

General Discussion on Haemorrhagic Septicaemia

Chairman: Namioka S. (Japan): Before starting the general discussion, Dr. Konno will present briefly some data on the pathology of haemorrhagic septicaemia (HS).

Konno S. (Japan): As the pathology of HS is not very well known, studies on the pathology of this disease have been initiated at the VRI, Malaysia. Comparative studies between experimentally infected cattle with *Pasteurella multocida* and natural infection in the field have been carried out. The pneumonic form and the visceral form have been recognized in animals experimentally infected.

Pneumonic type of HS: Macroscopic lesions: Exudation of fibrin on pneumonic lung. Cut surface: Presence of localised whitish foci in diffuse pneumonic lung. Microscopic examination (PTAH staining): Foci of necrosis corresponding to the localised foci observed macroscopically.

Visceral type of HS: Presence of inflammatory foci involving the intestine, the kidneys and other organs. Microscopic examination of the intestinal lesions showed the presence of necrotizing vasculitis with thrombus formation and inflammatory exudates surrounding the blood vessels. 1) I wonder if the participants could comment on these lesions, particularly if they could compare them to those observed in the field cases. 2) We inoculated a large number of *P. multocida* type 6:E, approximately more than 10^9 . Is it possible to inoculate a smaller amount of micro-organisms (10^6)? 3) What are the criteria for the diagnosis of HS in the field?

de Alwis M.C.L. (Sri Lanka): 1) In experimental transmission, in using the serotype 6:B, we have found that when the inoculum is scaled down to 10^4 organisms or less, it is possible to consistently reproduce the disease. 2) In Sri Lanka the routine diagnostic procedures for HS are as follows: a) direct culture, not always reliable, especially when the material is contaminated. b) mouse inoculation, reliable, pure culture isolated is identified by the morphology, by biochemical tests and slide agglutination test of Namioka, using hyper-immune rabbit serum. The pneumonic changes described by Dr. Konno are seen in cattle and buffaloes only when the course of the disease exceeds 3 days. More often, however, the animals die suddenly or show a short course and no lung changes are noted macroscopically. The animals show evidence of bacterial septicemia with widespread petechial hemorrhages, particularly at the base of the heart as well as edema in the throat region. The serotype 6:B can produce both the classical manifestations of HS and the pneumonic form, depending on the state of immunity of the animal at the time of the infection.

Chairman: I would like to mention that 5:A strains are able to induce fowl cholera experimentally. Strain selection appears to be of paramount importance for the development of symptoms as even in the same serotype some strains are exceptionally virulent at low concentration. The study of vaccines and, in particular the potency of vaccine and the duration of the immunity conferred are the most important topics in HS. It would be appropriate to know more about comparative studies pertaining to the vaccines as far as immunopotency, duration of immunity and side-effects are concerned.

de Alwis M.C.L. (Sri Lanka): Most vaccination programs are done in the face of HS outbreaks. Alum precipitated vaccine is used. In some areas, routine prophylactic vaccination is done. Then the oil-adjuvant vaccine is used once a year. The two vaccines have been compared in field trials carried out both in enzootic and in non-enzootic areas. The results of trials done in enzootic areas are not reliable as some unvaccinated controls also developed immunity (perhaps as a result of exposure which served as a booster). In some vaccinated animals, immunity was unusually long. The results obtained in non-enzootic areas were more reliable. The alum precipitated vaccine protected for 3-4 months and the adjuvant vaccine for 6-9 months. We find that the passive mouse protection test in mice using cattle sera gives a reasonably reliable index of immunity in cattle and buffaloes. No serious side-effects have been observed with either vaccine. I would like to add that none of the vaccines had been standardized (immunogenicity, serotype used, number of organisms expressed by dry weight/dose). The method of evaluation of the vaccine was not standardized either. There is an obvious need, I believe, to promote the standardization of the vaccines produced in different countries.

Joseph P.G. (Malaysia): In Malaysia, comparative studies have been carried out by Dr. Thomas. We use both broth bacterin and oil-adjuvant vaccine (OAV). Broth bacterin is used in the face of outbreaks whereas the OAV is used in annual vaccination campaigns. In a few instances both have been used simultaneously in the same animal without any adverse effect. In outbreaks, in-contacts and surrounding animals are first given broth bacterin and 2 weeks later OAV is administered. Studies on laboratory animals (rabbits and buffalo-calves) and in animals in the field indicate that broth bacterin gives 75% and more protection about 6 days after vaccination but the protection lasts only about 3 months (content of vaccine: 1.5 mg dry bacteria/dose). In the case of OAV, satisfactory protection is reached within 35 days after vaccination and the immunity lasts for about 1 year (content: 2 mg dry bacteria/dose). With OAV vaccine, side-effects are minimal. Hard swelling is more common and anaphylactic shock takes place at the rate of 1/2000.

Hanafi M. (Indonesia): Indonesia has 27 provinces and HS is found all over the country with only 10 provinces showing high prevalence in cattle and buffaloes (HS has not been reported to occur in goats, pigs or sheep). HS vaccine is distributed each year on a three-month basis as it is being produced locally (Bogor and Surabaya). Broth bacterin and aluminum precipitated vaccines afford a protection lasting 3-4 months. Since 1972, we administer the oil-adjuvant vaccine produced locally in using the Katha strain. In the beginning, local swelling was produced. Immunity conferred lasts about 9 months. Since 1978, we have embarked on an intensive program of vaccination in Lombok island to cover 80% of the cattle and buffalo population each year. We hope that after 3 years of such intensive vaccination, the disease will be controlled. This program is under the supervision of the Disease Investigation Center at Denpasar and Matawan and of the officials of the Central Office in Jakarta. Compulsory vaccination is performed 14 days before embarkation for inter-island transport of livestock.

Gatapia S.L. (Philippines): Annual vaccination is performed before the beginning of the rainy season in using alum precipitated vaccine which confers a 6-month immunity and does not give rise to side-effects. We are considering the production of oil-adjuvant vaccine.

Srihakim S. (Thailand): We use the alum precipitated vaccine every year, early in the rainy season in endemic areas. The immunity lasts about 3-4 months. Broth bacterin is used in outbreak areas.

Chairman: I would like to end the discussion in considering general aspects pertaining to HS.

Gatapia S.L. (Philippines): I would like to obtain more information on the transmissibility of *Pasteurella multocida* from one species to another, for example from swine to chickens.

Gupta B.K. (India): I would like to put forward the following hypothesis. When I find a 6:B strain in poultry with several somatic antigens, I assume that if there are some strains with more than one somatic antigen, these might possibly transmit the infection from one species to another.

Chairman: In Taiwan, *P. multocida* serotype 5:A is often found in the intra-nasal cavity of swine raised nearby duck flocks. The swine themselves are carriers which can transmit the disease to poultry but which do not actually become ill. Therefore, they should not be reared near poultry.

Joseph P.G. (Malaysia): We have observed that pigs and goats harbouring 6:B virulent strains are not at the origin of outbreaks. Conversely, some pigs may die after eating contaminated meat from infected buffalo (*Pasteurella* 6:B pathogenic to mice).

de Alwis M.C.L. (Sri Lanka): We have observed sporadic cases of HS in pigs which ate contaminated buffalo meat. Also a wild elephant was found dead, harbouring *Pasteurella multocida* which could be traced back to an epidemic of HS in buffaloes and cattle (6:B serotype). I would also like to ask a question to Dr. Namioka. According to your somatic typing system, within the capsular type B there are only 2 somatic types 6 and 11. What is the extent of cross-reaction between 0 groups 6 and 11 and how important is the absorption in somatic typing of capsular B strains?

Chairman: Cross-reaction is observed in 0 group 6 and 11 as there is a common antigen. Therefore, factor sera must be prepared for typing.

Ando K. (Japan): Can hyper-immune serum be used in the treatment of HS?

Joseph P.G. (Malaysia): Hyper-immune serum is of no practical value for treatment, according to our experience.

Srihakim S. (Thailand): How long does *Pasteurella multocida* survive in fresh meat at 27°C after the death of an animal?

Chairman: One week approximately.