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LOCAL PRODUCTION OF THERMOSTABLE VACCINE TO PROTECT VILLAGE CHICKENS AGAINST NEWCASTLE DISEASE

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La maladie de Newcastle demeure la contrainte majeure de la production avicole villageoise dans les Pays en Développement. Les vaccins du commerce se sont avérés d'usage inapproprié dans les villages du fait de leur thermolabilité, de leur présentation multidose et des besoins en devises qu'ils requièrent. Cependant, les projets ACIAR dans les pays asiatiques et africains ont montré que la maladie de Newcastle dans les élevages avicoles villageois peut être contrôlée avec un vaccin thermostable telle que la souche V4. Une souche vaccinale thermostable, souche I2, a été développée et fabriquée à coût réduit pour les laboratoires régionaux des Pays en Développement. Le vaccin a prouvé son efficacité en laboratoire et dans les essais en village au Vietnam. Il est envisagé que le vaccin I2 puisse être produit dans les laboratoires à partir d'oeufs disponibles localement, et distribué dans les villages sous forme liquide après dilution appropriée. Pour soutenir ce projet, l'ACIAR a mis en place des ateliers pratiques à Pretoria et Dar-es-Salaam, et procuré de simples couveuses et des lampes incandescentes pour les laboratoires régionaux de Tanzanie. Des campagnes de vaccination «soutenables» dépendront de la production locale des vaccins qui seront utilisés par des vaccinateurs villageois ou les fermiers eux-mêmes.

INTRODUCTION

Newcastle disease is the most serious constraint to the rearing of village chickens in nearly all developing countries. Uncontrolled Newcastle disease renders the village flocks poorly productive. Consequently villagers are unwilling to fund improvements in husbandry and further losses occur, especially among the brooding chicks. A vaccine suitable for village use could initiate a whole new science of village chicken production.

CONVENTIONAL VACCINES

Conventional Newcastle disease vaccines that serve the commercial poultry industry so well are unsuitable for village use. They are thermolabile and require the provision of an efficient cold chain. They are in excessively large packages (minimum of 1000 doses) for use in small village flocks and they cost foreign exchange.

V4 VACCINE AND VILLAGE CHICKENS

Projects funded by the Australian Centre for International Agricultural Research (ACIAR) led to the development of Newcastle disease virus strain V4 as a village vaccine. This is an avirulent virus of Australian origin that was relatively thermostable and that responded to artificial selection for enhanced thermostability. The vaccine could be supplied on certain foodstuffs to scavenging chickens, and spread between vaccinated and unvaccinated chickens. Trials in African and Asian countries have established the efficacy of this vaccine under both laboratory and village conditions (Copland, 1987; Spradbrow, 1992; Spradbrow, 1992/93). Food-based V4 vaccine became widely used in villages in Malaysia following local production under commercial conditions. Adoption of the technique in other countries has been retarded. Although the problem of thermostability has been overcome, problems with the use of a commercial form of vaccine remain. These are the large dose format of the freeze dried vaccine and the need for foreign exchange.

LOCAL PRODUCTION OF I_2 VACCINE

It has been argued (Spradbrow and Copland, 1996) that an interim solution to the problem of supplying Newcastle disease vaccine at a village level would be local production on a cottage-industry scale. This would require the provision of a thermostable seed vaccine, free of commercial ownership. Regional laboratories would require an egg incubator, a candling lamp, a refrigerator and access to a local supply of fertile eggs. Infected allantoic fluid could be stored in a suitable diluent, not freeze-dried, and supplied in small quantities suitable for small flocks. Technical staff would need training in the techniques of inoculating and harvesting eggs and in performing haemagglutination and haemagglutination-inhibition tests. ACIAR has funded the production of a suitable seed vaccine, strain I_2, that is similar to strain V4 and that is available without cost to laboratories in developing countries. The only stipulation is that vaccine is produced by a seed-lot system. The seed has been made available to several countries in Asia and Africa, and the vaccine has been extensively tested in Vietnam where it has now been approved as an official vaccine. ACIAR has supplied small incubators and candling lamps to the regional veterinary laboratories in Tanzania, where trials of local production and delivery to villages will be undertaken. Practical workshops have been conducted with ACIAR funding in Pretoria and in Dar es Salaam.

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It will not be possible to provide specific-pathogen-free eggs to regional laboratories for the production of vaccine. However the use of local eggs poses little risk. Vaccines based on allantoic fluid are relatively safe, and the vaccines will be applied to growers and adult chickens, preferably by eye drop. Most problems with adventitious agents in avian vaccines have developed after parenteral inoculation of chicks. Any agents in these rural vaccines will already be present in the local flocks, and simple safety tests will reveal any potentially lethal microorganisms.

Strain V4 has already proved effective in village trials in Tanzania. These trials were conducted under authentic village conditions by Dr. Ann Foster of the Church Missionary Society, Dodoma. Vaccine was reconstituted in well water. Dogs and goats sometimes competed with chickens for drinking water vaccine. Eye drop vaccine had sometimes to be applied with a feather. However, with vaccine delivered by these routes, both antibody responses and the results of buy-back challenge experiments indicated about 70% efficacy. Vaccine delivered on boiled sorghum was less effective. It is anticipated that locally produced I_2 vaccine will also protect.

Sustainable delivery of Newcastle disease vaccine to villages will require a product of low cost, a system of cost recovery, and vaccination performed by village vaccinators or by farmers. The vaccine produced in local eggs should be very cheap. An ACIAR project in Mozambique is investigating methods of cost recovery.

If Newcastle disease can be controlled, the production of village chickens will greatly improve the quality of life of many villagers. In countries where children die of protein malnutrition, any endeavour that increases the productivity of village chickens is warranted.

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