



Success Story on the Control of Newcastle Disease in Village Chickens Using Thermotolerant Vaccines



Photo: Malaysian boy with chicken.

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August 2003

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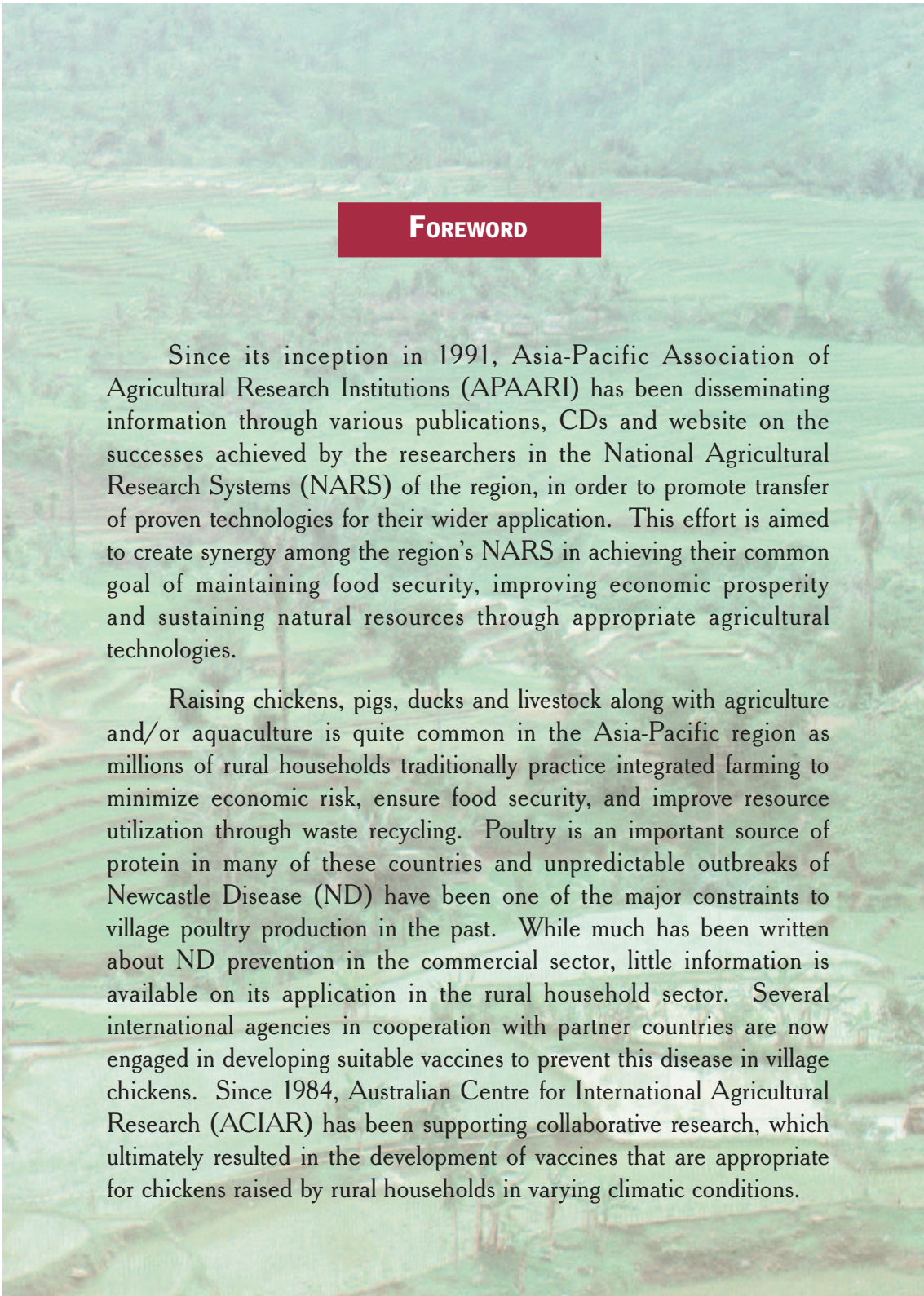
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FOREWORD

Since its inception in 1991, Asia-Pacific Association of Agricultural Research Institutions (APAARI) has been disseminating information through various publications, CDs and website on the successes achieved by the researchers in the National Agricultural Research Systems (NARS) of the region, in order to promote transfer of proven technologies for their wider application. This effort is aimed to create synergy among the region's NARS in achieving their common goal of maintaining food security, improving economic prosperity and sustaining natural resources through appropriate agricultural technologies.

Raising chickens, pigs, ducks and livestock along with agriculture and/or aquaculture is quite common in the Asia-Pacific region as millions of rural households traditionally practice integrated farming to minimize economic risk, ensure food security, and improve resource utilization through waste recycling. Poultry is an important source of protein in many of these countries and unpredictable outbreaks of Newcastle Disease (ND) have been one of the major constraints to village poultry production in the past. While much has been written about ND prevention in the commercial sector, little information is available on its application in the rural household sector. Several international agencies in cooperation with partner countries are now engaged in developing suitable vaccines to prevent this disease in village chickens. Since 1984, Australian Centre for International Agricultural Research (ACIAR) has been supporting collaborative research, which ultimately resulted in the development of vaccines that are appropriate for chickens raised by rural households in varying climatic conditions.



This success story describes several vaccines and ND control programmes developed by ACIAR's collaborative research activities in the Asia-Pacific region. The case studies of the success story illustrate implementation of ND control procedures and their impact on rural livelihood in a variety of socio-economic conditions. Several useful information resources, conferences, training programmes, and agencies involved in ND control research are also listed for interested readers.

I consider this appropriate to thank Dr. Robyn Alders for writing this Success Story, the nineteenth in the series by APAARI. I am sure this publication will prove to be a useful resource for not only poultry researchers and extension workers, but also for all those who are involved in traditional household poultry industry in the Asia-Pacific region.

A handwritten signature in black ink, which appears to read 'R. S. Paroda', is positioned above the printed name.

(R. S. Paroda)

Executive Secretary, APAARI

Bangkok, Thailand
September 2003

I. INTRODUCTION

Almost one third of the world's population consists of Asian farming households. Across the continent, hundreds of millions of families make at least part of their living from small-scale agriculture. Among developing countries in the region, the proportion of the population engaged in agriculture lies between 42% in Indonesia and 96% in Nepal. Most of these farming families are small holders.

Small farmers are the bedrock of Asian economic development. Because of the importance of small farmers as producers of each nation's food and industrial raw materials, as consumers of goods and services and as citizens, success in economic development largely hinges on the viability of smallholder agriculture and the vibrancy of social, economic and cultural life in rural areas.



Figure 1: A village poultry market in Malaysia.



Table 1: Poultry population data for the Asia-Pacific region for 1991, 1998 and 2001 including annual growth rate for 1991-2001 (FAO 2002).

Country	1991	1998	2001	Annual Growth Rate
Developing Countries:				
Bangladesh	95*	138	140	4.3%
Bhutan	0	0	0	0.8%
Cambodia	9	13	15	5.5%
China	2,306	3,121	3,771	4.7%
Cook Islands	0	0	0	6.7%
DPR Korea	22	9	17	-2.3%
Fiji	3	4	4	4.2%
India	300	375	413	3.4%
Indonesia	664	646	751	-0.8%
Iran	165	230	260	4.7%
Lao PDR	8	12	14	4.6%
Malaysia	74	115	125	4.8%
Maldives	-	-	-	-
Mongolia	0	0	0	-12.2%
Myanmar	24	36	48	6.7%
Nepal	14	17	20	4.1%
Pakistan	75	145	155	7.3%
Papua New Guinea	3	4	4	2.2%
Philippines	78	138	115	4.9%
Rep. of Korea	75	86	102	3.6%
Samoa	0	0	0	2.5%
Solomon Islands	0	0	0	2.9%
Sri Lanka	8	10	11	2.2%
Thailand	131	229	190	6.7%
Tonga	0	0	0	4.9%
Vanuatu	0	0	0	0.8%
Viet Nam	76	116	150	6.2%
Sub-total	4,131	5,445	6,308	4.0%
Developed Countries:				
Australia	55	90	96	5.9%
Japan	332	303	297	-1.4%
New Zealand	10	12	13	3.2%
Sub-total	396	405	406	0.1%
Asia Pacific Total	4,527	5,850	6,714	3.7%
Rest of World	6,586	7,489	8,146	2.1%
World	11,113	13,338	14,859	2.8%

* Unit: 1,000,000 heads

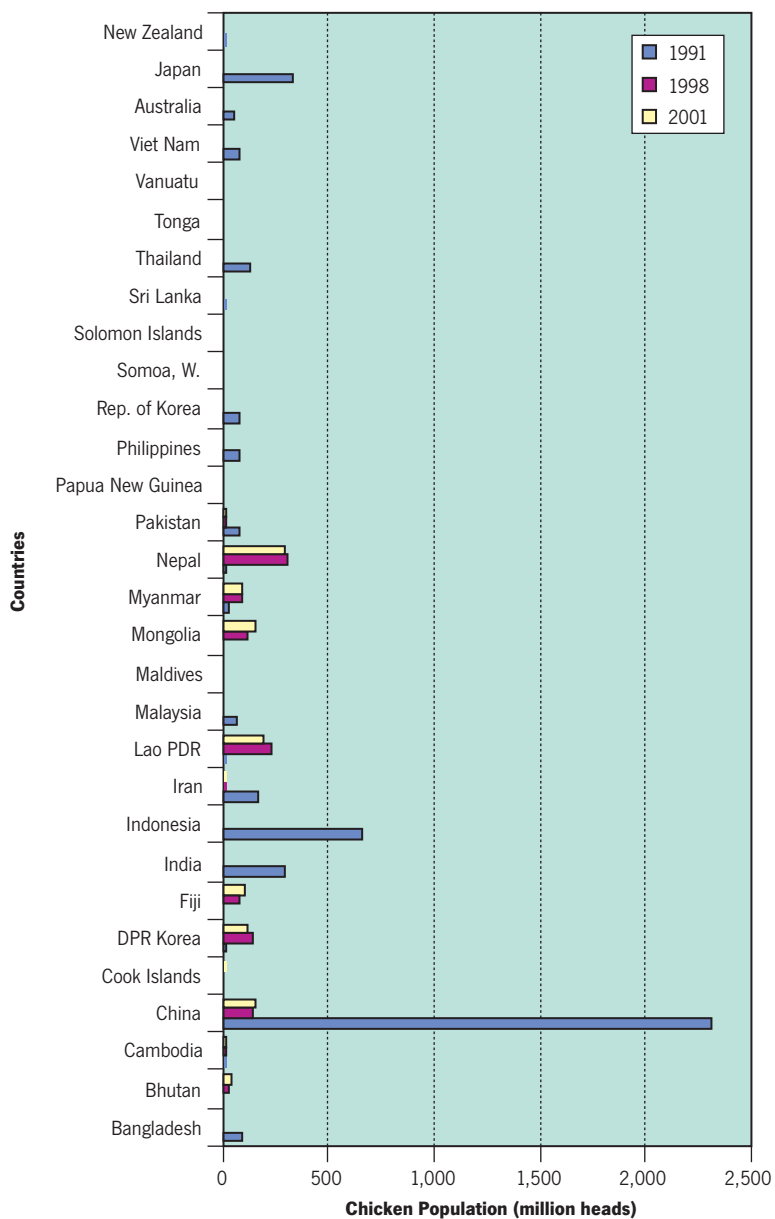


Figure 2: Poultry population data for Asia-Pacific region for 1991, 1998 and 2001 (FAO 2002).

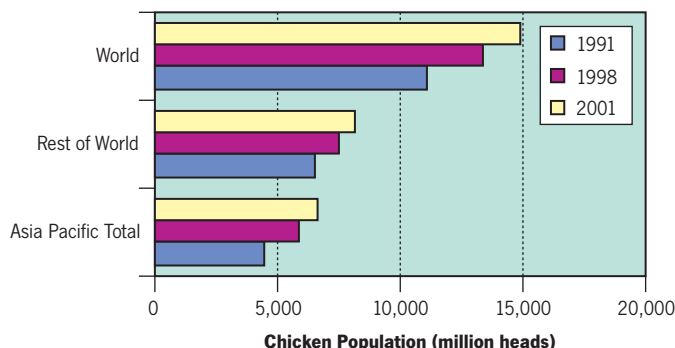


Figure 3: Comparison of poultry population data for the Asia-Pacific region and the rest of the world for 1991, 1998 and 2001 (FAO 2002).

Small farmers generally practise mixed farming and most raise small stock. By producing and raising a diversity of products and animals, farmers spread their risks, decreasing the impact of lowered production in one of their endeavours. The majority of householders in Asia live in rural environments and raise poultry, usually chickens that are relatively cheap to buy and require very few inputs. Asia is home to 46% of the world's chickens and 85% of the world's ducks. For example, in Myanmar there are 35 million village chickens (86% of the total chicken population) that are kept throughout the country with flock sizes varying from 1 to 15 chickens. There are approximately 120 million chickens in Viet Nam and most of the national flock (75%) is kept at home: as village or backyard chickens. About 95% of the total chicken population in Viet Nam consists of local chicken breeds. In Bhutan, village chickens are kept throughout the country and constitute approximately 86% of the national poultry flock.

Improving the production of village chickens leads directly to improved food security for the households raising the chickens and indirectly to improved food security in the surrounding community as poultry products become more readily available. It is generally acknowledged that poultry production is the most efficient and cost-effective way to increase the availability of high-protein food.



Once farming families have confidence that they have sufficient birds and that these birds will not die in great numbers, the consumption of poultry meat and eggs increases. The increased consumption of poultry meat and eggs is especially important for children and pregnant women. Poultry can make a particularly crucial contribution in areas where childhood malnutrition is common, because malnutrition inhibits growth, increases the likelihood of illness, affects mental development and reduces subsequent school performance and labour productivity.

Urban communities also gain from increased availability of village poultry. Increasing numbers of birds normally leads to a decline in the sale price. With lower prices, the number of urban consumers who can afford to buy poultry and poultry products will increase, thus allowing village poultry producers whose productivity has increased to sell more birds and make a greater profit.

II. THE ROLE OF VILLAGE CHICKENS IN RURAL AREAS

Poultry can be raised by farmers for many different reasons, from the need to create an income to the simple pleasure that some farmers have in watching their healthy birds walk around their houses. In general, rural poultry provide scarce animal protein in the form of meat and eggs, and are available for sale or barter in societies where cash is not abundant. Village poultry also fulfill a range of other functions for which it is difficult to assign a monetary value. They provide pest control and manure, are used in special festivals and to meet social obligations, and they are essential for many traditional ceremonies and treatment of illnesses.

In many cases, little or no supplementary feeding is given and chickens roost in trees or on the roof of the owner's home. They require minimal external inputs, minimal human attention and cause



Figure 4: Chickens reduce tick numbers and so reduce the incidence of tick-borne diseases in cattle when the species are raised together.

minimal disruption to the environment. Village poultry are also the livestock most likely to be owned and cared for by women and children.

Eggs can be stored under village conditions more easily than most foods of animal origin. For decades, the egg has represented the standard reference food, perfectly balanced, containing most essential amino acids, large amounts of calcium, phosphorous, magnesium, iron and zinc. It represents one of the main sources of vitamin A and of vitamin B complex. One egg provides approximately 11.5% of daily protein requirement and 5% of daily energy requirements.

An example of the diverse roles played by poultry comes from the south of Bhutan where poultry play an important role in the worship of local deities. These goddesses require that animals be offered in pairs. A chicken, duck or pigeon can be used to make up



Figure 5: A Bhutanese village chicken farmer and her chicken house.

a pair with a large animal, or one of the birds can be offered in the place of a goat or a pig. For example, a pig and a chicken or a goat and a pigeon are considered equal to two large animals. Farmers in this region believe that the offerings will ensure that there will be no sickness in their households.

In northern Thailand, a study has found that a family on average kept 13 chickens per year for consumption, and that this was the only source of animal protein in the diet. Despite the relatively low production, these few chickens are often the only disposable assets owned by the rural poor. A study in Indonesia found that ten scavenging chickens provided a rural family with 25% of their monthly expenditure, but only in the absence of Newcastle Disease (ND).



Figure 6: Village mother hen and chicks.

III. NEWCASTLE DISEASE — A MAJOR CONSTRAINT TO VILLAGE CHICKEN PRODUCTION

The first recorded outbreak of ND occurred in 1926 in Java, Indonesia, and in Newcastle-upon-Tyne, England. However, it is now thought that the disease may have occurred in Central Europe before 1926 and possibly in Korea as early as 1924. Within a few years, numerous ND virus isolations were made around the world.

Newcastle disease (ND) is caused by a paramyxovirus which mainly affects poultry. Chickens are the most susceptible host. Chickens infected with virulent ND virus strains may die without showing any signs of illness. The clinical signs of ND include: fluffed feathers and drooped wings; lethargy and inappetance; respiratory signs



Figure 7: Torticollis is generally seen in chickens only when ND is at an advanced stage.

such as mild rales and snicks; greenish diarrhoea; nervous signs of tremor, torticollis, convulsions and paralysis of wings and legs; and a marked decrease in egg production.

It is widely accepted that one of the major constraints to village chicken production in the developing world is Newcastle disease (ND) (Alexander 1991). In these countries circulating strains of ND virus are capable of causing 100% mortality in unprotected flocks. In Bangladesh, mortality due to ND was higher in unvaccinated village flocks compared to the vaccinated flocks, i.e., 21.6% and 4.9%, respectively. The mortality was significantly higher in unvaccinated growers compared to chicks and adult birds (Barman, pers.com.).

Outbreaks of ND are unpredictable and discourage villagers from paying proper attention to the husbandry and welfare of their chickens. The importance of ND is indicated by the fact that ND has a local name in many countries, for example, in Bhutan, it is called *Ja Ney* (in the north, east and center of the country) and *Hai Ja* (in the south).



Among village poultry farmers in the south of Viet Nam, ND is known as *bệnh dịch tả gà*. In much of Asia, ND is known as Ranikhet disease.

ND is a serious problem either as an enzootic disease or as a cause of regular, frequent epizootics throughout Africa, Asia, Central America and parts of South America. In other areas, such as Taiwan, the situation appears to be one of sporadic epizootics occurring despite vaccination programmes. Taiwan reported an outbreak in 1999 and Malaysia reported an outbreak between 2000 and 2001. In 2000, ND was reported as endemic in Nepal and India also experienced outbreaks in this same period.

ND tends to be under diagnosed and under reported, but it is of major significance to both small scale and commercial farmers in many parts of the region.

Until 1998, Australia had been free of virulent ND virus, since the 1932 outbreak. It had been recognised since 1966 that viruses similar to those placed in the “asymptomatic enteric” pathotype group were present in wild birds in Australia and on occasions had spread to commercial poultry flocks. Two outbreaks of virulent ND occurred in Australia in 1998 and further outbreaks were reported in 1999, 2000 and 2002. New Zealand and the Pacific Islands remain free of virulent ND virus.

There are many constraints to village chicken production (Sonaiya et al. 1999) including a range of bacterial (e.g. Fowl Cholera) and other viral diseases (e.g. Fowl Pox), internal and external parasites (Permin and Hansen 1998), poor nutrition and predation. However, in areas where ND is endemic, ND control through vaccination is generally a very cost-effective intervention and given a high priority by farmers. Village chicken farmers are disheartened by the loss of large numbers of their birds to ND outbreaks that often occur on an annual basis. Once the dramatic losses caused by ND can be controlled,



farmers will be more receptive to other messages concerning improved poultry husbandry.

Since 1984, the Australian Centre for International Agricultural Research (ACIAR) has been supporting collaborative research on the control of ND in village chickens (Copland 1992). The origins of the project reflected the importance of ND in Asia and the lack of appropriate vaccines for village chicken farming systems. It also built on earlier experience and research interests of Australian and Asian partner countries and their strategies for disease control. The ND control technology developed has been made available by ACIAR and in Asia it has been used in Bhutan, Cambodia, Malaysia and Viet Nam with support from other donor agencies including the Australian Agency for International Development (AusAID) and the Food and Agriculture Organisation of the United Nations (FAO). The European Union has recently supported the introduction of thermotolerant ND vaccine into Lao PDR.

IV. RESEARCH ACHIEVEMENTS

Initial ACIAR ND control projects focused on the development of live, thermotolerant ND vaccines that are suitable for use in difficult rural conditions where the cold chain is often absent or unreliable. The vaccines that were developed through this research proved to be efficacious but the development of sustainable ND control programmes requires more than the availability of an appropriate vaccine alone. If the control programme is to continue beyond the project phase, the vaccination of village chickens against ND must be accompanied by appropriate organizational, training, communication and economic practices. Over the past four years, ACIAR has supported the development of a wide range of extension materials designed to assist with the development and implementation of sustainable ND control programmes in rural areas.



Options for Newcastle disease control

Much has been written about Newcastle disease and its control in the commercial poultry sector. Vaccination is a routine practice for the prevention and control of the disease. The control of ND by vaccination commenced shortly after the disease was recognized with the first trials taking place in Indonesia in 1928 (Spradbrow 1993/94). However, it is difficult to transport and maintain conventional thermolabile vaccines in ambient temperatures ranging from 24°C to 36°C. While the basic characteristics of the ND virus encountered in the commercial and family sectors are similar, it is the production systems used to raise village chickens and the socio-economic status of their owners that make ND control in the family sector a very complex issue.

Vaccines developed for use in rural areas

The control of ND in the family sector, as in the commercial sector, requires a multifaceted approach. In the commercial sector, ND control consists of (Alexander 1997):

- International control policies;
- National control policies;
- Biosecurity at the farm level; and
- Vaccination.

While the details may vary, in general, these four components also apply to the control of ND in the family sector. The challenge has been to develop an effective ND control program for the family sector that is sustainable, both economically and socially.

In circumstances where the cold chain is weak or absent, the only reliable option is the use of thermotolerant ND vaccines. Inactivated vaccines are slightly more stable than live conventional live vaccines



when held at ambient temperatures but they are a more expensive option and can only be administered by injection.

The NDV4-HR (Spradbrow, Samuel, and Ibrahim 1988) and I-2 ND (Bensink and Spradbrow 1999) vaccines developed by various ACIAR projects proved to perform well under these adverse conditions (Alders and Spradbrow 2001a, 2001b). For countries where foreign exchange is not readily available, ACIAR has provided the I-2 ND vaccine master seed to enable a ND vaccine suitable for use in village chickens to be produced locally (Alders and Spradbrow 2001).

NDV4-HR vaccine

The heat tolerant V4 (NDV4-HR) vaccine against ND was developed through collaborative research between the Universiti Pertanian Malaysia and the University of Queensland. It has yielded encouraging results in many countries in Asia (Spradbrow 1993-94) and Africa (Alders et al. 2001). The NDV4-HR vaccine is a living vaccine with the following characteristics:

- it is thermotolerant, retaining its activity for 12 weeks at a temperature of 28°C in freeze-dried form (Ideris et al. 1987);
- it can be administered via eye drop (intraocular), nose drop (intranasal), oral drench, or drinking water; mixed with certain feeds or by injection (Spradbrow 1993-94, Anon. 1991);
- its ease of administration makes it suitable for use by village farmers;
- the vaccine strain can be transmitted by contact from vaccinated to non-vaccinated birds (Spradbrow 1993-94);
- it is avirulent and can be safely administered to chickens of any age from day-old to adult (Spradbrow 1993-94, Anon. 1991);

- its biological safety is superior to that of other living ND vaccine strains such as B1 or La Sota (Anon. 1991).



Figure 8: Vaccinating a village chicken with NDV4-HR vaccine in East Timor.

FAO recommends this vaccine for the control of Newcastle disease in village chickens in tropical countries and developing countries as a means of improving the food security of rural communities (FAO 1997).

The NDV4-HR vaccine is a commercial vaccine and can be purchased when foreign exchange is available. It is available in both 100 and 1,000 dose vials. The

Malaysian Vaccines and Pharmaceuticals Company has produced over 48 million doses of NDV4-HR vaccine and have supplied it to ten other countries in Asia and Africa. The newly independent nation of Timor-Leste (East Timor) has been using one and a half million doses of NDV4-HR annually and has distributed 4,000 eye-droppers to farmers and field staff trained in the control of ND in village chickens.

I-2 ND vaccine

The Australian Centre for International Agricultural Research (ACIAR) commissioned workers at the John Francis Virus Laboratory in the University of Queensland to produce a seed virus similar to NDV4-HR that could be made available to laboratories in developing countries (Bensink and Spradbrow 1999). Forty-five isolates of avirulent ND virus were examined for antigenicity, safety and ability to

spread. The most promising of these isolates were checked for their thermostability and the more resistant isolates selected for enhanced heat resistance. The result was strain I-2, which was amplified in eggs from a disease-free flock to form a master seed. The seed was tested for safety and for freedom from bacterial contamination.

Strain I-2 underwent laboratory and field trials in Viet Nam in collaboration with the National Veterinary Company (NAVETCO) in Ho Chi Minh City and was found to be protective against local virulent strains of ND virus (Tu et al. 1998). In Viet Nam it has been officially recognized as the ND vaccine for use in village chickens. By 2000, NAVETCO was producing 10 million doses of I-2 ND vaccine a year. Community-based animal health projects in Cambodia have successfully used I-2 ND vaccine imported from Viet Nam. In Bhutan,



Figure 9: After in-country testing, locally produced I-2 ND vaccine and an extension package was launched by the Honorable Minister for Agriculture, Dr Lyonpo Kinzang Dorji in May 2001.



the I-2 ND vaccine has been registered as the ND vaccine for village chickens, following successful local laboratory and village trials (Chamling Rai et al. 2002). The FAO supported the introduction of the local production of I-2 ND vaccine in Myanmar in 1998 and by 2001 26 million doses of the vaccine had been produced and administered to village chickens. A project sponsored by the European Union supported the introduction of local production of the I-2 ND vaccine in Lao PDR in 2002.

Research has shown that ND vaccine of acceptable standard for use in village chickens can be produced from strain I-2 in central laboratories. The vaccine can be produced in eggs that are not specific-pathogen-free, but which come from a minimum disease flock that is regularly screened for key poultry diseases (such as pullorum disease). It can be produced and stored in liquid form, and suitably diluted in a protective solution such as 1% gelatin (in which the vaccine will maintain its activity for at least 12 weeks at 22°C; Bensink and Spradbrow 1999) before use. The I-2 ND vaccine produced in freeze-dried form will maintain its activity for eight weeks when stored below 30°C (Table 2). The thermotolerant vaccine is best administered via eye drop (Alders and Spradbrow 2001). A detailed guide to the production and quality control of I-2 ND vaccine for use in village chickens is available from ACIAR (Young et al. 2003).

Impact of Newcastle disease control on rural livelihoods

ND control in village chickens promotes sustainable livelihoods in rural areas in several ways. Village chickens are the livestock most likely to be raised by poor households. Household food security and income generation is increased with increased chicken numbers. Compared to ruminant species, chickens are more likely to be consumed, or to be sold to resolve immediate family needs such as medicines or school fees.



Table 2: Comparison of wet and freeze-dried I-2 ND vaccine production (Young et al. 2003).

	<i>Wet I-2 Vaccine</i>	<i>Freeze-dried I-2 Vaccine</i>
Staff training	Training in small scale I-2 vaccine production and quality control recommended	Training in small scale I-2 vaccine production and quality control recommended; trained staff required to operate and maintain freeze drier
Equipment	Cheap to produce – no specialised equipment needed	Expensive equipment needed to freeze dry vaccine
Vaccine containers	A range of 'virus friendly' containers may be used, including glass and plastic containers	Glass vials, caps and seals are costly and limit cost-effective minimum dose format
Storage space	Requires greater amount of storage space	Less storage space required
Storage time at 4°C	Wet vaccine may be stored for only 8 weeks at 4°C with no significant drop in titre*	May be stored for over 12 months at 4°C with no significant drop in titre [#]
Cold chain	More stringent and far-reaching cold chain needed – wet vaccine may be stored for up to 2 weeks at 28°C*	Less stringent and far-reaching cold chain needed – freeze-dried vaccine may be stored for up to 8 weeks at 28°C with no significant drop in titre [#]
Ease of use	Ready to use – no dilution required in the field	Dilution required in the field

* depends on the dilution and diluent

[#] depends on the stabiliser

The community as a whole also gains as the collective financial reserves of the community increase as the number of chickens increases. As the number of chickens vaccinated against ND increases, the outbreaks of ND in villages decrease (Table 3). Community benefits will be further increased if some community members become chicken traders supplying local chickens to markets beyond their immediate vicinity.

Urban communities also gain from increased numbers of village chickens. If mortalities among chickens purchased by traders decrease and the number of chickens available for purchase increases, the unit



Table 3: Mortality rates in flocks before and six months after vaccination with I-2 ND vaccine in Dong Thap Viet Nam.

<i>District</i>	<i>Mortality rates in flocks (%)</i>	
	<i>Before vaccination</i>	<i>6 months after ND vaccination</i>
Hong Ngu	65.0	17.1
Tan Hong	60.0	18.0
Tam Nong	50.0	20.0
Thanh Binh	40.0	5.8
Thap Muoi	80.0	30.4
Than Hung	86.0	7.1
Lai Vung	85.0	11.0
Chou Than	65.0	11.5
Sa Dec Town	35.0	9.2
Cao Lanh Town	70.0	23.3

sale price of chickens should decrease. The chicken farmer will sell more birds and so make more money than was possible prior to the introduction of ND vaccination and the number of urban consumers who can afford to purchase chickens will increase as the unit sale price decreases.

The gains for local people in cases where the ND vaccine is locally produced are many. The equipment required to produce the vaccine is almost identical to that required for quality control procedures. Therefore, quality control of ND and some other vaccines can be done before vaccines are dispatched to the field. Employment is provided for local staff and the knowledge required for production of vaccine of a quality suitable for use in village chickens is held in the country. Most of the costs associated with local production stay in the country as only some of the inputs need to be imported. The instructions that accompany the vaccine are produced in the national language making them accessible to more people in countries where English is not spoken. Those responsible for the local production of the vaccine are more likely to ensure that the product is of an adequate quality if control activities are implemented in a participatory fashion.



When the service or product provider is directly answerable to the client, work is usually of a higher quality.

Extension and veterinary services gain increased prestige and more work when ND control activities are successfully implemented. As noted by Bagnol (2001), most mixed farmers seek to increase the number of livestock species that they raise when surplus numbers of chickens permit such purchases.

V. SECRETS OF SUCCESS

Over the years, it became apparent that to make ND control activities sustainable attention had to be given to social and economic aspects of the work. 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. Experience has shown that a sustainable ND control program is composed of four essential components (Alders et al. 2001):

- an appropriate vaccine and vaccine technology;
- 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; and
- and economic sustainability based on the commercialisation of the vaccine and vaccination services and the marketing of surplus chickens and eggs. (Figure 10)

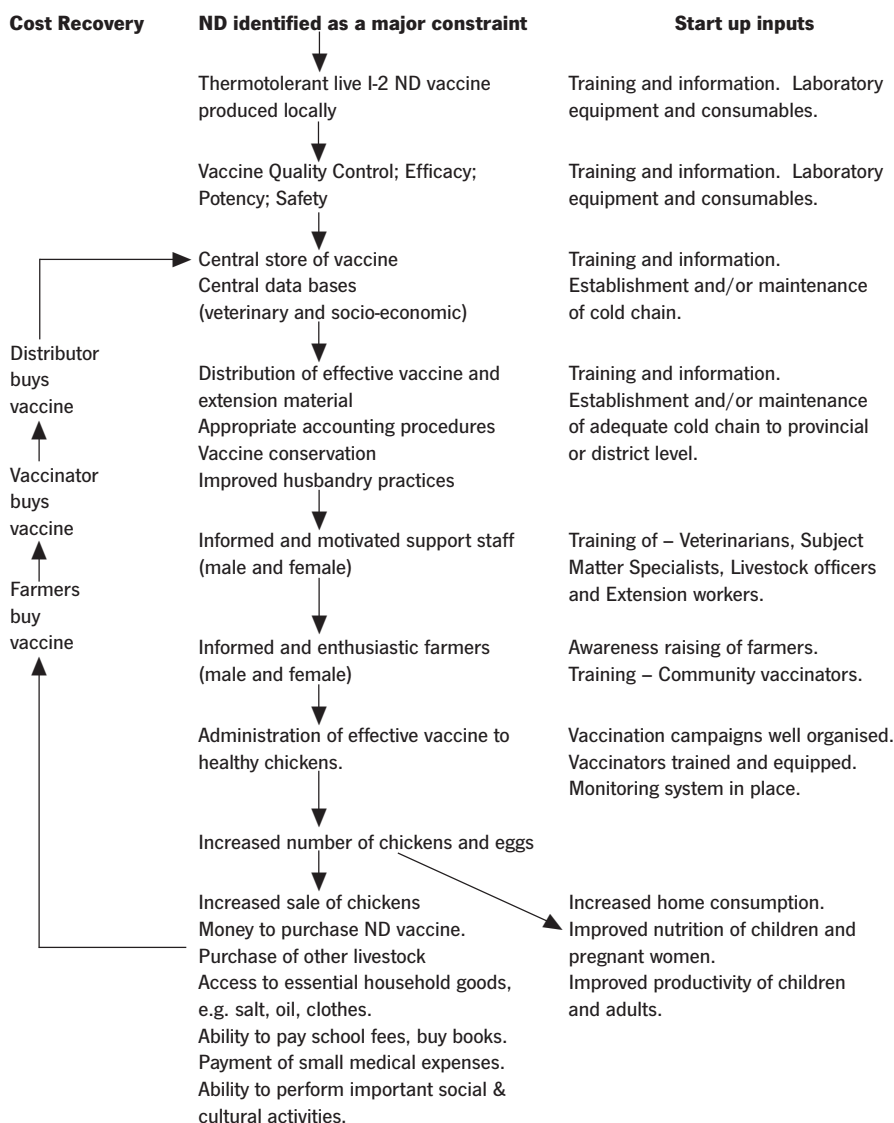


Figure 10: Components and desired results of a sustainable ND control program in village chickens.¹

¹ Adapted from Alders, R.G., Spradbrow, P.B., Young, M.P., Mata, B.V., Meers, J., Lobo, Q.J.P. and Copland, J.W. 2001. Improving rural livelihoods through sustainable Newcastle disease control in village chickens. Proceedings of the 10th International Conference of the Association of Institutions for Tropical Veterinary Medicine, 20-23 August 2001, Copenhagen.

Gender and social aspects of Newcastle disease control

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 with regards to village chicken production and 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. Table 4 shows the disaggregation of tasks associated with village poultry production formulated at a workshop in Cambodia.

Table 4: Disaggregation by gender and age of tasks associated with village chicken production in Cambodia.

Task	Man	Woman	Boy	Girl
Feeding chickens		X	X	X
Construction of chicken house	X			
Catching chickens	X		X	
Who should be informed about the need to catch chickens		X		
Selling chickens		X		
Deciding when to sell chickens	X	X?		
Deciding whether to vaccinate chickens	X	X		
Deciding when to eat chickens	X	X		
Eating chicken	X	X		
Eating eggs			X (rarely)	X (rarely)

In many Asian countries, women usually tend and sell smaller animals, such as pigs, chickens and ducks, which are kept near to the house. Consequently, much of the extension activities developed for small livestock should be based on methodologies that will facilitate the participation of women.



Gorman (1999) made a series of recommendations regarding the training of women in Cambodia:

- training sessions should be done in short, regular bursts and not run for the entire day and should be located in the village rather than at provincial training centres;
- training methodologies must take into account the high levels of illiteracy among rural women. Some organisations use visual aids for training, but this type of methodology is more difficult for veterinary training, which involves recording medicines and dosages;
- information imparted in short training sessions over a longer time period is more easily remembered;
- When new information is introduced which relates specifically to women's areas of work, it is particularly important to ensure that women are given control over this information. Veterinary training is one such area, because women are responsible for small livestock. Where this training and information is provided to men, there is a risk that women will lose control over areas formerly considered female;
- Female extension workers are important role models and increase women's self-esteem and the awareness that women are intelligent, particularly when they approach village women on the same level, and not as alien city women. Female extension workers are a significant influence on the participation of women in extension and support activities. Field workers noted that female extension workers managed to work effectively in a way that still allowed them to behave in a manner considered appropriate for women. In this way, they were respected and listened to by all members of the community;



- The number of female extension workers should be increased. The lack of female extension workers is a tremendous setback. The numbers of women currently in agricultural higher education institutions is low, and has decreased in recent years.

Extension and training material developed

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 adapted for use in other countries:

- **A ND field manual** – a 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 2001).
- **A ND training manual** – a 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, dos Anjos, Bagnol, Fumo, Mata and Young 2002).

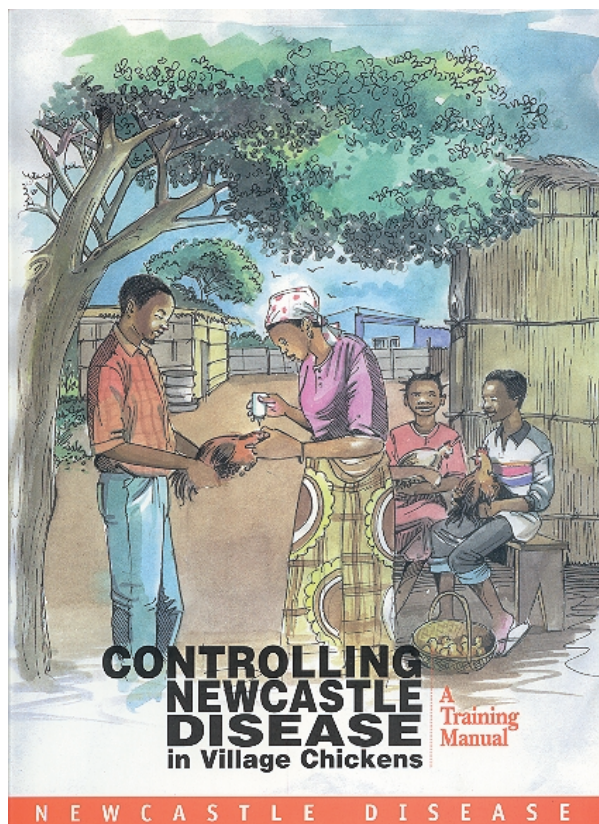


Figure 11: ND training manual cover.

- **A ND laboratory manual** – details the small-scale production and quality control of live, thermotolerant ND vaccine (Young, Alders, Grimes, Spradbrow, Dias, da Silva and Lobo 2003).
- **A flip chart** – an illustrated A3 flip chart, with clear, largely self-explanatory line drawings and an accompanying narrative. It 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.

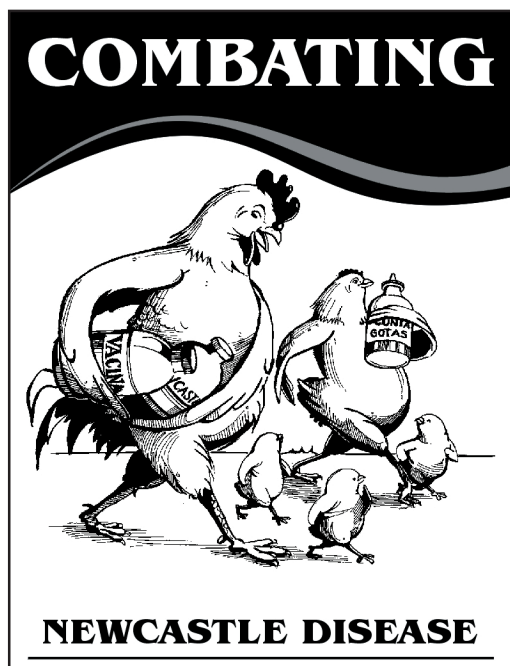


Figure 12: The title page of the ND control illustrative flip chart.

- **A poster** – consists of a large black and white line drawing of a rooster, ND vaccine vials and an eye-dropper. The poster provides space for the local vaccinator to write the place, date, time and contact person for the next ND vaccination campaign.
- **A pamphlet** – provides an introduction to ND and its control. It is printed on both sides of an A4 sheet and is easily reproduced. It is useful for front line extension staff, literate farmers, farmers' associations and school children.
- **A ND vaccination calendar** – this calendar highlights the months in which vaccination campaigns should be implemented, prompts vaccinators to get their orders for vaccine in well before the campaign begins and reminds distributors when they should have the vaccine in stock.



The majority of these items can be downloaded from the village poultry website (<http://www.vsap.uq.edu.au/RuralPoultry>) sponsored by ACIAR and AusAID and managed by the University of Queensland and GRM International.

Conferences and workshops held in the Asia-Pacific Region

Date:	16 – 20 March 1987
International Workshop:	Newcastle Disease in Poultry: A new food pellet vaccine.
Location:	Universiti Pertanian Malaysia, Malaysia
Target group:	International Experts involved with village chicken research and development.
Sponsor:	ACIAR
Date:	6 – 10 October 1991
Location:	Kuala Lumpur, Malaysia
International Workshop:	Newcastle Disease in Village Chickens: Control with Thermotolerant Oral Vaccines
Target group:	International Experts involved with village chicken research and development.
Sponsor:	ACIAR
Date:	29 September – 6 October 1998
Location:	Central Vaccine Production Laboratory, Yangon, Myanmar.
Laboratory Workshop:	Small-scale Production and Quality Control of I-2 ND vaccine.
Target group:	Laboratory technicians and supervising officers.
Sponsor:	FAO
Date:	30 September – 2 October 1998
Location:	Livestock Breeding and Veterinary Department, Yangon, Myanmar.
Extension Workshop:	Extension and administration programs for the control of ND in village chickens in Myanmar.
Target group:	Laboratory technicians and supervising officers.
Sponsor:	FAO



Date: 24 June – 2 July 1999
Location: Central Veterinary Laboratory, Department of Animal Health and Production, Ministry of Food, Forestry and Fisheries, Phnom Penh, Cambodia
Laboratory Workshop: Small-scale Production and Quality Control of I-2 ND vaccine.
Target group: Laboratory technicians and supervising officers.
Sponsor: FAO



Figure 13: Cambodian laboratory technicians learning about the production and quality control of live, thermotolerant vaccine.

Date: 29 June – 2 July 1999
Location: Department of Animal Health and Production, Ministry of Food, Forestry and Fisheries, Phnom Penh, Cambodia
Laboratory Workshop: Extension programs for the control of ND in village chickens in Cambodia.
Target group: Field extension agents and veterinarians and supervising officers.
Sponsor: FAO



Figure 14: Cambodian veterinarians and extension workers planning ND control activities in rural areas during a training workshop in Phnom Penh.

Date:	25 September – 2 October 1999
Location:	Vaccine Production Centre, Serbithang, Bhutan
Laboratory Workshop:	Small-scale Production and Quality Control of I-2 ND vaccine.
Target group:	Laboratory technicians and supervising officers.
Sponsor:	AusAID
Date:	27 – 30 September 1999
Location:	Royal Veterinary Epidemiology Centre, Serbithang, Bhutan
Extension Workshop:	Extension programs for the control of ND in village chickens in Bhutan.
Target group:	Field extension agents and veterinarians and supervising officers.
Sponsor:	AusAID



Figure 15: I-2 ND vaccine is administered to a chicken during a training workshop in Serbithang, Bhutan.

Date:	25 February – 1 March 2002
Location:	Dong Thap Province, Viet Nam
Extension Workshop:	Extension programs for the control of ND in village chickens in Viet Nam.
Target group:	Farmers, women's organizations, field extension agents and veterinarians and supervising officers.
Sponsors:	AusAID and NAVETCO (Ho Chi Minh City)
Date:	6 – 10 October 2002
Location:	Gold Coast, Queensland, Australia
International Conference:	Family Poultry Farming Sessions of the 7 th WPSA Asian Pacific Federation Conference.
Target group:	International Experts involved with village poultry research and development.
Sponsors:	AusAID, Cobb Breeding Company and many others.



Proposed Date:	April 2003
Location:	Vientiane, Lao PDR
Laboratory Workshop:	Small-scale Production and Quality Control of I-2 ND vaccine.
Target group:	Laboratory technicians and supervising officers.
Sponsors:	European Union
Proposed Date:	October 2003
Location:	Central Vaccine Production Laboratory, Yangon, Myanmar
Laboratory Workshop:	Refresher course on I-2 ND vaccine production and quality control.
Target group:	Laboratory technicians and supervising officers.
Sponsors:	ACIAR

VI. COLLABORATION AND COORDINATION

Improving the production of village chickens in a sustainable manner is an ongoing challenge. Gains will be made more swiftly if information and experiences are shared between those involved in research and development with village poultry. The section below outlines a number of networks and enterprises involved with village poultry R and D.

Householder Poultry Enterprise in Asia (HOPE-A)

HOPE-A is designed to assist and encourage village poultry production in Asia including intensification if the conditions are right, with the aim of assuring food security and income generating in case of surplus production, benefiting the rural poor, especially woman and children.

HOPE-A was established as a sub-commission of the Animal Production and Health Commission for Asia and the Pacific (APHCA), as an initiative of the members at their 25th Anniversary Session held in Bangladesh in November 2000.



The objectives of APHCA have always included the development of livestock as an integral part of agriculture. The strategy for achieving this goal has been founded on collective self-reliance and mutual assistance between the developing countries, and this successful model will be followed with **HOPE-A**.

HOPE-A will therefore be an active enterprise, of and for APHCA member countries with the specific aims of:

- promoting joint action, cooperation, coordination and information exchange among the members for better householder poultry production;
- overcoming existing constraints to householder poultry production in Asia to the extent achievable;
- developing appropriate agricultural education and research that relates to Asian householder poultry systems;
- seeking cooperation and assistance from relevant UN and other international and intergovernmental organizations to help implement **HOPE-A** activities;
- carrying out the above functions so as to raise the output and income of farmers, by developing profitable village poultry production.

For **HOPE-A**, poultry production assistance has a broad meaning. It includes research, development, extension, training and support activities relevant to the production, marketing and management of village poultry in Asia.

HOPE-A does not directly undertake all the above-mentioned activities but commissions groups in Asia such as private, public and non-governmental organizations and individuals to carry out this work under umbrella partnership agreements.



HOPE-A, as a legitimate sub-commission of APHCA, operates within the framework of the APHCA constitution, established 25 year ago, which stipulates management by the members and annual international audit of accounts. APHCA presently consists of 15 member countries; Australia, Bangladesh, Bhutan, India, Indonesia, Iran, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, and Thailand. Any country, which is a member of FAO, can easily join APHCA and therefore become a part of **HOPE-A** by requesting membership in writing, and acknowledging the existence of and willingness to follow the articles of APHCA.

More details about HOPE-A can be found on the internet at:
http://www.aphca.org/hope_a/HOPE_A.htm.

Rural Poultry in Developing Countries Website

This rural poultry website was developed by staff of the School of Veterinary Science at the University of Queensland and is funded by the Australian Centre for International Agricultural Research and the Australian Agency for International Development. It aims to provide a resource for farmers and workers from research and diagnostic laboratories, extension services, non-government organizations and development agencies. A quarterly electronic newsletter is sent out to those registered on the site. The website provides a forum for the exchange of information and ideas about rural poultry. The website address is: <http://www.vsap.uq.edu.au/ruralpoultry>.

The International Network for Family Poultry Development (INFPD)

This network is an independent voluntary network funded by the FAO and administered by a seven-member Executive Committee. Members include researchers, policy makers, educators, staff of



development agencies, aid donors and smallholder farmers. The objectives of INFPD are the promotion of:

1. The documentation of training programmes for research and development personnel;
2. The coordination of training programmes for research and development personnel;
3. The identification of research and development priorities, funding sources and cooperation opportunities; and
4. The development of research and development protocols.

Further details about INFPD may be found on the internet at: <http://www.fao.org/ag/aga/agap/lpa/fampo1/fampo.htm>.

Danish Network for Smallholder Poultry Development

This network is a collaboration between the Royal Veterinary and Agricultural University of Copenhagen, the Danish Institute of Agricultural Sciences, the University of Copenhagen and the University of Aarhus. It offers services in research, education and project support. It has a homepage at: <http://www.poultry.kvl.dk>.

VII. EPILOGUE/LOOKING AHEAD

The research supported by ACIAR has demonstrated that ND can be controlled in village chickens. Successful ND control programs will make a vital contribution to the improvement of household food security and poverty alleviation in many developing countries. To ensure that these control activities are sustainable all those involved, – both the public and private sectors – must be committed to the program.



ND control activities will often be the first step in the process of ongoing improvement of village chicken production. The marketing of village chickens will also be an important area and one that is likely to be quite lucrative as consumers increasingly seek out products that are free of hormonal and antibiotic residues.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the assistance provided by Dr Anil Bawa of APAARI, Dr John Copland of ACIAR, Dr Denis Hoffmann of FAO Bangkok, and Emeritus Professor Peter Spradbrow and Dr Joanne Meers of the University of Queensland. Thanks also go to colleagues and farmers in Bhutan, Cambodia, Lao PDR, Malaysia, Myanmar, Timor-Leste (East Timor) and Viet Nam for their willingness to share their knowledge and experiences.

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Appendix 1:

Institutions involved Newcastle Disease Research and Development in the Asia-Pacific Region

Australia

Australian Animal Health Laboratory
P.O. Bag 24
Geelong, Victoria 3220

Elizabeth Macarthur Agricultural Institute
NSW Department of Agriculture and Fisheries
Private Mail Bag 8
Camden NSW 2570

Faculty of Natural Resources, Agriculture and Veterinary Science
St Lucia Campus
Seddon Building
University of Queensland
St Lucia Qld 4072

Bangladesh

Department of Pathology
Faculty of Veterinary Medicine
Bangladesh Agricultural University
Mymensingh 2202

Bhutan

Royal Veterinary Epidemiology Centre
Serbithang

Cambodia

National Veterinary Diagnostic Laboratory
Department of Animal Health and Production
Ministry of Food, Forestry and Fisheries



No. 7 Monivong Blvd
Sangkat Srah Chak, Khan Doun Penh
Phnom Penh

Timor-Leste (East Timor)

Livestock Section
Ministry of Agriculture, Forestry and Fisheries
Fomento Building
Dili

India

Tamilnadu Veterinary and Animal Sciences University
Madhavaram
Chennai – 600 051
Tamil Nadu

Indonesia

Central Research Institute for Animal Sciences
Jl. Raya Pajajaran
Bogor 16151

Department of Parasitology and Pathology
Faculty of Veterinary Medicine
Bogor Agricultural University
Bogor

Lao PDR

Veterinary Vaccine Production Centre
P.O. Box 1298
Vientiane

Dept of Livestock and Fisheries
P.O. Box 8330
Vientiane



Malaysia

Faculty of Veterinary Medicine and Animal Science
Universiti Pertanian Malaysia
43400 UPM Serdang
Selangor

Malaysian Vaccines and Pharmaceuticals Sdn Bhd
Malaysian Technology Development Corporation Sdn Berhad
Block Grana
UKM-NTDC Smart Technology Centre
43600 Bangi
Selangor Darul Ehsan

Myanmar

Disease Diagnosis and Control Section
Livestock Breeding and Veterinary Department
Insein
Yangon

Nepal

Department of Livestock Services
Kathmandu

Pakistan

Poultry Vaccine Production Centre
Animal Science Complex
Korgani
Karachi – 14

Philippines

Bureau of Animal Industry
Diliman
Quezon City



Sri Lanka

Veterinary Research Institute
Gannoruwa
Peradeniya

Thailand

National Animal Health and Production Institute
Central Kaset
Bangken
Bangkok 10900

Viet Nam

Veterinary Research Centre
Ho Chi Minh City

National Veterinary Company
29 Nguyen Dinh Chieu Street
District 1
Ho Chi Minh City

Department of Animal Health
Phuong Mai – Dong Da,
Ha Noi



Appendix 2: Sources of live, thermotolerant Newcastle disease vaccine

NDV4-HR Vaccine

Malaysian Vaccines and Pharmaceuticals Sdn. Bhd.
Block Grana
UKM-MTDC Smart Technology Centre
43600 Bangi
Selangor Darul Ehsan
Malaysia
Tel: +60-3-8922 3506, 8061 5701
Fax: +60-3-8922 3503, 8061 2557
Website: www.mvp.com.my

I-2 ND Vaccine Master Seed

Dr John Copland
Australian Centre for International Agricultural Research
GPO Box 1571
Canberra ACT 2601
Australia
E-mail: copland@aci-ar.gov.au
Website: <http://www.aci-ar.gov.au>