course on Specialized Diagnostic Techniques of Poultry Diseases (17 Jul - 8 Aug '93)

Dr Isep Suleiman
Disease Investigation Centre Region 7, Sulawesi INDONESIA

Dr Andre Heryanto
Disease Investigation Centre Region 4, Central Java INDONESIA

Dr Sanusi Achsan
Type C, Animal Health Laboratory, Rangkasbitung,
West Java INDONESIA

Dr Lilia Mosrales
National Animal Disease Diagnostic Laboratory
Visayas Avenue, Diliman, Quezon City
PHILIPPINES

Ms Nieves Bautista
National Animal Disease Diagnostic Laboratory
Visayas Avenue, Diliman, Quezon City
PHILIPPINES

Ms Rosenani Said
State Veterinary Diagnostic Laboratory, Kota
Samarahan, Kuching, Sarawak MALAYSIA

Ms Liew Sin Lan
Animal Disease Research Centre, Tanjung Aru,
Sabah MALAYSIA

	A150	A160	B301	B302	B303	B304	B305	B306	B307	B308	B309	B310	B311	B312	B313
ブルネイ	(+)	+	+++	+	-	-	-		+++	-	+++ V	-	++ T	-	- Ie
インドネシア	-	++ PnV*	- 1988	- 1988	-	...	-	+ T	+ T	-	++ PnV*	+ V	- 1988	-	+ PaT
マレーシア（半島）	- 0000 *	++ V	+	+	- 0000	- 1985 *	! *	+	+	-	+	+	+..	-	+ PaSp Iv*
マレーシア（SABAH）	-	+ V	+ V	+ V	-	-	-	-	+ V	- 1985	- 1990	- 1990	+ TV	-	-
マレーシア（SARAWAK）	-	++ V	+++ V	+ V	- *	?	?	+ *	+ V	+	++	+ V	+ T	-	- Sle
フィリピン	- 0000 P	+ X PV	- P	- Qf	- Qf	- Qf	- Qf	+ QfV	+ QfV	- Qf	- Qf	- 1987 S	+? QfT Ie	- Qf	+? Qfe
シンガポール	- 0000	(+) V	- 1991	- 1989 V	- 0000	- 1991	- 0000	- 1991	(+) V	- 0000	- 1988 V	(+) V	- 1990	- 1987	- 1991
タイ	- 1985	+ PQIe V	- 1988 PQfS V	- PQf	-	...	...	- 1988 PQfV	- PQfV	... PQf	... PQf	- 1988 PQf	- PQf	- PQf Iv	- 1988 PQf Iv
日本（参考）	- 19 45 QfS*	- 1991 QfSV*	+ QfV*	+ QfV	- Qf	- 0000 Qf	- 0000 Qf	- 1953 QfS*	+ QfV	- 1990 Qf*	+ QfV	+ QfV	+ QfV	+? Qf	+ 1989 QfS*

ANIMAL HEALTH YEAR BOOK 1992 (FAO-OIE-WHO)より抜粋。　上段：発生状況　下段：防疫措置

記号	OIEリスト	疾病名
A150	A	家禽ペスト
A160	A	ニューカッスル病
B301	B	伝染性気管支炎
B302	B	伝染性喉頭気管炎
B303	B	結核
B304	B	アヒル肝炎
B305	B	アヒルウイルス性腸炎
B306	B	家禽コレラ
B307	B	鶏痘
B308	B	家禽チフス
B309	B	伝染性ファブリキウス嚢病
B310	B	マレック病
B311	B	マイコプラズマ病
B312	B	オウム病
B313	B	ひな白痢

（注）1. ＯＩＥ：International Office of Epizootics（世界獣疫事務局）
2. ＯＩＥリストとは、ＯＩＥの区分けした疫病の重要度を示し、Ａ＝最重要、Ｂ＝中程度に重要、Ｃ＝あまり重要でない疫病、となっている。

記号	発生状況
0000	現在まで発生報告なし
-	発生報告なし
year	最終発生年
?	発生疑いあるが確認せず
(+)	例外的発生あり
+	低率に発生あり
++	中程度に発生あり
+++	高頻度に発生あり
+?	発症はないが抗体またはウイルス分離陽性
+..	病気は存在するが分布と発生は不明
0	発生が特定区域に限定される
X	至る所で発生あり
!	国内での初発生
...	情報得られず

記号	防疫措置
P	発生国から輸入禁止
Pa	国内の特定区域にあるいは特定の家畜に対して防疫措置あり
Pn	国内の全域で防疫措置あり
Q	国境での検疫および国内での移動制限措置あり
Qf	国境での検疫措置あり
Qi	国内での検疫および移動制限措置あり
S	発症動物の殺処分義務あり
Sp	発症動物の一部に殺処分義務あり
T	治療を行う
Ie	検査を行う
Iv	一部の家畜のみ検査を行う
V	ワクチン接種
Vp	ワクチン接種禁止
*	発生動物の届け出義務あり

7　アセアン諸国の鶏の飼育羽数比較

	鶏の飼育羽数（千羽）	人口（百万人）
ブルネイ	2400	
インドネシア	555,476	184
マレーシア	145,000	17
フィリピン	69,539	62
シンガポール	3,800	2
タイ	107,559	54
日本（参考）	337,857	123

ANIMAL HEALTH YEAR BOOK 1992 (FAO-OIE-WHO)より抜粋。

JICA