

No.

PART - II

REGION - III

LAMPUNG, SOUTH SUMATRA AND BENGKULU

DISEASE INVESTIGATION CENTER, TANJUNG KARANG

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PART - II

REGION - III

LAMPUNG, SOUTH SUMATRA AND BENGKULU

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DISEASE INVESTIGATION CENTER, TANJUNG KARANG

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PREFACE

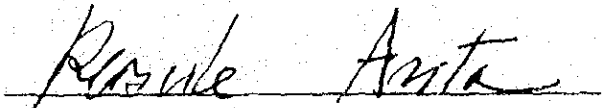
It is with great pleasure that I present to the Government of the Republic of Indonesia a report entitled the Animal Health Improvement Project in Indonesia (ATA-133).

This report embodies the result of the activities carried out at the Disease Investigation Centres in Medan and Tanjungkarang in Sumatra Island, jointly by the Japanese experts and Indonesian counterparts during the five-year period from July 7, 1977 to July 6, 1982 on the basis of the Record of Discussion signed on July 7, 1977.

I sincerely hope that this report will be useful as a reference for strengthening DIC's activities and contribute to the development of livestock industry in Indonesia.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the Japanese experts.

Tokyo, December 1982

A handwritten signature in cursive script, reading "Keisuke Arita", written over a horizontal line.

Keisuke Arita
President
Japan International Cooperation Agency

REPORT ON ANIMAL HEALTH IMPROVEMENT PROJECT

On behalf of the Japanese experts assigned to the project, I the undersigned have the honor of submitting herewith the Report on Animal Health Improvement Project for 1977 to 1982.

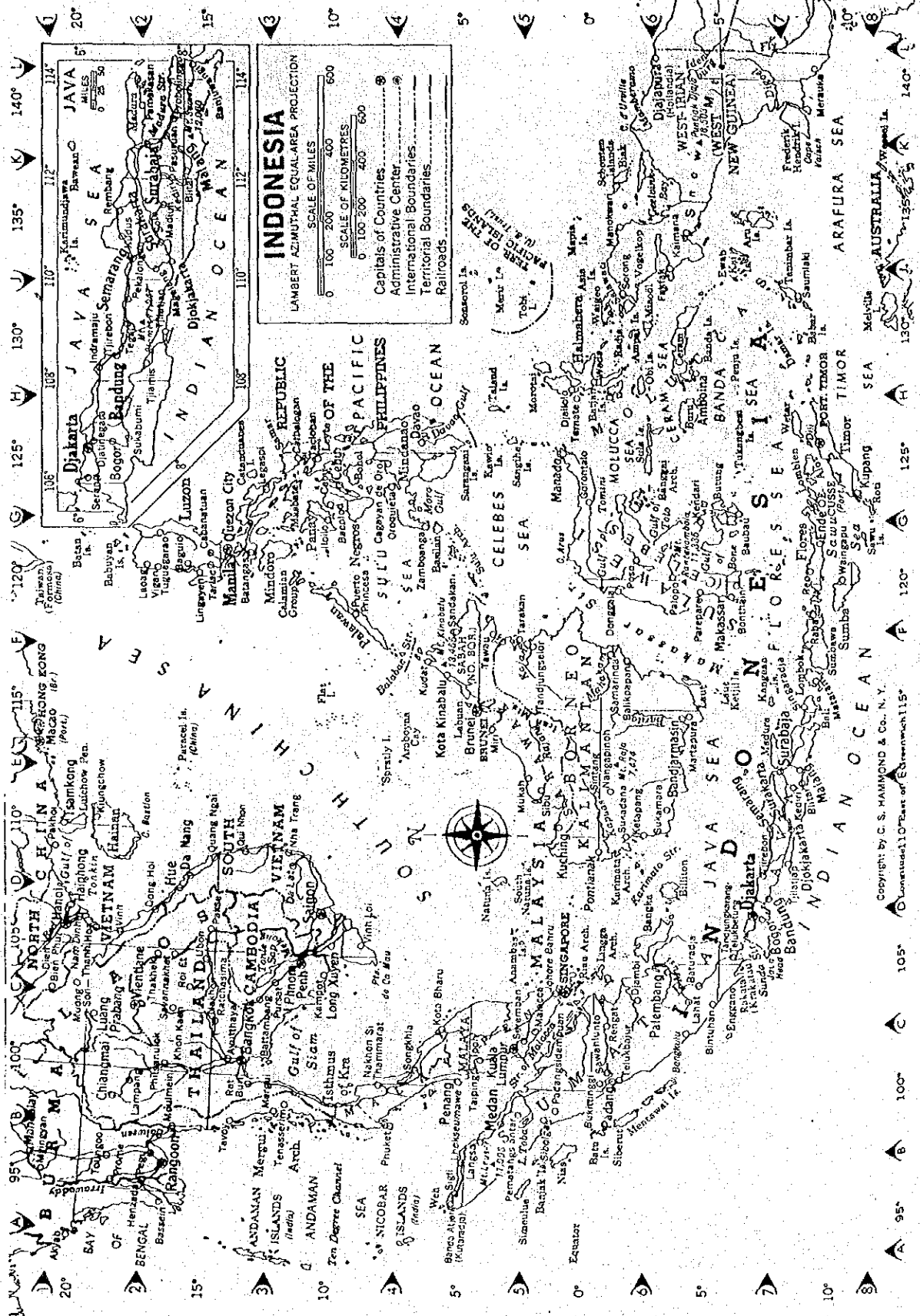
The activities of the project were executed under the Technical Cooperation Project on Animal Health Improvement Programme (ATA - 133) with the full collaboration of the Indonesian officials concerned.

Medan, 30 June 1982

A handwritten signature in black ink, appearing to read 'Seichi Nagano', written over a horizontal line.

Seichi Nagano
Team Leader of JICA Experts

INDONESIA



INDONESIA
 LAMBERT AZIMUTHAL EQUAL-AREA PROJECTION

SCALE OF MILES
 0 100 200 400 500

SCALE OF KILOMETRES
 0 100 200 400 600

Capitals of Countries
 Administrative Center
 International Boundaries
 Territorial Boundaries
 Railroads

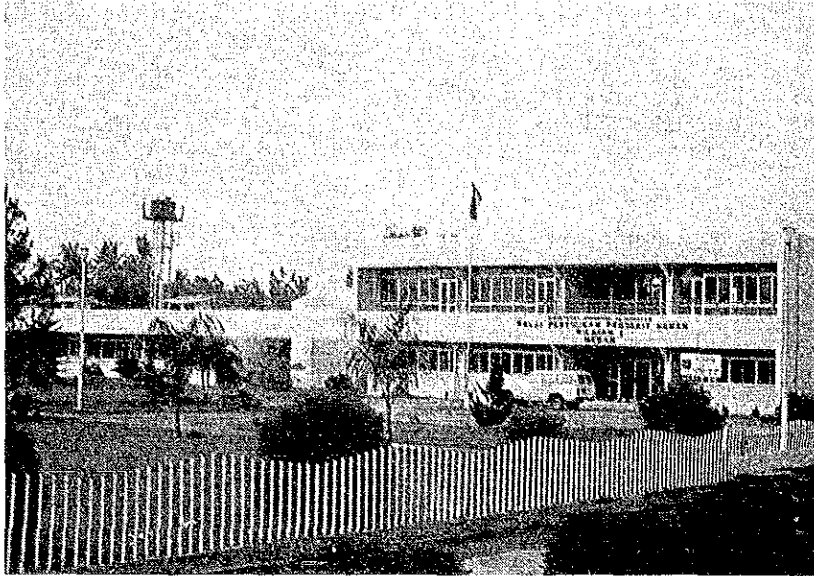
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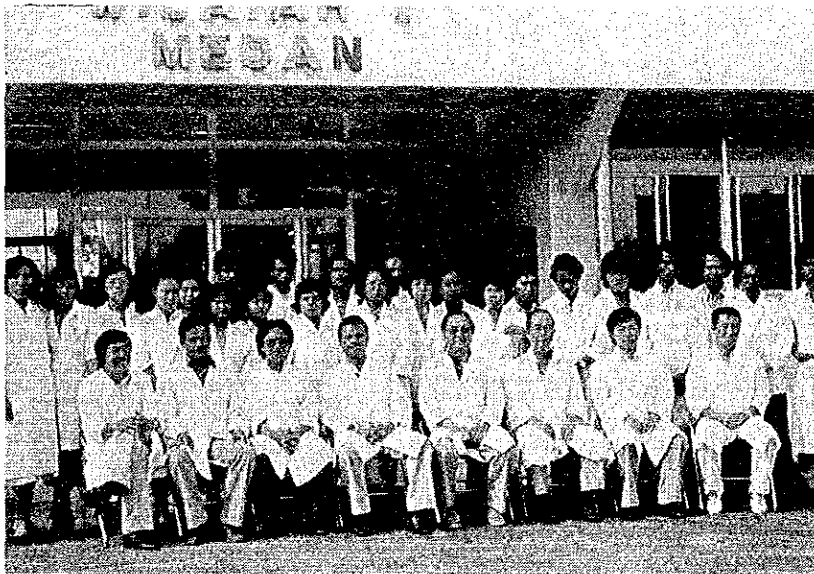
Opening ceremony of the Medan DIC
(25 November, 1978)



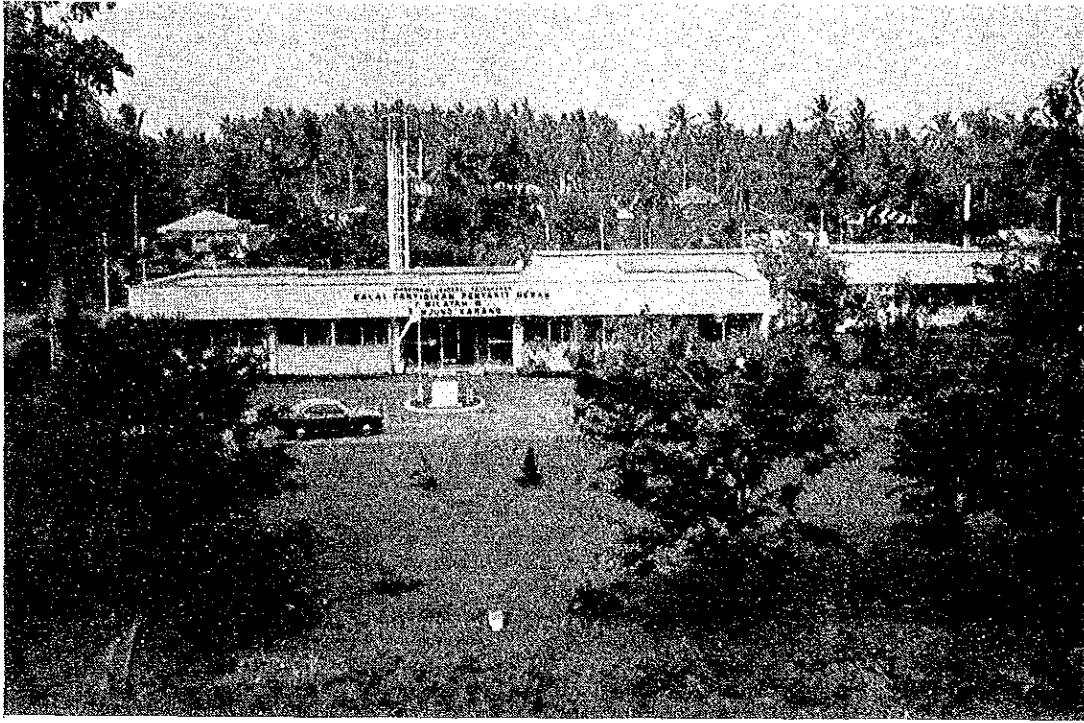
Closing ceremony of the Technical Cooperation Project
on Animal Health Improvement Programme.
(From right) Director. Dr. Adat Paranginangin, Consul-
general of Japan. Mr. Masuda, Director General of
Livestock Services Prof. Dr. J. H. Hutasoit, and
Governor of the North Sumatra Province.



The Disease Investigation Center in Medan
(front view)



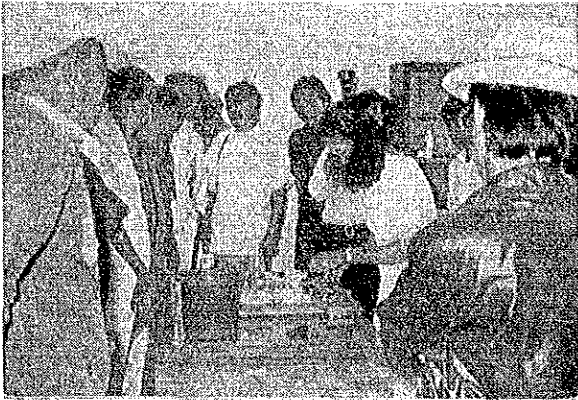
Indonesian staffs and Japanese experts of the Disease
Investigation Center in Medan.



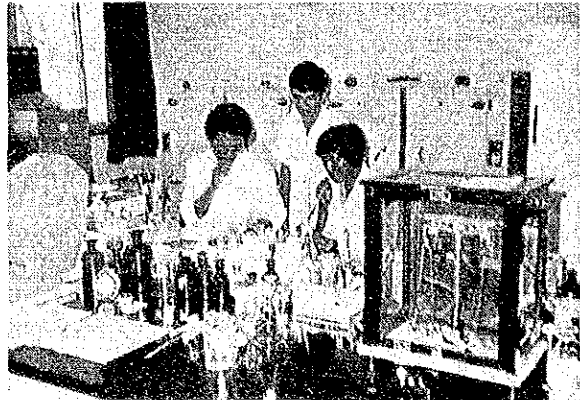
The Disease Investigation Center in Tanjungkarang (front view)



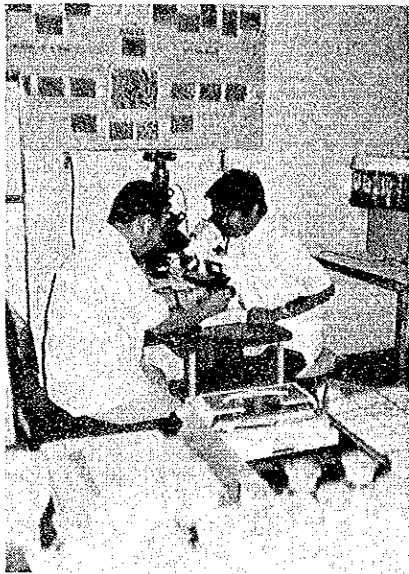
Indonesian staffs and Japanese experts of the Disease Investigation Center in Tanjungkarang



Pathological autopsy of chicken



Serological test



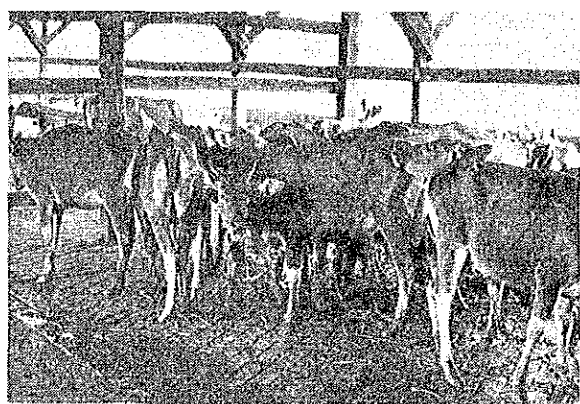
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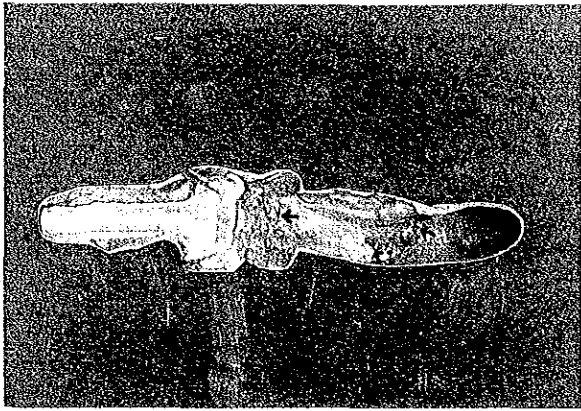
Aseptical operation



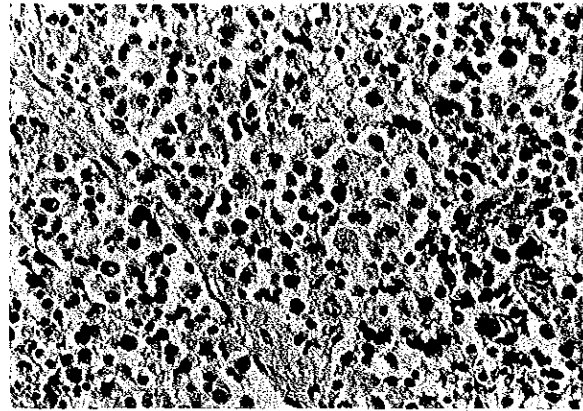
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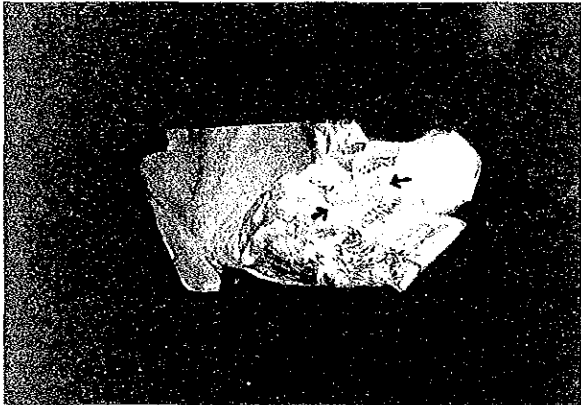
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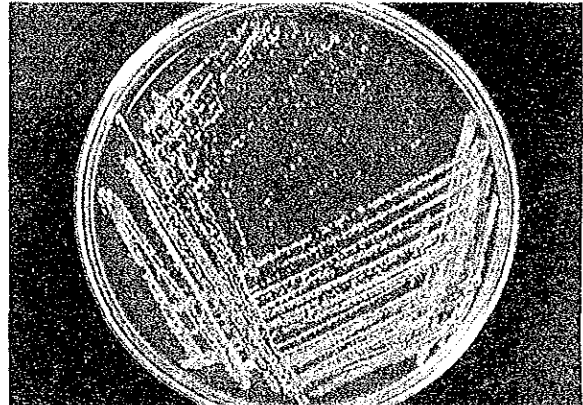
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for Rama Dewa disease: Case No. 2



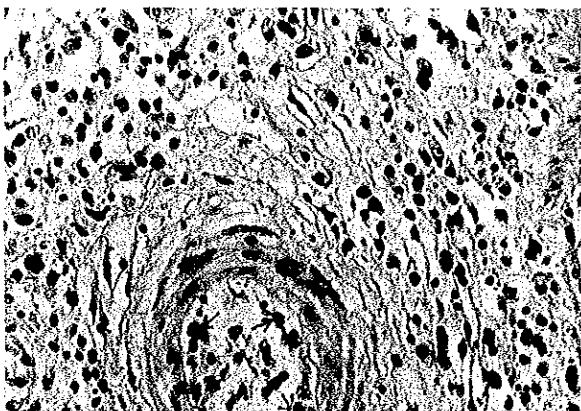
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HE staining, X 200



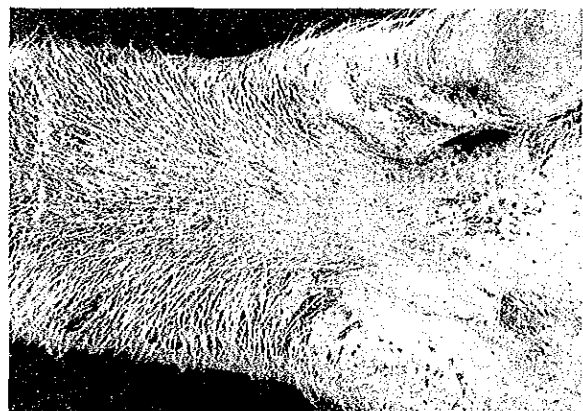
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Dewa disease: Case No. 2



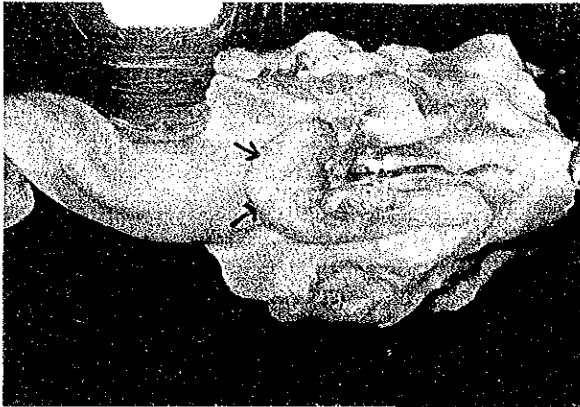
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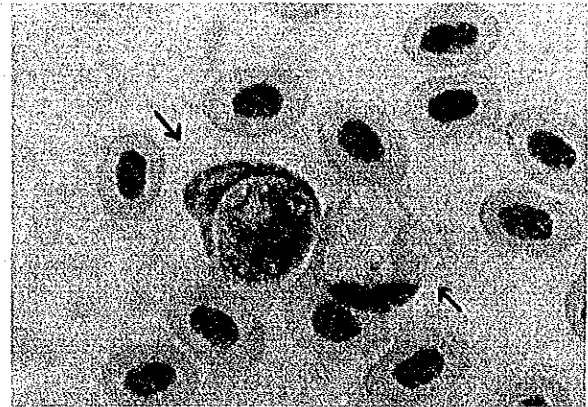
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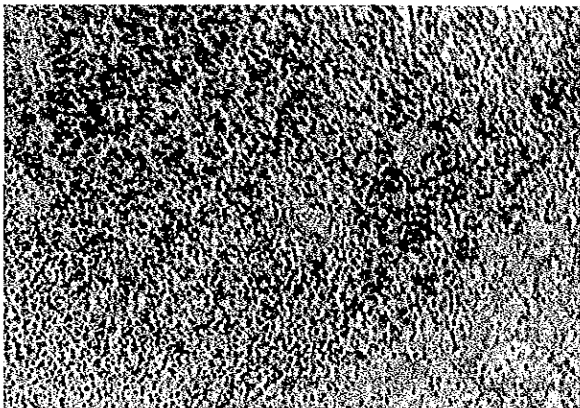
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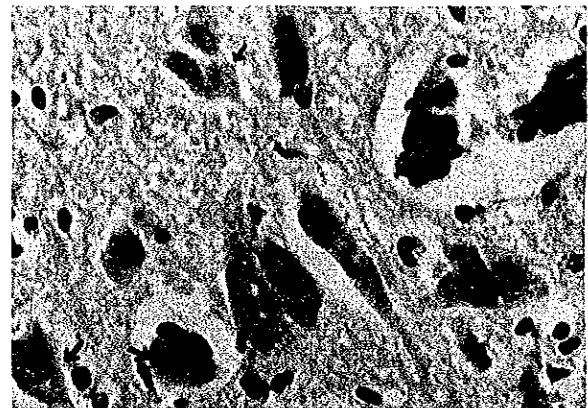
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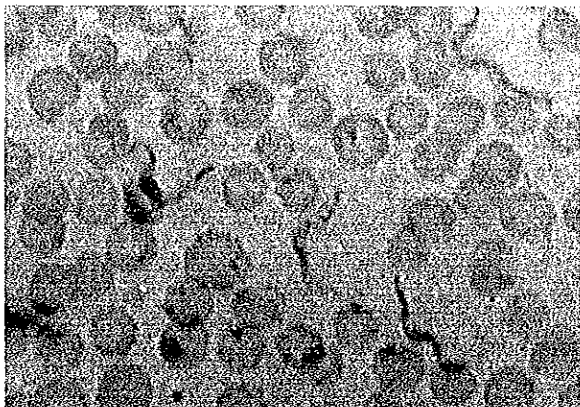
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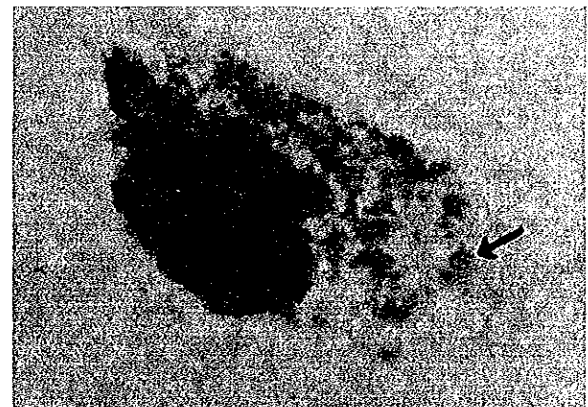
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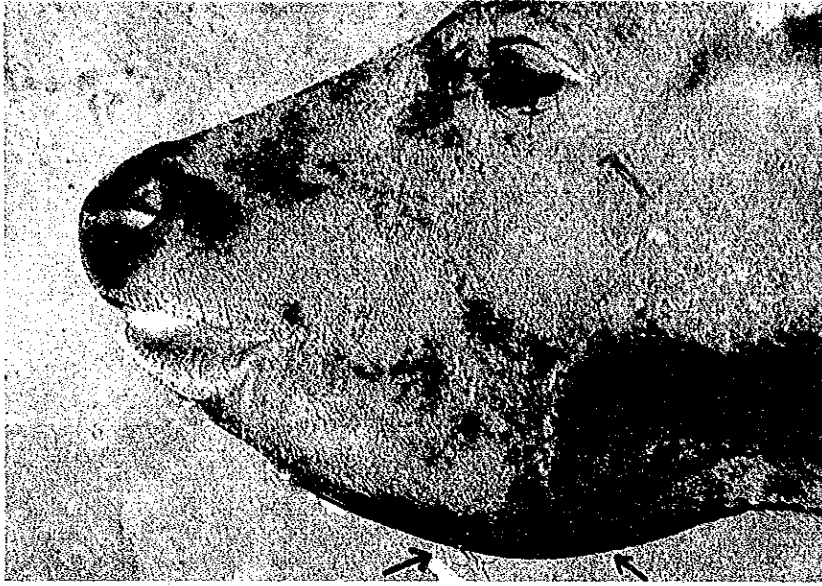


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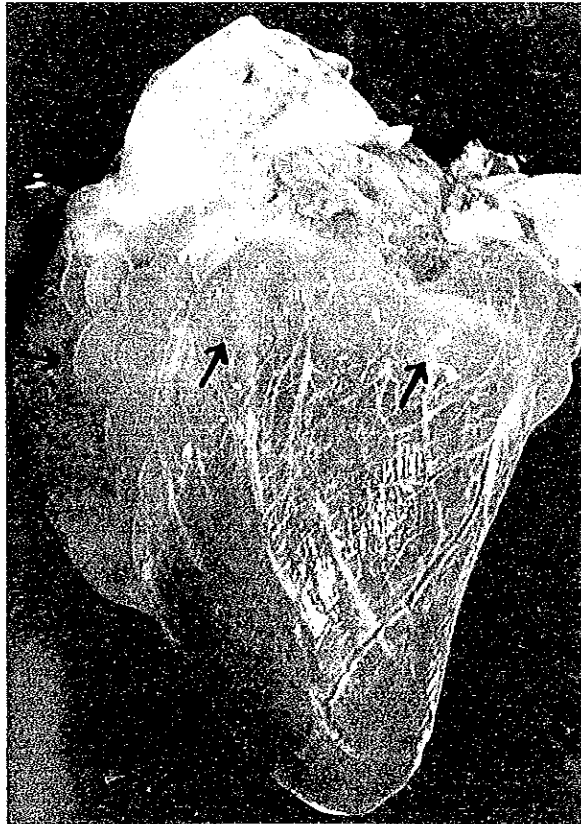


Negri bodies (arrows) seen in cytoplasm of never cells for hippocampus of a rabid dog. Sellers staining, X 1,000





Marked edema at mandibular space of cattle:
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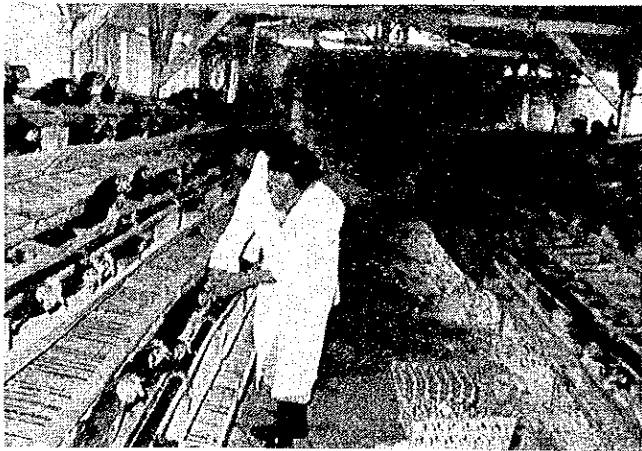
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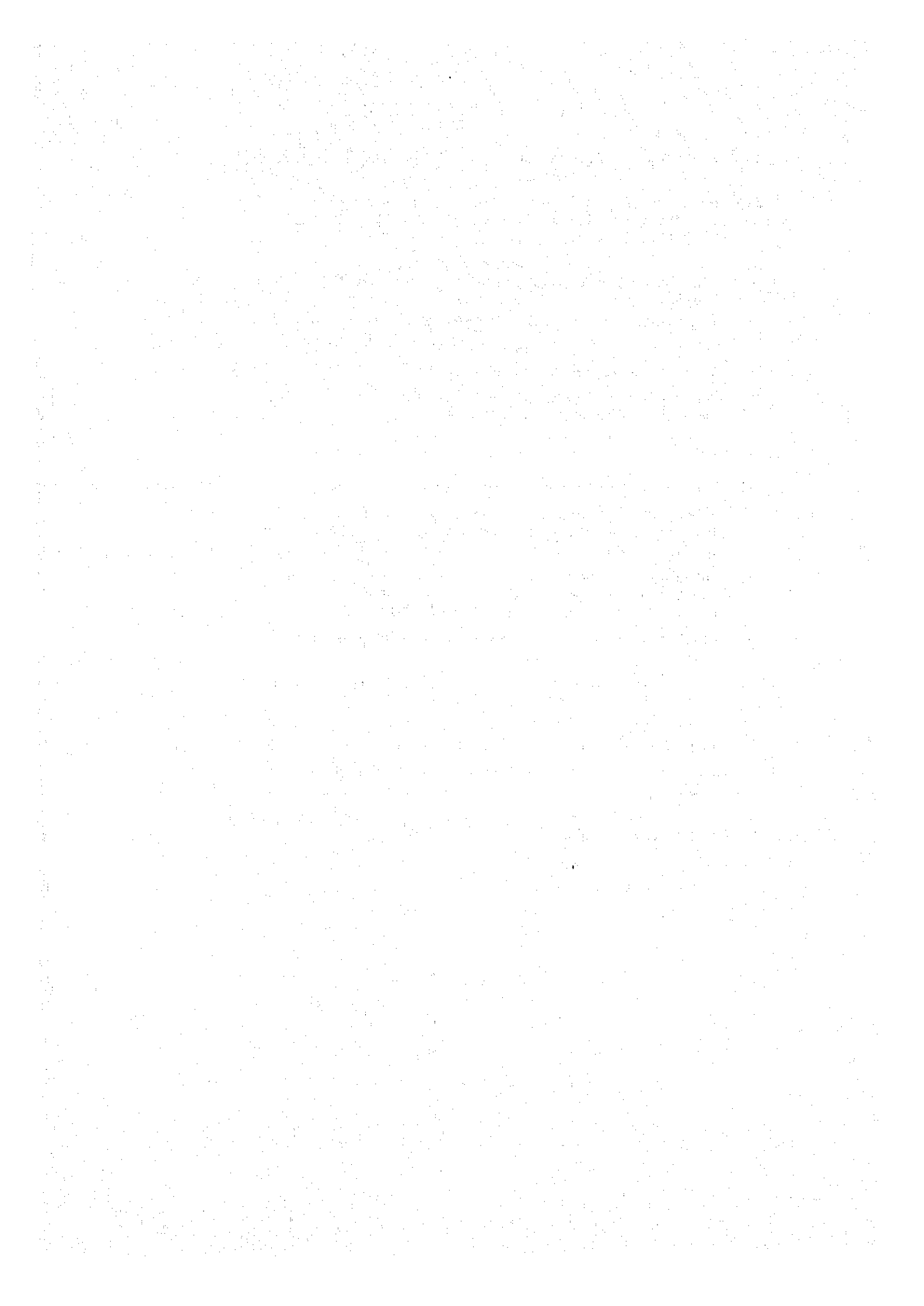
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Report on the Activities of the Animal Disease
Investigation Center, Region III. Tanjungkarang
during the period under Record of Discussions of ATA - 133
by Ruizo ISHITANI, Kimiaki TAGUCHI and Toshitake KAWANO
(JICA Colombo Plan Experts assigned at DIC, Region III)
Tanjungkarang

I. Introduction

It has been 3 years and 7 months since DIC, Tanjungkarang began to function under the Record of Discussions of ATA - 133. Since Dr. F. X. Soesilo assumed the Director ship of DIC, the staff, increased to the present 7 veterinarians, 45 persons including veterinary assistants, administrative staff and workers.

On the other hand, Dr. Tamotsu Ogata, JICA Colombo Plan Expert, and the other 5 long-term and 6 short-term experts have come to DIC and cooperated with their Indonesian counterparts in the following activities;

- 1) Diagnosis of animal diseases
- 2) Investigation of animal diseases
- 3) Establishment of channels for collecting specimens from the field
- 4) Training in laboratory techniques for field and laboratory officers
- 5) Making recommendations on how to control and tract animal diseases

This report is designed to describe the outline of the results of the diagnostic services and field investigations which were carried out in the period from January 1979 to March 1982, and to refer to the important problems of DIC from the standpoint of the JICA Colombo Plan.

The contents of this report are nearly the same as those of the Annual Report of DIC, Region III. Tanjungkarang - 1979/1980, 1980/1981 and 1981/1982. (This will soon be published.)

Thanks are due to Dr. F. X. Soesilo, Director, and the staff of DIC, Tanjungkarang who has granted the funds for publishing this report.

II. Diagnostic services and field investigations

1. Specimens submitted to and collected by DIC

The specimens or materials consisted of 5 kinds, A, B, C, D and E, namely, A: specimens submitted to DIC directly from the applicants, B and C: specimens submitted to DIC from the applicants through Animal Husbandry Offices of Provinces, Districts and Subdistricts, D: specimens collected from the field by Special Survey Teams of the Animal Husbandry Offices and DIC, and E: specimens collected from the field by the DIC Survey Team.

In addition, materials of rabies-suspected dogs, cats and monkeys were brought from the human hospital.

The specimens listed above were distributed to the 4 laboratory sections of pathology, parasitology, virology and bacteriology by the diagnostician in DIC. In order to manage the specimens, blank forms were used from diagnostician to Section-chief (model F-1), from Section-chief returned to diagnostician (model F-2) and from diagnostician to director (model F-3), respectively. Then model F-3 was usually sent by mail through the General Affairs Section to the applicants. But in the positive cases in rabies, telegrams were used to let applicants know results quickly. (See Figure 1.)

Specimens could also be divided into 7 kinds and the methods of examination were as follows;

1) Dead and live animals

They were diagnosed at DIC or at the field where the animals died. As a result of post-mortem changes and etiological investigation, diagnoses were made as quickly as possible.

2) Heads and brains

In both materials, hippocampus of the brain has taken out and used for diagnosis of rabies. The method of how to diagnose rabies is as below;

Animals suspected of having rabies were brought to DIC and were clinically observed for 2 weeks. The diagnosis of rabies can be based upon the symptoms if they are typical, but should be confirmed by laboratory examinations. Fluorescent antibody techniques for the demonstration of rabies antigen (virus),

Seller's staining for Negri bodies, and histopathological examinations were routinely performed. In cases in which Negri bodies could not be demonstrated, and still non-suppurative encephalitis was present, a mouse inoculation test was done.

3) Organs

Small pieces of organs, such as livers, spleens, lungs, hearts, kidneys, lymph nodes, etc. of animals dissected at the field were stored in glycerinsaline and fixatives of 10% formalin solution or 95% alcohol, and were usually sent by mail to DIC. These materials were used for the cultivation of bacteria and histological diagnosis.

In particular, unfixed hippocampus and other parts of the brain were routinely used in the fluorescent antibody technique for rabies and Seller's staining for Negri bodies.

4) Blood and serum

Sera from Cattle, buffalo, sheep and goats were used for serological tests, brucella rapid agglutination tests (RAT), tube agglutination tests (TAT) and complement fixation tests. As for the sera of chickens, the rapid-agglutination test of Salmonella pullorum and Mycoplasma gallisepticum and hem agglutination (HA) and hem agglutination inhibition (HI) tests were routinely performed.

Antigens for the serological tests stated above were as follows: Brucella RAT: Animal Disease Research Center, Bogor; Brucella TAT and CFT: National Institute of Animal Health, Japan; Pullorum RAT: Serum Institute of Chiba Prefecture, Japan; Mycoplasma RAT: Division of Microbiology, Kyoto Biken Lab. INC., Japan; Newcastle Disease HI and HA: Nippon Institute of Biological Science, Tokyo, Japan.

The whole blood of cattle with EDTA added as an anticoagulant was employed for the measurement of hematocrit value. The serum-protein content was also measured in cattle.

5) Blood smears

In the blood smears which were fixed with methanol and stained with Giemsa solution, blood protozoas such as Trypanosoma evansi, Theileria sp., Babesia sp., and Anaplasma sp. in cattle, and

Leucocytozoon caulleryi, L. sabrasegi and Trypanosoma sp. were examined, respectively.

6) Feces

Parasitic eggs of Helminth contained in the feces of cattle, buffalo, sheep and goats were examined by the direct method in order to know the kinds of parasites in these animals. Of chicken feces, Ascaridia galli were examined.

7) Other materials

Cotton swabs of nasal and vaginal mucous discharges, small pieces of tissues collected from skin lesions, contents of abscess and edematous parts, etc. were also involved.

2. Numbers of applicants and specimens

The total numbers of applicants and specimens collected in DIC in the period from January 1979 to March 1982 are shown in Tables 1 and 2, for diagnostic services and field investigations respectively. From both of these tables, we can know that most of the specimens were collected from Lampung Province until March 1980, but after that the specimens from other provinces increased gradually.

Lampung Province accounted for 91.1% of the total applications in 1980/1981, and 85.0% in 1981/1982, and also 93.6% of the total specimens in 1980/1981 and 91.7% in 1981/1982, respectively. But for the diagnostic services only, applications and specimens sent from South Sumatra and Bengkulu provinces increased yearly. (See tables 1 and 2)

For the kinds of animals, cattle and chickens were numerous, and occupied 97.8% of the total applicants for Jan. 1979/1980, 90.8% in 1980/1981 and 84.7% in 1981/1982, and also 96.7% of the total specimens in Jan. 1979/1980, 86.6% in 1980/1981 and 85.4% in 1981/1982, respectively. (See tables 3, 4 and 5).

Moreover, the number of specimens was shown by the kinds of specimens and animals.

The tables also indicate the abovementioned facts.
(See tables 6 and 7).

3. Results obtained in diagnostic services and field investigations

1) Findings on dead and live animals and organs

Heads and brains as shown in Tables 6 and 7 were involved in this.

a) Cattle and buffalo

In 118 applicants consisting of 114 cattle and 4 buffalo, the cases of infectious disease were low in percentage, but as for Rama Dewa disease and hemorrhagic septicemia, these were parts of animals which either died or were slaughtered.

It was detected that the diseases of respiratory and digestive organs and malnutritional disorder were important as a cause of death in cattle.

Especially the data of 1981/1982 revealed the importance of above-mentioned diseases in Brahman and Santagertudis Cattle imported from Australia since May 1981.

It was assumed that the changes of environment and feed due to transference from Australia to Sumatra might induce the autogenous infectious diseases of respiratory, digestive, circulatory and locomotive organs.

As seen in Table 8 about one-third of the applicants could not be diagnosed, because of the presence of severe, post-mortem changes and of no characteristic histological ones. From this data, it was pointed out that how to select and take the specimen pieces from dissected animals was important. (See Table 8).

b) Deer (See Table 9).

c) Sheep and goats

The pattern of the diseases was similar to that of cattle. (See Table 10).

d) Swine

The swine raised in the Region of DIC were small in number, so that specimens were also small in number. In them, infectious and parasitic diseases were conspicuous. (See Table 11).

e) Chickens and ducks

In this paragraph 97% of the applicants were chickens (dead or live), and infectious diseases occupied the majority of the cases. Of the organs sent from the field, infectious bursal disease of chickens in Muara Enim of South Sumatra Province and Fowl Pox in Benskulu Province were noticeable as a first case of the disease for each district. (See Table 12).

f) Dogs and cats

Cases diagnosed as rabies occupied 93.3% of all applicants. Parasitic diseases were also important in dogs. (See Table 13).

2) Findings of blood and serum

a) Brucella rapid agglutination test

Fifteen out of 1,451 cattle (1.01%) in Jan. 1979/1980 and 42 out of 3,301 (1.27%) in 1981/1982 were positive in Brucella rapid agglutination test. (See Table 14).

Thirty nine sheep and 93 goats were examined in 1981/1982, and one goat was positive in Brucella rapid agglutination test. (See Table 15).

Forty-two cattle and one goat being positive in Brucella rapid agglutination test were examined by tube agglutination and complement fixation tests. As the result, 20 cattle were diagnosed as Brucellosis and 7 were considered as Brucellosis-suspected cattle. All cattle diagnosed as Brucellosis had been imported from Australia. (See Table 16).

b) Salmonella pullorum and Mycoplasma gallisepticum rapid agglutination tests

Seventy-two of 1,031 chickens (6.98%) in Jan. 1979/1980, and 2 out of 1,559 (0.13%) in 1980/1981 and 135 out of 1,031 (3.39%) were positive in Salmonella pullorum rapid agglutination test, and 63 out of 1,031 (6.1%) in Jan. 1979/1980, 230 out of 1,559 (14.75%) in 1980/1981 and 1,639 out of 3,978 (41.2%) in 1981/1982 were respectively positive in Mycoplasma gallisepticum rapid agglutination test.

In the chicken farms where the investigations of pullorum and mucoplasmosis were carried out, chicks have been bought

from the breeders at Jakarta, so that chicken breeding farms should be free from both diseases. (See Table 17).

- c) Investigations of antibodies against Newcastle disease virus by use of hem agglutination inhibition test

Investigations of HI antibodies against Newcastle disease virus were carried out in Lampung Province chicken farms. In the investigations, one applicant consisted of 10 chickens. GM values of HI antibody were measured on 22 applicants in North Lampung, 102 in South Lampung, 74 in Central Lampung, 95 in Tanjungkarang-Telukbetung and 41 in I. Chicken Farm, respectively. As the results, the number of applicants which showed GM value of less than $\times 64$ (included $\times 64$) were 15 (68.2%) in North Lampung, 45 (60.8%) in Central Lampung, 51 (50.0%) in South Lampung, 63 (66.3%) in Tanjungkarang-Telukbetung and 20 (43.5%) in I. Chicken Farm, respectively. In these applicants, inoculation with Newcastle disease vaccine was performed or advised. (See Table 18).

- d) Serum-protein content and hematocrit value of cattle

Serum protein of less than 6.0% (excluded 6.0%) and hematocrit value of less than 20% (excluded 20%) were considered as abnormal values in this instance. One hundred and fifty out of 1,192 cattle (12.58%) and 83 out of 1,302 (6.37%) showed abnormal values of serum-protein content, 55 out of 1,108 (4.96%) in 1980/1981 and 43 out of 732 (5.87%) were abnormal in hematocrit value. (See Table 20).

3) Findings on blood smears

- a) Examinations of Protozoa in the blood smears of cattle and buffalo

Results were as follows; 9 out of 1,332 cattle (0.68%) in Jan. 1979/1980, 15 out of 2,033 (0.72%) in 1980/1981 and 9 out of 3,130 (0.03%) in 1981/1982 were positive in Trypanosome evansi, respectively. 58 out of 1,332 cattle (4.35 percent) in Jan. 1979/1980, 77 out of 2,033 (3.79%) in 1980/1981 and 84 out of 3,130 (2.68%) was positive in Theileria sp., respectively. Babesia sp. was positive in 10 out of 1,332 cattle (0.75%) in Jan. 1979/1980, and 2 out of 3,130 (0.01%) in 1981/1982. Of Anaplasma sp., 3 out of 1,322 (0.02%) in Jan.

1979/1980, 15 out of 2,033 (0.73%) and 19 out of 3,130 (0.60%) were positive, respectively.

The total number of buffalo was 66, and in these *Trypanosoma* sp., *Theileria* sp. and *Anaplasma* sp. were found in 2, 2 and 3 cases, respectively. (See Table 21).

b) Examination of Protozoa in chicken blood smears

Results were as follows; 3 out of 326 chickens (0.92%) in Jan. 1979/1980, 4 out of 1,196 (0.33%) in 1980/1981, and 46 out of 3,647 (1.26%) in 1981/1982 were positive in *Leucocytozoon caulleryi*, and 49 of 1,196 (5.00%) in 1980/1981 and 37 out of 3,647 (0.10%) were positive in *Leucocytozoon sabrasesi*, respectively. *Trypanosoma* sp. was detected in only one chicken in 1981/1982. (See Table 22).

4) Findings of feces

a) Detection of helminth by the examination of parasitic eggs contained in the feces of cattle

Fasciola sp., *Oesophagostomum* sp., *Cooperia* sp., *Paramphistomum* sp., and *Bunostomum* sp. were constantly parasitized in cattle. (See Table 23).

b) Detection of eggs of *Ascaridia galli* in chicken feces

As for *Ascaridia galli* eggs, 281 out of 689 chickens (41.1%) were positive in the feces, and it was pointed out that a scariasis is very important in chickens. (See Table 24).

5) Viruses identified, and viral antigens and antibodies detected by Virology Section (See Tables 25 and 26).

6) Bacteria and fungi identified, and bacterial antibodies detected by the DIC Bacteriology Section (See Tables 27 and 28).

7) Protozoa and endo- and acto-parasites identified by the DIC Parasitology Section (See Tables 29 and 30).

4. Important diseases occurring in the Tanjungkarang Region of DIC

1) Rama Dewa Disease

(1) Occurrence and symptoms

The enzootic disease of cattle broke out for the first time at Rama Dewa village, subdistrict of Seputih Raman, Central Lampung

on May of 1976, so that this disease has been called the Rama Dewa disease. Since then, this disease occurred in 1978, 1979, 1980 and 1981 in only Central Lampung, but in 1982 in Tanjungkarang-Telukbetung. It was in August, 1980 that we experienced for the first time the disease at the villages of Astomulyo, Sidomulyo, Rama Utama, and so on in Central Lampung.

Afterwards this disease continued to occur, and many Bali cattle died (Fig. 2).

Rama Dewa disease is a serious infectious disease, with its mortality rate very high. Only Bali cattle suffered from the disease. Main clinical symptoms were fever, anorexia, congestion of conjunctiva, excretion of mucous or mucopurulent nasal discharge, marked swelling of prescapular and mandibular lymph nodes and watery or bloody diarrhea. Bloody sweating which was considered as one of the characteristic symptoms in Jembrana disease was supposed to be present, but this was uncertain. There was usually a period of 8 - 10 days from the onset of symptoms to death or slaughter.

(2) Pathological findings

Main pathological changes in the cases investigated at DIC are shown in Table 31. Erosion and ulcer of tongue, plate, pharynx, and sometimes esophagus and rumen, congestion, hemorrhage, erosion and ulceration of abomasum and intestine, and erosion and ulceration of the upper respiratory tract were prominent. But in some cases such lesions were either slight or absent.

The most characteristic histological changes in this disease were the marked proliferations of lymphoid cells in the liver, spleen, lymph nodes, lungs, kidneys, etc. Lymphoid cells had nuclei and cytoplasms bigger than that of lymphocyte, and often showed cytoplasmic basophilia. Lymphoid cells usually proliferated in Glisson's sheath of liver, perivascular spaces of central and follicular arteries, and red pulp of spleen, lymphoid tissues of lymph nodes, alveolar septum and perivascular space of blood vessels of lung, and the perivascular area of kidney. Besides proliferation of lymphoid cells, vasculitis showing leukocytic cell infiltration of the vascular walls was observed in livers, lungs and intestines.

Microscopic examination of the central nervous system revealed edema and slight lymphocytic aggregation of vascular walls in case No. 2, but no changes in other cases. (See Table 31).

(3) Differential diagnosis

Considering the lesions of the alimentary organs, Rama Dewa disease resembled BVD-MD (bovine virus diarrhea-mucosal disease); however, BVD-MD affects usually calves, and adult cattle don't die with the disease. Moreover, lymphoid proliferation of parenchymatous organ was not present in BVD-MD (W.R. Prichard et al. 1956, F.K. Ramsey & W.H. Chivers, 1953 and S. Inui, et. al. 1978).

Rama Dewa disease also resembled the rinderpest and hemorrhagic septicemia of cattle because of high mortality and clinical symptom, but this disease could be differentiated from both diseases with the characteristic lesions of parenchymatous organs mentioned already.

From the point of differential diagnosis, the most important infectious diseases were BMCF (bovine malignant catarrha fever) and IBR (Infectious bovine rhinotracheitis). Both diseases are due to herpes virus, and BMCF resembled Rama Dewa disease very much from the points of changes to the upper alimentary and respiratory organs, and in the presence of vasculitis and lymphoid cell infiltration of parenchymatous organs (C.J. Mare, 1977; F.M. Hamdy et al., 1978; I.E. Selman et al., 1978).

In BMCF, the presence of nonpurulent encephalitis has been emphasized (A.R. Kahter, 1963); however, these changes were not found in the present cases of Rama Dewa disease. Dr. Rugh Darmadi (1979) reported Bali Island that Rama Dewa disease greatly resembled Jembrana disease occurring on from clinical and pathological findings. There is a report by Dr. S. Iwan, T. Budiarmo and Socharjo Hardjosworo, indicating the details of clinical and histopathological findings of Jembrana disease. Causal agents of Jembrana disease have not yet completely been clarified, so etiological investigations into Rama Dewa disease are very important problems in Indonesia at the present time.

Comments: The present data was reported by Hadi Prabowo et al. at the Seminar of Animal Husbandry and Animal Health held at Bogor on 8th - 11th of February, 1982.

2) Hemorrhagic septicemia of Cattle and Buffalo

(1) Occurrence

Sub-districts of Lampung Province in which hemorrhagic septicemia of cattle and buffalo occurred in the recent 3 years are shown in Fig. 3. However, the exact number of cattle and buffalo which suffered from this disease is not known because the disease had come to an end when we went to the subdistricts where the disease had occurred.

In the outbreak at Kedaton, South Lampung in August 1981, many animals showed sudden attacks of fever and anorexia and died. Bacteriological and pathological investigations resulted in the isolation of Pasteurella multocida from several kinds of organs of one buffalo and characteristic histological changes. Also, in another case of buffalo, the same bacteria were isolated from nasal swabs.

(2) Properties of Isolated Bacteria

As already stated, Pasteurella multocida was isolated from 2 buffalo, and its biological properties were as follows.

a. Morphological identification

- (a) Loeffler's methylen blue staining: Coccoid bipolar in staining
- (b) Gram staining: Gram negative
- (c) Capsule staining: Positive in capsule

b. Characteristics in culture of agar media

- (a) Trypto-soy agar: Colonies were mucoid, white blue in colour, and 0.5 - 10 mm in diameter for 24 hours.
- (b) MacConky agar: Did not grow.
- (c) Trypto-soy blood agar: Colonies were mucoid, no hemolysis, white blue in colour and 0.5 - 1.0 mm in diameter for 24 hrs.

c. Characterization tests

Catalase	+
Motility	-
H ₂ S (SIM)	-
Indol	+
Citrate utilization	-
Lysine decarboxylase	-
Nitrate	+
Urease	-
VP	+
IPA	-
Malonate	-
Glucose	+
Lactose	-
Saccharose	+
Maltose	-
Mannitol	+

(3) Clinical and pathological findings

Typical cases of this disease could neither be observed clinically nor pathologically, but pathologic examinations of the organs of diseased buffalo revealed findings of septicemia such as hemorrhage, necrobiosis and mass of bacteria of spleen, hemorrhage, edema and neutrophilic infiltration of lung, hemorrhage and neutrophilic infiltration of liver and neutrophilic infiltration of tonsil.

3) Swine pasteurellosis

(1) Occurrence

Swine pasteurellosis broke out in 5 sub-districts of Lampung Province in the last 3 years (Fig. 3). In one outbreak in January, 1981, about 60 head of swine died showing an acute disease course, and in that in October, 1981, 60 out of 300 swine died.

(2) Properties of isolated bacteria

Pasteurella multocida was purely isolated from heart blood, spleen, lung, liver, kidney and mandible lymph node of diseased swine.

The morphology of *Pasteurella multocida* was the same as that of *Pasteurella* isolated from the buffalo mentioned before; however in the biological properties, one strain from swine showed lactose (+), saccharose (+), and maltose (+), and another strain from swine manifested lactose (-), saccharose (+) and maltose (-), compared with the strains from buffalo (see the paragraph on hemorrhagic septicemia of cattle and buffalo).

(3) Clinical and pathological findings

The disease occurred 2 to 6 months after birth. As clinical signs, there were fever, anorexia, erythema of the skin, and marked subcutaneous edema of mandibular and neck. The period from the onset of symptoms to death was about one week.

As the pathological findings, subcutaneous inflammatory edema with leukocytic infiltration, inflammatory edema of laryngopharyngeal space and serofibrinous pneumonia were prominent.

In the periacute form of the disease, petechial hemorrhage of the lung, heart, liver, spleen and kidney were present. There were cases showing severe congestion and intestinal hemorrhage.

The pneumonic type has been commonly known in swine pasteurellosis (Hagan's *Infectious Diseases of Domestic Animals*, 1973) but, present cases were of the septic type, and pathological findings were the same as those reported in hemorrhagic septicemia of cattle and buffalo.

Comments: Hemorrhagic septicemia of cattle, buffalo and swine is the main research subject of the Bacteriology Section of the DIC.

4) Surra - trypanosomiasis of cattle and buffalo

The cattle and buffalo infected with *Trypanosoma* were widely present in Lampung province; however, they were not yet found in South Sumatra and Bengkulu Provinces. As the results of surveys performed in the period from January 1979 to March 1982, it became clear that diseased cattle were few in number (see Table 21 and Fig. 4), but animals having a lot of *Trypanosoma* in their blood were present.

This protozoa was identified as *Trypanosoma evansi* by Prof. J. Holz, Department of Parasitology, Faculty of Medicine, Pajajaran University, Bandung, West Jawa, using blood smears of severely infected

cattle sent from DIC¹, Tanjungkarang.

Two ml. of the whole blood from the cattle mentioned above were inoculated intraperitoneally into guinea pigs. One out of 2 guinea pigs died 4 days after inoculation, and another one showed severe parasitemia on the 5th day (1st generation). Three guinea pigs were inoculated intraperitoneally with blood of the 1st generation guinea pigs, and they all showed severe parasitemia 5 or 6 days after inoculation. At the stage of severe parasitemia, the blood of guinea pigs was collected, anticoagulated, diluted with 20 percent glycerin-Alsever solution at the rate of 1:1, and stored in a deep freezer at -70°C.

Furthermore, one tube of stocked blood was dissolved in an incubator at 37°C, and one ml. was inoculated into the peritoneal cavity of a guinea pig after confirming the movement of *Trypanosoma*. This guinea pig (3rd generation) showed parasitemia within a few days, and its blood was also stored in the same deep freezer, by the same method.

In North Lampung, there has been a disease with buffalo exhibiting nervous symptoms and dying, and it has been assumed that the cause of this disease may be *Trypanosoma*. This problem should be clarified by inoculation experiments in near future.

5) Babesiosis of cattle

The first case of Babesiosis in cattle occurred in Central Lampung of Lampung Province in 1979. Recently, 2 dairy cattle suffered from *Babesia* sp. and died at a dairy farm near Palembang, South Sumatra.

Icterus and hemoglobinuria were marked and *Babesia* sp. was observed in the blood smears of both cattle.

6) Theileria and anaplasma infection in cattle

In parallel with the investigation of *Trypanosoma* sp., the frequency of parasitism was examined on *Theileria* sp. and *Anaplasma* sp. by the blood-smear method. As the results, 219 and 39 out of 6,495 cattle (3.37 and 0.57%) were positive in *Theileria* sp. and *Anaplasma* sp., respectively. (See Table 21).

As for the serum of 16 cattle, a complement fixation test of *Anaplasma marginale* was carried out, and it was positive in x10 in 6 cases of which 3 were also positive in *Anaplasma* sp. by the blood-smear

method. There was a record that severe Anaplasmosis occurred in Central Lampung of Lampung Province in May 1979, but since then no cases have occurred in the Region of DIC.

7) Leucocytozoonosis in chickens

Two kinds of Leucocytozoon (L), L. caulleryi and L. sabrasesi were present in Lampung Province (Fig. 7).

In the investigation by the blood-smear method, 53 (1.02%) and 36 (1.67%) out of 5,169 chickens were positive in L. caulleryi and L. sabrasesi, respectively. (Table 22).

In the blood smears, the majority of gametocytes of L. sabrasesi were spindle shaped, and the host cell nuclei were seen adjacent to them, but some were round in shape with or without flagellum-like structure. A few of gametocytes were free from host cells.

Gametocytes of L. caulleryi were observed in the blood smears of chickens of showing different degree of anemia.

Up till now, schizonts of L. caulleryi were only observed in the intestine and lung of one chicken raised at a chicken farm in Tanjungkarang. The outbreak of Leucocytozoonosis which is due to schizogony of L. caulleryi, has not yet been found in this district.

An agar-gel immunodiffusion test (AGT) of L. caulleryi (antigen used was prepared by Dr. Tsutomu MORII, Department of Parasitology, Faculty of Medicine, Kyorin University, Tokyo, Japan) and the blood-smear method of L. caulleryi and L. sabrasesi were investigated, and the results shown in Table 33 were obtained. In the majority of the poultry farms where AGT-positive cases were present, gametocytes of L. caulleryi were found in the blood smears of chickens. Sera of chickens in which L. sabrasesi was observed in the blood smears were negative in AGT of L. caulleryi. (See Table 33).

Relationships between the prosperity of *Culicoides* and the occurrence of Leucocytozoonosis, and also that of *Simulium*, the vector of L. sabrasesi, and L. sabrasesi infection are not yet known.

8) Rabies

Rabies is one of the most important zoonoses in the region of DIC, Tanjungkarang, and the diagnostic service of this disease began in August

1979. The number of dogs and cats which bit man increased year by year, and the total number of animals examined at DIC was 240 of which 146 (60.8%) were positive in rabies. (See Table 34).

In the Tanjungkarang region of DIC, especially in 1981/1982, the province of Bengkulu was the highest in the percentage of occurrence of Rabied animals.

Their percentages were 74.3 in Bengkulu, 64.7 in South Sumatra and 58.9 in Lampung Provinces, respectively. (See Table 35).

Figure 8 indicates the distribution of Rabied animals in the Region of DIC, Tanjungkarang. (See Fig. 8).

In the stamp smears of hippocampus stained by Seller's method, Negri bodies were reddish-violet or dark red, while nuclei of nerve cells were blue in colour. Negri bodies in hippocampus or other of the brain of animals diagnosed as rabies were detected in 100 percent.

Histological examination of brain samples of Rabied animals revealed marked perivascular lymphocytic infiltration, modular and diffuse proliferation of gliacells and Negri bodies in nerve cells. Neuronophagia was sometimes observed. Lesions of nonpurulent encephalitis stated above were detected in 53 percent of all cases diagnosed as Rabies.

9) Poultry Diseases

(1) Newcastle disease

Newcastle disease is the most important disease for poultry, has broken out all year in the DIC region, so that the prevention of this disease is a problem of pressing need. The disease was of an acute or subacute septic type, and usually diagnosed by the presence of characteristic lesions and proof of viral antigen by use of fluorescent antibody technique. (See Table 18).

(2) Avian infectious bronchitis (IB)

There was an outbreak of a respiratory disease in chickens in the Lampung Province, and fluorescent antigen of IB virus was proved to be present in the mucous discharge of chicken trachea. But the mode of occurrence has not yet been clarified.

(3) Fowl pox

This disease has occurred in the DIC Region.

(4) Infectious bursal disease of chickens

A disease of broiler chicks occurred at Muara Enim, South Sumatra Province, and was diagnosed as an infectious bursal disease of chickens from the findings of epidemiology and histopathology. The virus for this disease has not yet been isolated.

(5) Marek's disease

The disease has occurred in some poultry farms in Lampung Province, and was classical in type, it was not acute. Enforcement of vaccination is important.

(6) Avian lymphoid leukosis (LL)

In chicken autopsied at DIC, this disease was often found, so that its eradication is very important. The most noteworthy matters are to disinfect the chicken sheds where baby chicks are raised, and not to buy baby chicks from breeding farms where this disease has occurred.

(7) Pullorum disease

(8) Chronic respiratory disease of poultry (CRD)

(See the paragraph of *S. pullorum* and *M. gallisepticum* rapid agglutination test)

(9) Coccidiosis

This disease occurred mostly in chicks.

10) Parasitic Diseases

(1) Liverfluke disease of cattle

As for the eggs of parasites, the feces of 5,588 cattle were examined over the past 3 years and 3 months, and the positive rate of a sp. was 9.63 percent. Marked hepatic lesions due to *Fasciola* sp. have also been found in slaughter houses, so that field investigation of this disease is now being carried out in Lampung Province.

(2) Haemonchiasis of cattle, sheep and goats

The disease caused by *Haemonchus contortus* has frequently occurred in cattle, sheep and goats in Lampung Province.

The characteristic post-mortem changes are cachexia and severe hemorrhages and abomasum edemas and duodenum due to *Haemonchus*. Treatment by insecticide should be carried out in the early stage of infestation.

(3) Lungworm disease of cattle

Pneumonia caused by lungworm (*Dictyocaulus viviparus*) was observed in one animal imported from Australia, but this disease has not been found in native cattle as yet.

(4) Ascariasis of swine and chickens

Parasitic rate of *Ascaris* was very high in swine and chickens. (See Table 24).

(5) Swine kidney-worm disease

Swine raised at the village of Rama Dewa, Central Lampung, suffered from this disease, and a lot of *Stephanurus dentatus* eggs were found in the urine of this swine, so this disease may spread in this area.

11) Nutritional disorder - malnutritional cachexia in Bali Cattle
(Sheeping disease)

Many Bali Cattle transported from Sulawesi, and West and East Nusa Tenggara to Panjang harbor, Lampung Province, died during the quarantine period.

In post-mortem examinations, subcutaneous edema was conspicuous, especially at the mandible space, and mucoid degeneration of the adipose tissues of coronary groove of heart, omentum, mesentery and bonemarrow was marked. Spleens, kidneys and livers showed atrophy. A few helminth were found in rumen and intestines in some cases, but lesions were not present.

The changes stated above were the same as those seen in starvation cases and it was assumed that the causes were malnutrition which occurred either before or during shipping.

12) Bali Sickness

Bali sickness or Bali ziekte is the disease which occurs only in Bali Cattle, and is found not only in Bali but also in Sulawesi and East

Nusa Tenggara. In the DIC Region, Tanjungkarang, this disease occurred in Lubuklinggau of South Sumatra Province in 1978, and then in Punggur of Lampung Province in 1980.

Clinical signs are the erythema, serous infiltration and necrosis of skin of nose, ear, abdomen, limbs and hips. Sometimes, cattle died with icterus.

Dr. Soebari, Staff of DIC, Ujung Pandang, reported that the Lantana camera, a poisons wild plant, was the cause of this disease.

When one Kg of this plant was given to the cattle they became sensitive to sunlight, and upon getting sunshine the skin manifested the changes stated above.

In Lampung Province, 2 Bali cattle suffered from Bali sickness in April 1980, but after that no cases has reported up till now.

13) Feed poisoning of chicken occurring in South Lampung

An acute chicken disease broke out at a big chicken farm in South Lampung, 948 out of 60,000 adult chickens became sick, and about 50 percent of them died or were slaughtered. No chicks suffered from this disease. Clinical signs were anorexia, marked cyanosis and edema of comb, face and neck. Death occurred within 2 or 3 days after the onset of symptoms. Autopsy of dead chickens revealed severe subcutaneous edema of head and neck, marked hemorrhage of breasts and thigh muscles, and petechial hemorrhages of ovary, kidney, heart and proventriculus. No encephalitic change could not be observed histopathologically. After bacteriological and virological examinations, no meaningful agent were isolated. At the chicken farm Clopistat, an anticoccidial drug, was mixed into the feed at a rate of 500 gr per ton (0.05%), and fish-meal imported from Chile was also mixed in the same feed. Adult chickens were fed for 7 days, and chicks were fed for 3 days.

Experiments using adult chickens and the feed in question were carried put at DIC. As the results, bacteria and virus were both denied as being the cause, and it was assumed that the feed may have been the cause of this disease.

III. Technical progress in DIC, Tanjungkarang

Techniques for the examination and diagnosis of animal diseases have gradually progressed, but there are still unsatisfactory points in DIC. Present accomplishments are as follows;

1. Virology Section

Serological tests such as hemagglutination and hemagglutination inhibition (HI) tests have been routinely applied for the diagnosis of Newcastle disease (ND) as well as for the vaccination response against ND virus in the field. A HI test was also used for the demonstration of Akabane-disease-virus parainfluenza-virus Type 3 and Japanese-encephalitis-virus infections of cattle, etc. But, a neutralization test is not yet well developed.

In order to isolate viruses and to do neutralization tests, the tissue culture should be more studied. In the present situation, chicken kidney (CK) and chicken embryo (CE) cell cultures have only been applied for the isolation of ND virus. As for bovine cells, bovine kidney (BK) and bovine testis (BT) cells are suitable for the isolation of viruses of bovine origin, but it is not easy to obtain BK and BT routinely. Cell lines of HmLu and MDBK have been maintained, so that using both cells, virus isolation and neutralization tests should be carried out at least for the important diseases of cattle.

Fluorescent antibody (FA) techniques have been applied for the diagnosis of rabies, Newcastle disease, avian bronchitis and hog cholera routinely. (This disease is not yet present in Indonesia.) Especially for rabies, in order to make a secure diagnosis, positive control (rabbit brain infected with virus fix of rabies) and negative control (normal rabbit brain) should be used in every examination.

Fluorescent antibodies of these diseases must be supplied by institutes of biology in Indonesia and Japan.

2. Bacteriology Section

Serological tests for brucellosis, pullorum disease and mycoplasmosis, and allergy testing for tuberculosis have been routinely carried out. Antigens not only for the above-stated diseases but also for John's disease must be supplied by institutes of biology in Indonesia and Japan.

Techniques for the cultivation and identification of bacteria, especially aerobic ones have been gradually developed, but further efforts are expected. Techniques of how to cultivate anaerobic bacteria must be studied in parallel with those of aerobic bacteria.

3. Parasitology Section

Microscopic examinations of parasitic eggs of helminth, and of protozoa and blood parasites using the blood-smear method have been routinely carried out. Identification of helminth is possible, but that of ectoparasite has not yet been developed.

Serological tests such as complement fixation test of Anaplasma marginale, Ratex agglutination test of Toxoplasma gondii and Agar-gel immunodiffusion test of Leucocytozoon caulleryi were performed; however, more development in this field should be expected.

4. Pathology Section

Autopsy, collection and fixation of dissected materials, post-mortem diagnosis of diseases have been routinely carried out. When dead and live animals were dissected at DIC or at the fields where the animals died, veterinarians of DIC, especially pathologists must give the suggestion on whether the disease is infectious or not, and on the kind of disease. According to the suggestions, materials for the virus isolation and bacterial cultivation should be collected aseptically. When poisoning is suspected, experiments using feed and so on must be performed.

Histopathological diagnosis has also been carried out routinely, and more developments are expected in this field.

5. Laboratory animals

Such laboratory animals as mice, guinea pigs, rabbits and chickens have been raised at DIC, but their management and feeding methods need improvement. Animals used in the experiments must be healthy, and nearly identical in age, sex and genetics. Veterinarians who visit Japan in the near future, need to have the opportunity of getting enough knowledge about laboratory animals.

6. Photography

Macro- and micro-photography are important techniques in laboratory and field works; however, training for the taking of scientific photographs is insufficient. A short term training course in this field needs to be held either in Indonesia or Japan.

IV. Comments and recommendations for future plan

1. Staff and personnel

As stated in the introductory paragraph, the number of staff veterinarians and supporting personnel has increased gradually; however, in addition to the present staff, at least 2 veterinarians, one pathologist and one entomologist, are needed to strengthen the activities of DIC.

2. Laboratory animal shed

There is no satisfactory shed for laboratory animals in DIC, Tanjungkarang. As stated already in this report, the role of laboratory animals in the detection of diseases is important, so that the sheds for this purpose are urgently required.

3. Water supply

DIC has one deep water well which supplies water for the laboratory, animal sheds and staff housing. It seems that the quantity of water obtained from the one well is insufficient, especially in dry season. One more water well is necessary.

4. Management of laboratory equipments

In order to manage and maintain the laboratory equipment and instruments, a technical engineer consultant is necessary for DIC.

5. Library

Textbooks and journals are also insufficient at DIC. It is necessary to increase the number of textbooks and to at least obtain important periodical journals

a) American Journal of Veterinary Research (U.S.A.)

b) Journal of American Veterinary Medical Association (U.S.A.)

c) Veterinary Record (U.K.)

d) Japanese Journal of Veterinary Science (Japan)

e) National Institute of Animal Health Quarterly (Japan)

6. Strengthening of the DIC and C types the Provinces of South Sumatra and Bengkulu

B Type DIC has been established at Palembang in South Sumatra and at Bengkulu municipality and Kurotidur in Bengkulu Provinces. South Sumatra Province is large, so the establishment of 2 more B type well equipped DIC's is needed.

As for B type DIC located in the Bengkulu municipality, the buildings were finished but equipment not yet prepared. Cooperation is necessary for this purpose.

7. Telecommunication facility of DIS is not available yet. Since this is a tool for communication between the DIC and the Animal Husbandry Offices as well as between field officers, utmost efforts are desirable to facilitate telephone lines.

V. Lists of table and figures

Table:

1. Numbers of applicants and specimens in diagnostic services
2. Numbers of applicants and specimens in field investigations
3. Relationships between diagnostic services and field investigations, and kinds of animals - 1 (Jan. 1979/'80)
4. Relationships between diagnostic services and field investigations, and kinds of animals - 2 (1980/'81)
5. Relationships between diagnostic services and field investigations, and kinds of animals - 3 (1981/'82)
6. Number of specimens submitted to and collected by DIC
7. Relationships between kinds of specimens and animals
8. Results of diagnose on organs and dead and live animals - cattle and buffalo
9. Results of diagnoses on organs and dead and live animals - Deer
10. Results of diagnoses on organs and dead and live animals - sheep and goats
11. Results of diagnoses on organs and dead and live animals - swine
12. Results of diagnoses on organs, and dead and live animals - chickens and ducks
13. Results of diagnoses on organs, and dead and live animals - dogs and cats
14. Results of Brucella rapid agglutination test in cattle and buffalo
15. Results of Brucella rapid agglutination test in sheep and goats
16. Final decision of cattle and goats which were positive in Brucella rapid agglutination test
17. Results of Salmonella pullorum and Mycoplasma gallisepticum rapid agglutination tests
18. Investigations of antibody against Newcastle disease virus by use of hemoagglutination inhibition (H.I) test.
19. Serum protein content in cattle
20. Hematocrit value in blood of cattle
21. Examination of protozoa in blood smears of cattle and buffalo
22. Examination of protozoa in blood smears of chickens
23. Detection of helminth by examination of parasitic eggs contained in feces of cattle
24. Detection of eggs of Ascaridia galli in feces of chickens
25. Viruses identified by virology section

26. Viral antigens and antibodies detected by virology section of DIC
27. Bacteria and fungus identified by Bacteriology Section of DIC
28. Bacterial antibodies detected by Bacteriology Section of DIC
29. Protozoa and endo- and ecto-parasites identified by Parasitology Section of DIC
30. Protozoal antibodies detected by Parasitology Section of DIC
31. Main pathological changes of Rama Dewa disease occurring in Lampung Province in the period from 1980 to 1982
32. Main pathological changes and bacteriological findings of Swine pasteurellosis occurring in Lampung Province
33. Investigations of Leucocytozoon by use of blood-smear method and agar-gel immunodiffusion test
34. Occurrence of rabies of animals in region of DIC in the period from August 1979 to March 1982
35. Occurrence of rabies of animals in the provinces of Lampung, South Sumatra and Bengkulu

Figure:

1. Scheme of diagnostic services in DIC, Tanjungkaran
2. Subdistricts where Rama Dewa disease occurred in Lampung Province in the period from August 1980 to February 1982
3. Subdistricts where hemorrhagic septicemia of cattle and buffalo occurred in Lampung Province in the period from January 1979 to March 1982
4. Distribution of cattle and buffalo infected with Trypanosoma sp. in Lampung Province
5. Distribution of cattle and buffalo infected with Theileria sp. Babesia sp. in Lampung Province
6. Distribution of cattle and buffalo infected with Anaplasma sp. in Lampung Province
7. Distribution of chickens infected with Leucocytozoon caulleryi and L. sabrasesi in Lampung Province
8. Distribution of rabied animals in the provinces of Lampung, South Sumatra and Bengkulu

Table 1. Numbers of applicants and specimens in diagnostic services

Period	Lampung		South Sumatra		Bengkulu		West Java		Total	
	No. of* applicants	No. of specimens	No. of applicants	No. of specimens	No. of applicants	No. of specimens	No. of applicants	No. of specimens	No. of specimens	No. of applicants
Jan. 1979/'80	222	468	7	7	4	4			233	479
1980/'81	144	506	14	24	16	21	1	1	175	552
1981/'82	279	1,177	50	455	128	135	5	35	480	1,802

Comments: * No. of applicants is almost equal to No. of farmers.

Table 2. Numbers of applicants and specimens in field investigations

Division	Jan., 1979/'80			1980/'81			1981/'82					
	Lampung	South Sumatra	Bengkulu	Total	Lampung	South Sumatra	Bengkulu	Total	Lampung	South Sumatra	Bengkulu	Total
No. of applicants	1,243			1,243	1,697	93	4	1,794	2,041	114	1	2,197
No. of specimens	2,284			2,284	3,583	200	4	3,583	7,606	190	207	8,044
Times of investigations	180			180	176	4	1	181	250	3	1	255
No. of subdistricts	193			193	264	16	1	281	302	12	1	320
No. of villages	291			291	400	20	1	421	506	15	1	545

Comments: * No. of applicants is almost equal to No. of farmers.

Table 3. Relationships between diagnostic services and field investigations, and kinds of animals - 1 (Jan. 1979/'80)

Animal	Diagnostic services						Field investigations						Total				
	Lampung		South Sumatra		Bengkulu		Total		Lampung		South Sumatra		Bengkulu		Total		
	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	No. of appli-cants	No. of speci-mens	
Cattle	184	248	2	2	1	1	187	251	1,199	1,234				1,199	1,234	1,386	1,485
Buffalo									1	1				1	1	1	1
Horses																	
Sheep									7	18				7	18	7	18
Goats								1	3	25				3	25	4	26
Swine	1	1															
Chickens	24	183	1	1			25	184	32	1,002				32	1,102	57	1,186
Ducks																	
Dogs	10	20	4	4	3	3	17	27								17	27
Cats	1	1					1	1	1	4				1	4	1	4
Monkeys																	
Rabbits																	
Others	2	15					2	15								2	15
Total	222	468	7	7	4	4	233	479	1,243	2,284				1,243	2,284	1,476	2,763