

The Australian village poultry development programme in Asia and Africa

J.W. COPLAND¹ and R.G. ALDERS^{2*}

¹Australian Centre for International Agricultural Research, GPO Box 1571, Canberra ACT 2601, Australia; ²AusAID Southern Africa Newcastle Disease Control Project, CP 1168, Maputo, Mozambique

*Corresponding author: robyn@mail.tropical.co.mz

Village poultry play a vital role in many poor rural households. They provide scarce animal protein (in the form of meat and eggs) and can be sold/bartered to meet essential family needs such as medicine, clothes and school fees. They also provide manure and pest control as well as being used in traditional ceremonies. Village poultry are generally owned and managed by women and children and improving their production can provide the first step out of poverty for the rural poor.

The Australian Centre for International Agricultural Research (ACIAR) has supported village poultry research in many countries since 1984. This research has had some significant outcomes including: the control of Newcastle disease (ND) using Australian derived live thermotolerant vaccines in a variety of poultry production systems in several countries; description and quantification of the scavenging feed resource base of low input/low output systems; development of gender-sensitive extension materials and methodologies suitable for use in remote rural areas in Asia and Africa; and the development and registration of a new duck plague vaccine in Vietnam.

The thermotolerant ND I-2 vaccine remains viable for periods away from the cold chain, can be administered by various routes and induces an acceptable level of protection under village conditions. The vaccine master seed, together with the ND Laboratory Manual, is made available without cost by ACIAR.

In developing countries where ND is endemic, outbreaks regularly result in high mortalities and in countries where it is not endemic, sporadic outbreaks make vaccination advisable. The implementation of an effective ND control programme in countries in Africa and Asia has resulted in increased chicken numbers, increased household purchasing power, increased home consumption of chicken products and increased decision-making power for women.

However, sustainable programmes for the control of ND in village chickens have been difficult to achieve, often due to limited appreciation by official agencies of the benefits of village poultry. Experience has shown that a sustainable ND control programme is composed of five essential components: a) an appropriate vaccine and vaccine technology; b) effective extension materials and methodologies that target veterinary and extension staff, community vaccinators and farmers; c) simple evaluation and monitoring systems; d) economic sustainability based on the

Developments in family poultry production and health

commercialisation of the vaccine and vaccination services and the marketing of surplus chickens and eggs; and e) support and coordination by relevant government agencies for the promotion of vaccination programmes.

Details of ND control in village poultry are provided on the ACIAR website, www.aciar.gov.au and by the Australian Agency for International Development www.usaid.gov.au.

Keywords: village poultry; Newcastle disease; disease control and extension; thermotolerant vaccine; Duck plague vaccine

Introduction

Village poultry play a vital and often under-valued role in rural development in many poor rural households and are a global asset for many millions who live below the poverty line. For instance, they provide scarce animal protein in the form of meat and eggs and can be sold or bartered to meet essential family needs such as medicine, clothes and school fees. They are generally owned and managed by women and children (Guèye, 2000; Spradbrow, 1993-94). Village chickens are used in many special festivals and ceremonies, and they provides manure and pest control.

Village chickens require the lowest capital investment of any livestock species and they have a short production cycle. They also play an important role in households where there is a lack of able-bodied workers, due to wars, HIV/AIDS and those that have a disabled or elderly family member. In households headed by widows, children or grandparents, chickens represent the easiest species to raise for sale and home consumption, providing a source of high quality protein and vitamins that play an important role in the nutrition of HIV/AIDS patients. Improved village poultry production is often the first step in poverty alleviation and asset generation.

Recognising the role that village poultry could play in poverty alleviation and household food security, the Australian Centre for International Agricultural Research (ACIAR) has supported village poultry research in many countries in Asia and Africa since its inception in 1983. This research has included: the control of Newcastle disease (ND) using Australian derived live, thermotolerant vaccines; understanding the scavenging feed resource base of low input/low output village poultry systems; the diagnosis and control of duck plague; and the development of gender-sensitive extension materials for the improvement of extensive poultry production systems and methodologies suitable for use in remote rural areas in Asia and Africa.

Control of Newcastle disease

One of the major constraints to production of village chickens is Newcastle disease (ND; Alders and Spradbrow, 2001a; Alexander, 1991). In countries where ND is endemic, outbreaks of this disease regularly result in mortalities of 50 to 100%. In developing countries where ND is not endemic, outbreaks may occur less frequently but potential losses due to the disease make vaccination mandatory.

Since 1984, the Australian Centre for International Agricultural Research (ACIAR) has been supporting collaborative research on the control of ND in village chickens (Alders, 2003; Copland, 1992). The origins of the project reflected the importance of ND in Southeast Asia and the lack of appropriate vaccines for village chicken farming systems.

Developments in family poultry production and health

It also built on earlier experience and research interests of Australian and Asian partner countries and their strategies for disease control.

Investigations into the control of ND in Southeast Asia and Africa have involved:

- Laboratory testing of thermotolerant, live ND vaccines; NDV4-HR (Ideris *et al.*, 1987) and I-2 (Bensink and Spradbrow, 1999);
- Field testing of these vaccines;
- The development of appropriate extension material; and
- Attention to cost-recovery and cost minimisation issues.

Details of the materials and methods used may be found in three ACIAR Proceedings edited by Alders and Spradbrow (2001b), Copland (1987) and Spradbrow (1992).

Initial ND control activities focussed on the development of a ND vaccine that was suitable for use in difficult rural conditions where the cold chain is often absent or unreliable. The NDV4-HR and I-2 ND vaccines proved to perform well under these adverse conditions (Alders and Spradbrow, 2001a, 2001b). It is important to note that while these vaccines are thermotolerant, they are still biological products that will eventually lose their potency if exposed to sunlight or excessive temperatures for long periods. The NDV4-HR vaccine is a commercial vaccine and can be purchased when foreign exchange is available. For countries where foreign exchange is not readily available, ACIAR has provided the I-2 ND vaccine master seed free of charge to enable a ND vaccine suitable for use in village chickens to be produced locally (Alders and Spradbrow, 2001a). However, it became apparent that to make ND control activities sustainable attention had to be given to social and economic implications of ND control in communities. The basic objective of ND control in village chickens is to improve food security in and assist with poverty alleviation of rural and peri-urban households. Sustainable food security is linked directly to sustainable livelihoods. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintains or enhances its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID, 2001). The robustness of village poultry in Asia has been well demonstrated in the financial crisis of 1997 and the recent Avian Influenza epidemic.

The implementation of an effective ND control programme in countries such as Mozambique has resulted in increased chicken numbers, increased household purchasing power, increased home consumption of chicken products and increased decision-making power for women (Bagnol, 2001). In the south of Mozambique, women have been able to sell excess chickens in order to buy goats and eventually cattle, thus giving them access to resources previously denied to them as ruminants have been traditionally raised by men. Where families allocate chickens to children, the children may sell their chickens to buy school supplies. Despite the need to control ND in village chickens, it has been difficult to achieve a sustainable control programme. Experience has shown that a sustainable ND control programme is composed of five essential components:

- An appropriate vaccine, vaccine technology and vaccine distribution mechanisms;
- Effective extension materials and methodologies that target veterinary and extension staff as well as community vaccinators and farmers;
- Simple evaluation and monitoring systems of both technical and socio-economic indicators;
- Economic sustainability based on the commercialisation of the vaccine and vaccination services and the marketing of surplus chickens and eggs and;
- Support and coordination by relevant government agencies for the promotion of vaccination programmes.

Developments in family poultry production and health

The thermotolerant ND I-2 vaccine Mmaster seed, together with copies of the ACIAR ND Laboratory Manual, is made available to interested countries without cost by ACIAR to allow sustainable local production of the I-2 ND vaccine.

Currently, AusAID is funding a ND control project in rural areas in Malawi, Mozambique and Tanzania. ACIAR is funding a ND control project in Myanmar to improve the production and quality control of the I-2 vaccine and its field usage. These projects all build on the findings of previous ACIAR and AusAID projects.

The ND control technology developed has been made freely available by ACIAR and it has been used in Bhutan, Cambodia, Ghana, Lao PDR, Malawi, Malaysia, Mozambique, Myanmar, Senegal, Tanzania and Vietnam with support from other donor agencies including the Australian Agency for International Development (AusAID), the Food and Agriculture Organisation of the United Nations (FAO), the International Fund for Agricultural Development (IFAD) and the World Bank.

Diagnosis and control of duck plague

Duck Plague is an acute, contagious infection of ducks, muscovy ducks, geese, swans and other species of the order Anseriformes. The disease can affect ducks of any age, causing a high level of mortality or a drop in egg production. In Vietnam, duck plague is a major constraint to duck production.

A polymerase chain reaction (PCR) method for the detection of duck plague virus (DPV) using two primers designed by the Australian Animal Health Laboratory has been established at the National Veterinary Company Laboratory in Ho Chi Minh City, Vietnam (Phuoc *et al.*, 2003). The primers have been shown to differentiate DPV from other DNA viruses such as fowl pox virus, porcine parvovirus, Marek's disease virus, infectious laryngotracheitis virus and Aujeszky's disease virus. This PCR technique was found to be more sensitive and specific than the ELISA technique in detection of DPV.

A new duck plague vaccine has been developed in Vietnam with ACIAR support. An existing Chinese vaccine strain was confirmed to be efficacious against contemporary challenge strains. This strain, initially grown in duck eggs was adapted to growth in chicken eggs and then to chicken cell cultures. This greatly reduces the risk of spreading duck pathogens with the vaccine. The new vaccine is now registered for use throughout Vietnam.

Scavenging Feed Resource Base

The major input to the village poultry production system is the scavenging feed resource base (SFRB) that comprises household waste, crop by-products and the gleanings of gardens, fields and wasteland. Roberts (1992) and colleagues from James Cook University developed a simple model for the village chicken production system in which the chicken population and the yield from it are determined by the capacity of the SFRB. Estimates of the size of the SFRB in different systems are made and the efficiency with which the resource is utilised in the production of high quality protein for human consumption can be calculated.

The data on the SFRB can be used in many ways to assess options for improving the productivity of scavenging village chickens under varying conditions. The efficiencies of different production systems can be compared, options for minimising wastage can be assessed, appropriate nutritional inputs to the systems can be planned and preliminary assessments made of the benefits which might be derived, and the potential benefits of

Developments in family poultry production and health

simple husbandry changes such as creep feeding can be determined. As an example, in the village flocks studied by Gunaratne *et al.* (1991) in Sri Lanka, the 22.4 kg of protein in the SFRB produced 0.6 kg of meat protein and 2.6 kg of egg protein. So the efficiency with which the family flock converted the protein in the SFRB into protein for human consumption was 14%.

Development of gender-sensitive extension materials and methodologies suitable for use in rural areas

Village chickens are generally owned and managed by women and children and are often essential elements of female-headed households. By learning who does what in village chicken production, we can help them do it better. Outlining tasks associated with the production of village chickens according to age and gender helps to determine who in the family should be targeted when developing extension material associated with various aspects of poultry production.

The sustainable control of ND requires that all involved in the control process have access to key information that will enable them to make sound decisions that will support the successful implementation of activities. Information packages are essential for every link in the chain between the production of the vaccine and the chicken that is to be vaccinated. Information should be presented in a clear and consistent manner and pre-tested (Zimmerman *et al.*, 1996) prior to wide circulation.

A comprehensive ND control extension package has been produced by ACIAR that can be adapted for use in many places. The package comprises:

- **A ND field manual.** This 112 page manual entitled ‘Controlling Newcastle disease in village chickens: A Field Manual’, aims to provide information to senior veterinarians and veterinary field staff on ND and its control (Alders and Spradbrow, 2001a).
- **A ND training manual.** The 128 page manual entitled ‘Controlling Newcastle disease in village chickens: A Training Manual’ is for trainers of community vaccinators and provides guidance on the preparation, implementation and evaluation of a three day training course for community vaccinators (Alders *et al.*, 2002).
- **A ND laboratory manual.** This 142 page manual details the small-scale production and quality control of live, thermotolerant ND vaccine (Young *et al.*, 2002).
- **A flip chart.** This illustrated A3 flip chart, with clear, largely self-explanatory line drawings and an accompanying narrative can be used for training and in the field, with farmers, to explain the characteristics of the vaccine and its application. Local frontline extension staff translate the narrative into the appropriate local language.
- **A ND control extension handbook.** This booklet provides basic information for extension workers on the control of ND using live thermotolerant vaccine; the organisation of vaccination campaigns; conservation and transport of vaccines; monitoring field activities; diagnosis of ND; determining the price of vaccine administration by community vaccinators; calibrating eye droppers; marketing of surplus chickens and eggs; and information on HIV/AIDS.
- **A poster.** The poster shows a large black and white line drawing of a rooster, ND vaccine vials and an eye-dropper and provides space for the local vaccinator to write the place, date, time and contact person for the next ND vaccination campaign.
- **A pamphlet.** This pamphlet provides an introduction to ND and its control and is useful for front line extension staff, literate farmers, farmers’ associations and school children. It is printed on both sides of an A4 sheet and is easily reproduced.
- **A ND vaccination calendar.** The calendar highlights the months in which vaccination campaigns should be implemented, prompts vaccinators to get their orders for vaccine

Developments in family poultry production and health

in well before the campaign begins and reminds distributors when they should have the vaccine in stock.

Most of these items can be downloaded from the village poultry website (www.kyeemafoundation.org) sponsored by ACIAR and AusAID and managed by the University of Queensland and GRM International or the ACIAR website (www.aciar.gov.au).

AusAID has also sponsored the publication of monographs in many countries, including 'A simple guide to managing village poultry in South Africa' (Farrell, 2000) and 'The Southern African Chicken Book: How to start a small business keeping chickens' (Wethli, 1999). AusAID is currently funding the preparation of a manual entitled 'Improving village chicken production: a comprehensive extension and field manual' (Ahlers *et al.*, 2005) that will be available for distribution in 2005.

Conclusion

The improved production of village poultry can make a vital contribution to the improvement of household food security, poverty alleviation and HIV/AIDS mitigation in many developing countries. Thermotolerant ND vaccine, simple housing and supplementary feeding provide an opportunity for rural communities to develop a robust extensive poultry production system that can be intensified as circumstances permit. The Australian government's aid programme prioritises HIV/AIDS, food security and rural development and the provision of support to village poultry research and development is an appropriate way to address these important issues.

Acknowledgements

The authors would like to acknowledge the support given to village poultry research and development by the Australian Centre for International Agricultural Research (ACIAR) and the Australian Agency for International Development (AusAID). Thanks go to all those village poultry researchers, veterinarians, extension workers and farmers in many countries with whom the authors have collaborated over the past two decades.

References

- AHLERS, C., ALDERS, R., CAMBAZA, A.B., HARUN, M., JUNIOR, J.L., MGOMEZULU, R., Ms AMI, H., WEGENER, P., WETHLI, E. and YOUNG, M. (2005) Improving village chicken production: a comprehensive extension and field manual. ACIAR and AusAID. (In preparation.)
- ALDERS, R. (2003) Success story on the control of Newcastle disease in village chickens using thermotolerant vaccines. Asia Pacific Association of Agricultural Research Institutions (APAARI), FAO-RAP Bangkok. August 2003.
- ALDERS, R., DOS ANJOS, F., BAGNOL, B., FUMO, A., MATA, B. and YOUNG, M. (2002); 2nd Edition (2003) Controlling Newcastle Disease in Village Chickens: A Training Manual. ACIAR Monograph N° 86, 128 pp.
- ALDERS, R.G. and SPRADBROW, P.B. (2001a) Controlling Newcastle Disease in Village Chickens: a field manual. Canberra. Australian Centre for International Agricultural Research. Monograph 82. 112pp.
- ALDERS, R.G. and SPRADBROW, P.B. ed. (2001b) SADC Planning Workshop on Newcastle Disease Control in Village Chickens. Proceedings of an International Workshop, Maputo, Mozambique, 6-9 March, 2000. ACIAR Proceedings No. 103. 170pp.
- ALEXANDER, D.J. (1991) Newcastle disease. In: Rweyemamu, M.M., Palya, V., Win, T. and Sylla, D., ed. *Newcastle Disease Vaccines for Rural Africa*. Debre Zeit, Ethiopia, Pan African Veterinary Vaccine Centre, pp. 7-45.

Developments in family poultry production and health

- BAGNOL, B.** (2001) The social impact of Newcastle disease control. In: Alders, R.G. and Spradbrow, P.B. (2001) *Controlling Newcastle Disease in Village Chickens: a field manual*. Canberra. Australian Centre for International Agricultural Research. Monograph 82. pp. 69-75.
- BENSINK, Z. and SPRADBROW, P.B.** (1999) Newcastle disease virus strain I-2: a prospective thermostable vaccine for use in developing countries. *Veterinary Microbiology* **68**:131-139.
- COPLAND, J.W.** ed. (1987) Newcastle Disease in Poultry: A New Food Pellet Vaccine. ACIAR Monograph N° 5, 119pp.
- COPLAND, J.** (1992) The origin and outcomes of the ACIAR Newcastle disease project. In: Spradbrow, P.B., ed., 1992. *Newcastle disease in village chickens: control with thermotolerant oral vaccines*. Proceedings of an international workshop held in Kuala Lumpur, Malaysia, 6-10 October 1991. ACIAR Proceedings N° 39, pp. 8-10.
- DFID** (2001) Sustainable Livelihoods Guidance Sheets. <http://www.livelihoods.org> August 2001.
- FARRELL, D.** (2000) A simple guide managing village poultry in South Africa. Josie Egan Publishing Services, Cape Town, South Africa.
- GUÈYE, E.F.** (2000) The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. *Outlook on Agriculture* **29**(2): 129-136.
- GUNARATNE, S.P., CHANDRASIRI, A.D.N., HEMALATHA, W.A.P.M. and ROBERTS, J.A.** (1991) The feed resource base for scavenging village chickens. Cited by Roberts, J.A. (1992) The scavenging feed resource base in assessments of the productivity of scavenging village chickens. In: Spradbrow, P.B., ed., 1992. *Newcastle disease in village chickens: control with thermotolerant oral vaccines*. Proceedings of an international workshop held in Kuala Lumpur, Malaysia, 6-10 October 1991. ACIAR Proceedings N° 39, pp. 29-32.
- IDERIS, A., IBRAHIM, A.L., SPRADBROW, P.B. and HUNG SENG** (1987) Development of Food Pellet Newcastle disease vaccine. In: Copland, J.W. ed. 1987. Newcastle Disease in Poultry: A New Food Pellet Vaccine. ACIAR Monograph N° 5, pp. 20-23.
- ROBERTS, J.A.** (1992) The scavenging feed resource base in assessments of the productivity of scavenging village chickens. In: Spradbrow, P.B., ed., 1992. *Newcastle disease in village chickens: control with thermotolerant oral vaccines*. Proceedings of an international workshop held in Kuala Lumpur, Malaysia, 6-10 October 1991. ACIAR Proceedings N° 39, pp. 29-32.
- SPRADBROW, P.B.** ed. (1992) Newcastle disease in village chickens: control with thermotolerant oral vaccines. Proceedings of an international workshop held in Kuala Lumpur, Malaysia, 6-10 October 1991. ACIAR Proceedings N° 39, 189pp.
- SPRADBROW, P.B.** (1993-94) Newcastle disease in village chickens. *Poultry Science Review* **5**:57-96.
- WETHLI, E.** (1999) The Southern African Chicken Book – How to start a small business keeping chickens. Juta and Co., Ltd., Kenwyn, South Africa.
- YOUNG, M., ALDERS, R., SPRADBROW, P., GRIMES, S., DIAS, P., DA SILVA, A. and LOBO, Q.** (2002) Controlling Newcastle Disease in Village Chickens: A Laboratory Manual. ACIAR Monograph N° 87, 142pp.
- ZIMMERMAN, M., NEWTON, N., FRUMIN, L. and WITTETT, S.** (1996) Developing Health and Family Planning Materials for Low-Literate Audiences: A Guide. Washington DC, Programme for Appropriate Technology in Health.

