PROTECTION CONFERRED BY VACCINATION WITH BLACKSBURG AND KOMAROV STRAINS OF NEWCASTLE DISEASE VIRUS AGAINST NEWCASTLE DISEASE IN BANGLADESH

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SUMMARY

An evaluation was undertaken of the efficacy of vaccination of day-old chicks with the Blacksburg (B1) strain of Newcastle disease virus (NDV) followed at various times by vaccination with the Komarov (K) strain. Antibody was detected by the haemagglutination inhibition (HAI) test one week after vaccination with B1 and titres peaked at three weeks and had declined to undetectable levels by nine weeks.

After subsequent vaccination with K strain at five, seven or eight weeks of age levels of HAI antibody (titre 80 to 640) were detected after three weeks. Birds vaccinated at seven weeks were tested for antibody and resistance to challenge beyond 19 weeks of age. In this group the HAI titres remained constant (80 to 640) up to 32 weeks of age and then steadily declined to 10 to 20 at 44 weeks of age.

A linear relationship between HAI titre and virus neutralising index (VNI) was demonstrated with a range of selected sera. Only birds with an HAI titre of 80 or greater resisted artificial challenge. It is recommended that, following B1 vaccination at day-old and K vaccination at seven weeks old, revaccination with K strain should be performed at intervals of not more than seven months.

INTRODUCTION

Newcastle disease (ND) is a widely distributed and highly contagious viral disease of chickens. The disease is characterised by its sudden appearance and rapid spread within a flock resulting in high morbidity and mortality which can approach 100%. ND is a major constraint to the maintenance and development of the poultry industry in Bangladesh.

The control of ND relies on vaccination but no single vaccine or vaccination programme has proved ideal for all situations and all geographical areas (Lancaster, 1964). The virulence of the field virus and the level of maternal immunity of a flock are factors which affect the choice of vaccine strain. The age at which birds are to be vaccinated is also important (Allan, Lancaster and Toth, 1978; Lancaster, 1964). Allan et al. (1978) have suggested that a vaccination schedule should contain a lentogenic vaccine as the initial dose followed by a mesogenic vaccine where the virulence of field virus requires the establishment of a high and consistent antibody response. Three lentogenic strains, F, B1 and La Sota and three mesogenic strains, K, Mukteswar (M) and Raokin, are used in live vaccines.
The immunogenicity of lentogenic strains parallels the degree of clinical reaction they induce in chickens (Allan et al., 1978). The F strain has the lowest virulence of the common lentogenic vaccine strains and the respiratory reaction in birds vaccinated with this strain is small (Allan et al., 1978). The La Sota strain is the most virulent and often causes respiratory signs. Therefore it is usually administered as a booster dose following vaccination with the B1 or F strain (Allan et al., 1978). Similarly, in comparative tests based on pathogenicity, the mesogenic K strain has been preferred to the M and Roakin strains (Allan et al., 1978) because it is less likely to produce disease.

The current vaccination programme against ND in Bangladesh includes eye-drop (ED) administration of live F strain vaccine to chicks below two months of age followed by intramuscular (i/m) injection of live M strain to growing and adult birds twice a year (Director of Livestock Services Report, see Amin, 1985). Since this protocol frequently fails to protect chickens against ND (Chowdhury, Sarker, Amin and Hossain, 1982; Amin, 1985) the present study was undertaken to evaluate the use of B1 and K strains in various vaccine protocols.

MATERIALS AND METHODS

Virus strains

The live lentogenic B1 and mesogenic K strains of vaccine virus were produced in the Department of Microbiology and Hygiene, Bangladesh Agricultural University (BAU) using the standard method of chicken embryo propagation (Allan et al., 1978). The B1 and K strains were originally obtained from Laboratoria Dr de Zeener by Gist-Brocades uv Delft, Holland and Dr Alwar, Indian Veterinary Association, respectively. The virulent field isolate Faridpur-4 was used as the challenge virus.

Chickens and eggs

One day-old to 44 week-old crossbred birds (White Leghorn × Rhode Island Red) were used in this study. White Leghorn eggs, used for cultivation and titration of virus and for virus neutralisation (VN) tests were obtained from the BAU poultry farm. The parent flocks were vaccinated against ND using the F and M strains of NDV.

Isolation and propagation of virus

Two hundred μl of a 10% tissue (trachea, lungs, brain) suspension in phosphate buffered saline (PBS, pH 7.4) containing penicillin (1,000 units/ml) and streptomycin (1 mg/ml) were inoculated into the allantoic cavity (AC) of each of five embryonating eggs and incubation continued for six days. The allantoic fluids (AF) were subjected to a slide haemagglutination (HA) test to determine the presence of virus while the embryos were examined for haemorrhagic lesions on their body surfaces. The HA-positive AF were collected as virus isolate or virus stock. The virulent virus and vaccine viruses were similarly propagated and stocks prepared.

Serological tests

The slide HA test was conducted by mixing two drops each of AF and 2% chicken red blood cells (RBC) on a microscope slide. The clumping of RBC within one min was considered as a positive HA reaction. The microplate HA