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## A scoping study investigating opportunities for improving biosecurity on commercial poultry farms in Indonesia

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## 1 Acknowledgments

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## 2 Executive summary

Drs Ian Patrick and Tristan Jubb conducted an ACIAR-contracted scoping study in Indonesia from 2-16 September, 2007 with the aim of determining the level of economic, social and technical incentives that existed for commercial poultry farmers to take responsibility for poultry disease control in their communities. The imperative to do this is HPAI, now endemic in 31 of the 33 Indonesian provinces and responsible for the deaths of more than 100 humans and millions of poultry. While the Gol has implemented HPAI control programs supported by regulations, it is the commonly held view that HPAI and other poultry diseases will continue to reduce profitability, increase poverty and cause human mortalities unless there is community-level ownership of responsibility for biosecurity and its implementation. The specific objectives of the scoping study were to:

1. Provide a definition and overview of the non-integrated commercial poultry sector (within Sectors 2 and 3).
2. Identify the main factors influencing the economic and social sustainability of the non-integrated commercial poultry sector.
3. Provide an overview of research needs for this non-integrated commercial poultry sector, with particular reference to appropriate technologies and management practices that could be implemented to improve biosecurity in this sector.
4. Identify the key private and public stakeholders (this will include producers, consumers, input suppliers and other support services) that will be involved in the research and technology adoption process.
5. Evaluate the possibility of a research delivery approach that includes all poultry industry stakeholders.

This report introduces the term non-industrial commercial poultry sector (NICPS). It is defined as the commercial poultry farming sector not owned by the eight large, industrial poultry companies. This sector consists of layer and broiler farms ranging from small semi-commercial independent producers (500 birds) with low or negligible biosecurity to large integrated operations (100,000 birds) with good biosecurity systems in place. While there is significant work being undertaken to minimise HPAI incidence in Sector 4, there is concern from the Gol that the NICPS is also a potential distributor and, therefore, a sector that may play a role in the continued spread of HPAI. There is a significant market for broilers and eggs for both consumption and ceremonial purposes and there is also significant overlap with product between sectors particularly post farm-gate. The Gol understands that the need to improve biosecurity on farm and post farm gate cannot be driven solely by government through regulation.

The structure of the marketing chain, particularly post farm-gate, ensures that there are inadequate private incentives within the poultry industry to control HPAI. There needs to be a commercially-driven imperative for this high risk sector to take responsibility for disease control (including, but not limited to HPAI). At present there is not sufficient market or community-led incentive to adequately control HPAI in Indonesia. It is not

regarded as the major poultry disease and individual farmers are not prepared to invest in infrastructure and management changes that do not have a proven direct benefit to their farming operations. The main production drivers at present are increasing demand for broilers and eggs to be produced at low cost, increasing feed and other input costs, continued demand for *kampung* chicken for consumption and social purposes and lack of market chain and institutional incentives to control HPAI.

The key stakeholders in the poultry sector are the farmers, private sector (Sector 1 contractors, input suppliers), post farm-gate buyers and processors, government and consumers. Any attempt to improve biosecurity in this important, at-risk, sector will require ownership by these stakeholders.

The scoping study found considerable potential to develop incentives in poultry farming communities, which with the support of industry, might drive improved disease control through improved biosecurity. A proposal outlining how government at national and provincial levels, and industry and farmer associations could work together to achieve this was developed as ACIAR project (AH/2006/169). The development of cost-effective biosecurity measures appropriate for NICPS farms is the most important researchable issue identified by this scoping study. The key elements of the proposed project are;

*A whole of industry approach.* For HPAI control there needs to be an economic imperative for the private sector and the farmers to invest in biosecurity. This project will place a special and unique emphasis on integrating the project into the private sector. Successful adoption of least-cost biosecurity measures in the NICPS depends on the support and input of the entire poultry industry.

*A community approach* will be used to implement project outcomes in three case-study areas. The project will not just provide policy advice and recommendations but will learn about adoption successes and failures through actual within-community adoption. The project will target three locations (one each in Bali, South Sulawesi and West Java) and concentrate on developing and implementing a whole of industry framework or model that can be tested and refined and, after project completion, be used in other locations throughout Indonesia and potentially throughout South-East Asia.

*A whole market-chain approach* will ensure that the adoption of cost-effective biosecurity measures is appropriate given the cultural and institutional characteristics of the poultry market. The project will work with all stakeholders in the industry to define and implement improvements to particular institutional constraints such as post farm-gate marketing systems.

It is believed that this integration of the project into the industry will maximise the possibility of attaining the objective of a biosecure NICPS. The research will determine cost-effective biosecurity measures in partnership with industry, government and universities. This adaptive research approach which culminates in training of private and public animal health staff and adoption of appropriate interventions is the recommended approach agreed to by all stakeholders.

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### 3 HPAI in Indonesia

HPAI first entered Indonesia in 2003 and is now endemic in 31 of its 33 provinces. It has the potential to cause significant economic loss for the producer (by reduction in income and protein), consumer (by higher prices) and service provider (by decreased demand). It has broader provincial and national level effects caused by increasing trade restrictions and demand for aid. There is also the continuing risk of a global pandemic (240 million Indonesians live closely with, and have close social and cultural ties with, birds), and the risk of HPAI entering Australia (by geographic proximity and close trade and tourist links). HPAI has been responsible for the deaths of over 100 people in Indonesia.

In Indonesia, the poultry industry employs over 10 million people and has an annual turnover of US\$30 billion. There is a total of US\$35 billion invested in the industry and

13,000 poultry markets are held daily. The economic loss caused by HPAI has been estimated at \$1 billion<sup>1</sup>. In a World Bank report<sup>2</sup>, it was estimated that direct costs in Indonesia could amount to 0.2% of Indonesia's GDP of US\$300 billion. Official GoI estimates in 2006 put the number of commercial poultry dying and culled since 2003 as 11 and 7 million, respectively. This equates to direct losses of up to US\$36 million and doesn't take into account losses in village poultry. An FAO report<sup>3</sup> of 2005 mentions a 45-60% drop in demand for day old chicks, plus drops in feed demand and a reduction in employment of over one-third in the poultry industry. The GoI has invested over US\$24 million since 2006 in combating the disease in poultry. The combined contribution of donor organizations for HPAI control in poultry since 2003 has been estimated at US\$100 million.

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## 4 Poultry industry in Indonesia

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### 4.1 The farm sector

The Indonesian poultry industry has been categorised into four sectors (FAO, 2005) and are the definitions used in this proposal. There are other definitions used by DGLS and drug companies which are based on slightly different criteria. However, it appears that the FAO definition, while still not perfect is becoming more universally accepted.

**Sector 1** is comprised of farms owned and managed by the eight large multinational corporately-owned companies operating in Indonesia which produce a highly valued product with complete control over inputs and outputs. The farms are known collectively as the *industrial* farms.

**Sector 2** are the breeding farms, some but not all of which are *industrial* farms. The industrial breeding farms are included in Sector 2 along with those breeding farms not owned and managed by the multinational companies, because as breeding farms they require special licensing and management.

**Sector 3** is predominantly the small commercial producers, with broiler farms either contracted to Sector 1 companies or working with 'local integrators', while the layer farms are generally independently owned and managed.

**Sector 4** is the village, or *kampung*, chicken sector.

This report (and the ensuing project) introduces the term non-industrial commercial poultry sector (NICPS). It is defined as the commercial poultry farming sector not owned by the eight large, industrial poultry companies. This sector consists of layer and broiler farms ranging from small semi-commercial independent producers (500 birds) with low or negligible biosecurity to large integrated operations (100,000 birds) with good biosecurity systems in place. The reason that this term is used in this scoping study is due to the significant overlap between Sectors 2 and 3 farms. While some farms may be involved in breeding (hence Sector 2) with regard to all other characteristics (size, quality of building materials, biosecurity) they are the same as Sector 3 farms.

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<sup>1</sup> 3.040CR ACIAR: *The epidemiology, pathogenesis and control of highly pathogenic avian influenza in ducks in Indonesia and Vietnam*. Retrieved 11 July 2007 from <http://www1.abcrc.org.au/pages/project.aspx?projectid=117>

<sup>2</sup> [EAP Half-Yearly Update - East Asia Update - November 2005](http://www.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTA). Spread of avian flu could affect next year's economic outlook. Executive Summary The Economic Impact of Avian Flu. [web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTA](http://www.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTA)

<sup>3</sup> <http://www.fao.org/avianflu/en/impact.html>. *Economic and social impacts of avian influenza*. Anni McLeod, Nancy Morgan, Adam Prakash, Jan Hinrichs, FAO

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## 4.2 National level industry stakeholder groups

Any attempt to improve animal health management at the farm level requires concerted support from both the private and the public sector at the national and provincial levels. The following section identifies the important stakeholders at the national level, these are mirrored at the provincial level.

### 4.2.1 National level farmer associations

There are six major associations with influence within the poultry industry.

**Asosiasi Obat Hewan Indonesia – ASOHI** (Association of the Indonesian Poultry Drug and Vaccine Suppliers). This association represents 16 provincial branches, with the aim of coordinating the production and distribution to both the private and public sector. In Indonesia the Gol is a major purchaser of poultry drugs and vaccines which it uses in smallholder development programs and areas of public good.

**Gabungan Organisasi Peternak Ayam Nasional – GOPAN** (Association of the National Chicken Farmer Organizations). This is a politically active association that represents the demands of all poultry farmers, predominantly aimed at providing a voice in the policy debate for the Sector 3 farmers. It also represents 16 provincial/districts branches.

**Gabungan Perusahaan Makanan Ternak Indonesia – GPMT** (The Feed Miller's Association). Represents 40 feed mill companies.

**Gabungan Perusahaan Perunggasan Indonesia - GAPPI** (Association of the Indonesian Poultry Producers). This association represents the eight large companies which have over 70 per cent market share in the poultry industry in Indonesia. Most of these are integrated companies who also produce feed, distribute drugs and contract Sector 3 farmers. Hence GAPPI members have important roles in other associations.

**Gabungan Perusahaan Pembibitan Unggas – GPPU** (The Poultry Breeder Companies Association). This is the Sector 2 farmer association, principally responsible for breeding DOCs for both the broiler and the layer industries. They represent 90 large breeder companies.

**Pusat Informasi Pasar – PINSAR** (The Indonesian Poultry Market Information Centre). An association representing smallholder farmers predominantly by providing daily market advice. They have representatives in 16 provincial/districts branches.

### 4.2.2 FMPI

The *Forum Masyarakat Perunggassan Indonesia* (FMPI) is an umbrella organisation funded by the industry associations to ensure appropriate integration of all stakeholders. All the associations mentioned above are members of the FMPI under the Directorship of Mr Don Utoyo<sup>4</sup>.

As well as these associations there are also forum observers, they include; poultry and agribusiness magazines (Agrina, Poultry Indonesia, Trobos, Infovet), poultry wet market and outlet associations (PPUJ), the poultry processing association, researchers and academics. The FMPI is not only a forum for industry consultation but it is also the most effective means by which the industry can consult with government on policy and economic issues facing the industry. Mr Utoyo is, in fact, a retired Government official, hence with strong ties with all stakeholders. Activities of the FMPI include:

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<sup>4</sup> The leaders of all the poultry sector associations and the 2 major private integrated companies were consulted during the scoping study. These included Don Utoyo (Chairman, FMPI), Anton Supit (Chairman, GAPPI), Paulus Setiabudi (Chairman, UPPPI), Hartono (Chairman PINSAR), Tri Hadiyanto (Head GOPAN), Hadi Gunawan (Charoen Pokphand), Teguh Prajitno (JAPFA), Maureen Kalona-Kandou (Vaksindo).

1. Assisting the GoI to develop the Indonesia National Committee for HPAI Control and Pandemic Influenza Preparedness (KOMNAS FBPI) and being a partner on this committee.
2. Advise the Ministry of Agriculture (MoA) and DGLS with regard to livestock/poultry development policy and also for the Ministry of Health upon HPAI management policy.
3. Partner donor organisations such as FAO, USDA, United States Foreign Agency Services (US-FAS), United States Animal Public Health Information Agency (US-APHIS), World Health Organization (WHO), and other national and international agencies to ensure a consistent approach in developing the Indonesian poultry industry.

#### 4.2.3 Government

The GoI plays a vital role in disease management although this is being divested to a large extent to the provincial government level. With a disease such as HPAI, where the major concern is not predominantly poultry farmer profitability but rather the risk of pandemic, the government is required to play a major role. The GoI has established KOMNAS to define the national (human and animal health) response to HPAI. It has three priorities; communication, control at the source and integrated surveillance. In terms of the specific animal health response the MoA has established the Campaign Management Unit (CMU) to coordinate the response at the national level. They are also in the process of establishing Regional Management Units (RMUs) to coordinate HPAI control at the provincial level. This response includes identification of outbreaks and implementation of appropriate responses of slaughter and compensation.

The GoI also plays an active role in working with private industry to develop the poultry industry through providing extension assistance, vaccination programs and farmer group and market development. It is difficult to separate the roles and responsibilities of government from that of the private sector. Apart from ongoing extension programs the MoA is undertaking three major programs at present to control HPAI in Indonesia, these are;

- *Compartmentalisation*. This MoA program 'Compartmentalisation and zoning of poultry industry; 2008' aims to develop HPAI-free zones around Sector 1 and Sector 2 farms. Development of Good Farming Practice (GFP) and minimum standards in these Sectors will be useful and applicable to Sector 3 farms.
- The *National Strategic Work Plan for the Progressive Control of HPAI in Animals 2006-2008* has been developed, with FAO assistance. This plan has nine elements, one of them being - Poultry Industry Restructuring (no.9). Within this plan is a program to remove wet markets from Jakarta - the highest risk area for human cases of HPAI in Indonesia. There are 800,000 broilers slaughtered in Jakarta daily which is 30 per cent of the total number slaughtered in Indonesia. The closeness of poultry and human populations has seen the largest incidence of disease and human deaths from HPAI occur in this area and has caused the government to ban the keeping of household chickens in Jakarta.
- *Participatory Disease Surveillance and Response (PDSR)*. This is an expanding surveillance program which aims to use small local teams of trained government officers to detect early, outbreaks of disease and implement control measures. The program is predominantly funded by USAID and managed by FAO.

In terms of research there are various government institutions that assist with the technical and policy decision in the Indonesian poultry sector. These include the Indonesian Centre for Animal Research and Development (ICARD), Indonesian Research Institute for Veterinary Science (Balivet), Indonesian Research Institute for Animal Production (Balitnak), and the Indonesian Centre for Agro-socioeconomic and policy Studies (ICASEPS).

#### 4.2.4 Sector 1

There are eight major integrated poultry companies that have diverse interests and inter-relationships across the industry<sup>5</sup>. As well as being producers themselves they are also producers of feed, input distributors and Sector 3 contractors. The biggest two (CPI and JCI) along with government have the biggest influence. These companies are involved across the broiler marketing chain as far as the door of the slaughterhouse. There is a public perception that they may have monopoly power if they can control the entire marketing chain, so it is restricted by public pressure and government policy. These companies are concerned with disease and disease management but a lack of quality control post-farm gate limits their ability or desire to enforce biosecurity rules on their contractor farms. The fact that these companies supply only the domestic market also limits their ability to improve biosecurity. Unlike in Thailand, where the poultry industry was export orientated and hence demanding production from HPAI free areas, Indonesian producers are not market-driven to produce from clean areas.

The large integrated companies, as are farmers, are responding to the specific, institutional, economic and social constructs that underpin the Indonesian poultry industry. Changes to incentives structures and institutions will change the way that large companies and all stakeholders respond.

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### 4.3 The NICPS

#### 4.3.1 Size and distribution

The poultry population in Indonesia has been estimated from 275 million to 1.3 billion<sup>6</sup>. Estimates of the proportion of poultry in Sectors 3 and 4 also vary dramatically between sources<sup>7</sup>, ranging from 20 to 80% of total poultry numbers. Rushton *et al*<sup>8</sup> have provided sectoral poultry population estimates for Indonesia (Table 1), but there are also doubts concerning their accuracy (e.g. an average population of 222 birds in industrial integrated broiler farms). While providing 'best bet' estimates, they do admit that the only estimates that are likely to be relatively accurate are those provided for Sector 4.

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<sup>5</sup> They are; Charoen Pokphand Indonesia (CPI), Japfa Comfeed Indonesia (JCI), Wonokoyo, Sierad Produce (SP), Super Unggas Jaya (SUJ), Cibadak, Malindo-Leong, and Shinta.

<sup>6</sup> This does not take into account populations of fighting cocks, quail, racing pigeons and fancy birds.

<sup>7</sup> as do the definitions of sectors. The definitions of Sectors 3 and 4 are different in this table to the definitions used by FAO.

<sup>8</sup> Rushton J, Viscarra R, Guerne-Bleich E, Mcleod A. 2006. Impact of avian influenza outbreak in the poultry sectors of five South East Asia countries (Cambodia, Indonesia, Lao PDR, Thailand, Vietnam) outbreak costs responses and potential long term control. *World Poult. Sci. J.*, 61: 491-514. Retrieved 12 July 2007 from [http://www.hewsworld.org/downloads/avian\\_flu/docs/pdf/impacts.pdf](http://www.hewsworld.org/downloads/avian_flu/docs/pdf/impacts.pdf)

Table 1: Indonesian chicken population by production system (data from Rushton et al's analysis of CASERED, 2004; Ministry of Agriculture, Indonesia, 2004; Johnson et al, 1992).

	Nucleus	Number of farms	Population (million birds)	Average farm size
<b>Industrial Integrated (Sector 1)</b>				
Broiler	354	13,520	3.0	222
Layer	128	2,418	6.7	2,771
<b>Total</b>	<b>482</b>	<b>15,938</b>	<b>9.7</b>	<b>609</b>
<b>Commercial (Sector 2)</b>				
Broiler		45,934	38.3	834
Layer		37,707	19.9	528
<b>Total</b>		<b>83,641</b>	<b>58.2</b>	
<b>Other (Sector 3)**</b>			32.4	
<b>Backyard (Sector 4)</b>			175.0	
<b>Total</b>			<b>275.3</b>	

### 4.3.2 Commercial linkages

The broiler industry is becoming increasingly vertically integrated with Sector 1 companies dominating the market. Independent producers are being required to work together to maximise market access and access to inputs. 'Local integrators' (independent farmers or investors who contract other farmers) are becoming more prevalent but are also under pressure to maintain market share. Support sectors such as Sector 2 breeders and vaccine and drug companies are also becoming increasingly tied to Sector 1 companies. In terms of obtaining quality DOCs, the highest quality go to the Sector 1 farms, the next best to the Sector 1 contractors and the lowest quality to independent farmers.

This increasing integration within the broiler industry and increasing partnerships between Sector 1 and NICPS farmers are having positive impacts on the biosecurity of the NICPS farms and will lead to a more sustainable, 'clean' sector. While there may be some short term adjustment issues for farmers at the 'dirty' end of the sector, with industry support and increasing demand for clean, uniform quality poultry products, it is expected that there will be long-term smallholder, consumer and industry benefits. Vaccine and drug manufacturers such as *Vaksindo* are increasingly being required to develop linkages with Sector 1 companies. While 10 years ago they were selling 80 per cent of the product to independent producers, it is now down to 30 per cent. They are developing formal linkages with distributors such as *Prima Findu* (a CPI subsidiary) who distribute to Sector 3 farms. *Vaksindo* are also beginning to provide loyalty benefits and credit notes to preferred customers. They also run management seminars mainly through the local integrators and employ their own veterinarians to provide advice to farmers and farmer groups. There is certainly a belief within the industry that the poultry sector is changing and becoming more commercial and more vertically integrated. It is expected that this trend will continue into the future. The poultry industry is the major employer of graduate veterinarians in Indonesia with approximately 6,000 employed in the private sector in 2007 (Hutabarat, per com, 2007).

### 4.3.3 Marketing chains

Figures 1-3 are schematic models of poultry marketing chains in Bali. From discussions with stakeholders it is clear that marketing of poultry does vary between provinces. In Bali, for example, Sector 1 companies purchase live birds from their contracted farms while in parts of Java there is a tendency to purchase dressed birds. This has significant implications for post-farm gate biosecurity.

Figure 1: Contract and non-contract broiler marketing chain

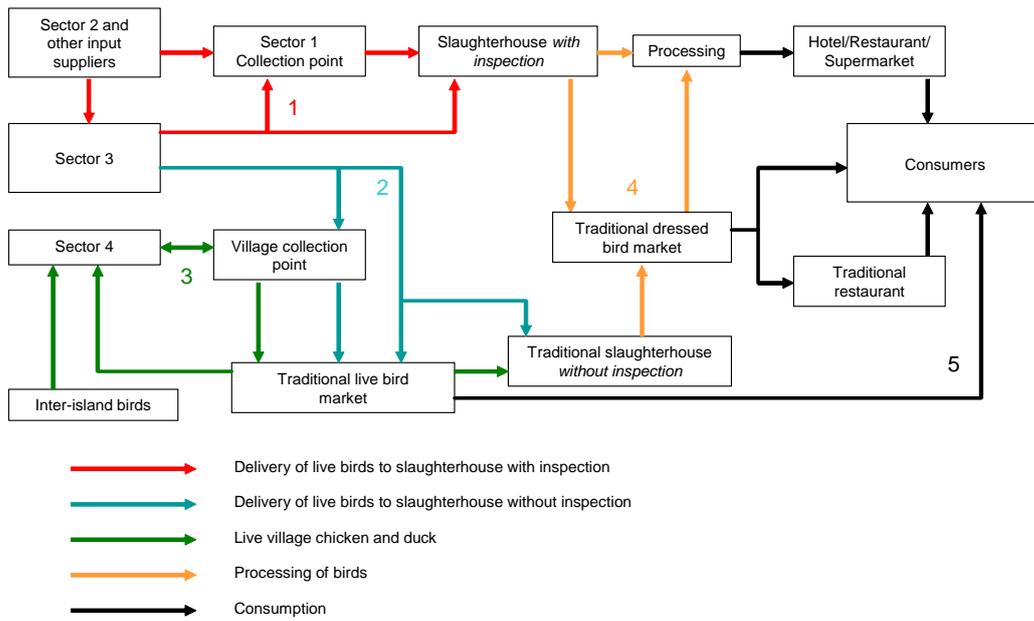


Figure 2: Layer, cull layer and cockerel marketing chain

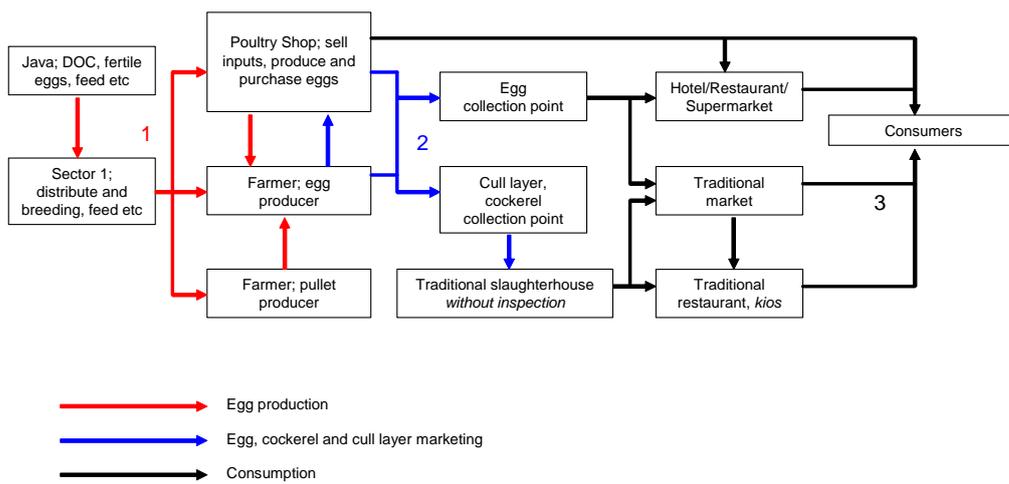
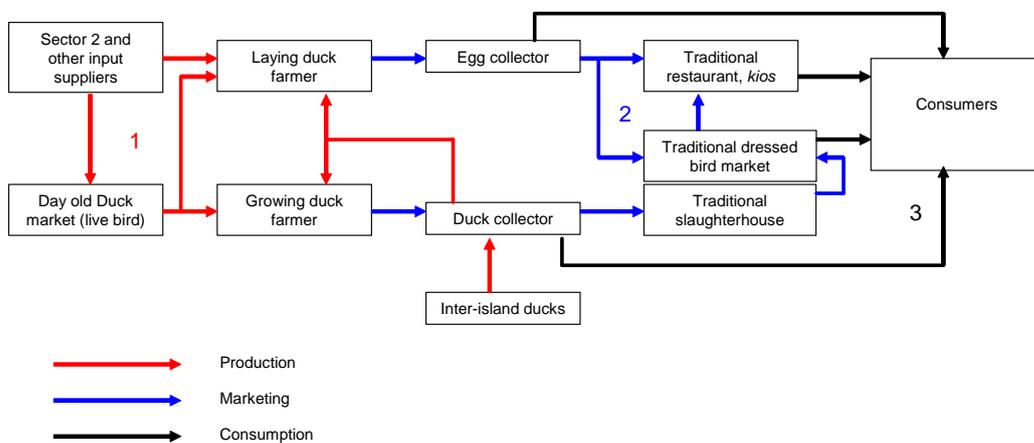


Figure 3: layer and meat duck marketing chain



Modelling these preliminary market chains has identified the detailed interrelationships between stakeholders in the industry. At the farm level there are a number of other market chain participants (Table 2) who play important roles in influencing the movement of live birds and hence the potential risk of disease. Their influence depends on the type of commodity being produced and the nature of the production systems (e.g. contract or non-contract). Any attempt to control HPAI in Indonesia will require a detailed understanding of the stakeholder relationships - if communities are to be responsible for improving their biosecurity it becomes especially important. For example minimising risk by bypassing collectors, while in theory would help, may well not be possible in the short-term. Control will need to engage and include all stakeholders in the marketing chain.

Table 2: Stakeholders in the poultry industry

	Broiler contract	Broiler non-contract	Layer Egg/Live bird	Chicken kampung	Duck commercial	Duck kampung
Companies	√	√	√		√	
Poultry shops		√	√	√		√
Contract producers	√				√	
Non-contract producers		√	√	√		√
Large collectors	√				√	
Small collectors		√	√	√	√	√
Sub-brokers			√	√		√
Live bird vendors	√	√	√	√	√	√
Slaughter house (Small)			√	√		√
Slaughter house (Medium)	√	√	√	√		
Slaughter house (Large)	√	√				
Carcass vendors		√	√	√	√	
Egg processors					√	√
Consumers – household	√	√	√	√	√	√
Consumers – commercial	√	√	√	√	√	√
Traditional healers					√	√

#### 4.3.4 Drivers

It is not possible to accurately determine the drivers of production and biosecurity in the NICPS throughout Indonesia. There is too much diversity between cultures, market opportunities, institution strength etc. The most important generalisation that can be made is that producers respond to the level of information they have, their perception of risks, cost structures, institutional environment and personal and community objectives. Production methods in the NICPS at present are being increasingly influenced by poultry health (including ND, Gumboro, HPAI and other disease issues), increasing costs of production (e.g. feed and fuel), seasonal shifts in demand, poor institutional support and social requirements for particular types of bird (especially in Bali).

If production methods are to be improved and disease risk minimised there needs to be further work undertaken to understand individual regional issues. There needs to be development of personal, community and economic drivers that ensure societal goals for HPAI control can be met. At present there is a lack of market demand for an HPAI free product. At present compliance with government (society) demand is driven only by private sector and not by consumers - this needs to change.

Limited visits to farms prevented gaining an understanding of the attitudes to biosecurity by farmers. Preliminary results from AH2004/032 - Identification of policy responses to minimise negative socio-economic impacts of an avian influenza epidemic in Indonesia (Simmons, UNE) indicate that while farmers are aware of HPAI and biosecurity, there is still not the real concern that HPAI is a major problem for them and implementing biosecurity measures may not provide private individual benefits.

Factors that limit farmers desire to improve biosecurity include a lack of knowledge, a perception of cost-ineffectiveness, a lack of awareness of disease risks, a lack of market

incentives, the existence of alternative markets options for sick birds, institutional weaknesses, and the fact that HPAI is regarded as a public issue more than a private one.

The present structure of the NICPS is determined by the institutional, social and economic characteristics of the poultry market. At present it is a sustainable system because there is minimal demand for biosecure production systems by consumers of product from this sector. The nature of the production and marketing system (in the broiler sector dominated by the Sector 1 companies and the wet market) still ensures that a low cost, high turnover system is appropriate. The environment, however, is changing. The introduction of HPAI and the chicken and more importantly human mortalities is making, and will continue to make, biosecurity an important factor in poultry management systems. Production will now be motivated by biosecurity as well as the traditional production and social factors.

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## 4.4 Researchable issues

The development of cost-effective biosecurity measures appropriate for NICPS farms is the most important researchable issue identified by this scoping study.

Within Indonesia, considerable work is being undertaken in Sector 4, however, little work is being done directly in the NICPS (Sawitri 2007 *pers com*). The lack of biosecurity in this sector ensures that HPAI cannot be effectively controlled in Indonesia. Lack of biosecurity past the farm gate, no trace-back, multiple production cycles, low level of understanding of biosecurity, and minimal price differentiation between healthy and sick birds, lead to low levels of biosecurity. Adoption of appropriate biosecurity measures if demonstrated to be simple, affordable and effective, may substantially change the productivity and zoonotic threat of the poultry industry.

Sector 1 and most sector 2 farms have the economic capability and a commercial imperative to minimise the risk of HPAI (and other diseases). Farmers in Sectors 3 and 4 are less able to invest in biosecurity and, being small-scale producers, are probably more capable of handling disease loss by rapid replacement, whereas in Sector 4 it is regarded as efficient to simply replace poultry that die rather than to reduce the mortality risk.

Many poultry from Sectors 1 and 2 are slaughtered at abattoirs, largely a 'dead-end' in terms of virus propagation (*particularly if cages and equipment are decontaminated before return to farms*). However, if the farmers dispose of sick and dead birds into traditional markets, they may be a source of significant viral load and a risk to animal and human health. Sectors 3 and 4 are expected to be the main reservoirs and propagators of the HPAI virus as they are for other avian diseases.

The poultry industry, KOMNAS, CMU, FAO and other stakeholders<sup>9</sup> in Indonesia recognise the need to minimise the role of the NICPS in HPAI transmission, however, the major concern of poultry grower associations and companies, is the lack of control of poultry products post-farm gate. Without the ability to ensure, or accredit a product as 'HPAI-free' there is a lack of incentive to implement significant biosecurity measures.

Large scale mortalities have been attributed to vaccination failure where vaccine has been inadequately administered but also from the vaccine not being protective due to genetic changes in the virus. Vaccine failure is an emerging issue as wild strains differentiate further from vaccine strains. Without vaccine (or less effective vaccine), biosecurity will become even more important to protect flocks from HPAI. The scale of mortalities in breeding flocks has had significant flow on effects affecting supply of replacement birds and feed sales and reshaping the industry.

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<sup>9</sup> Stakeholder groups are the participants in the poultry product marketing chain and include the private sector's lenders, creditors, contractors and service providers and the government's regulators and extension and animal health services.

There is a natural, and GoI encouraged, shift from the 'dirty' production systems at the bottom end of Sector 3 to the biosecure commercial production of the larger Sector 2 and 3 farms. The most important issue is how to equitably and efficiently encourage producers to improve their on-farm biosecurity and move to a more efficient and clean production system. The potential issues are outlined in Table 3 and will form the basis of applied research in the planned project. The scoping study highlighted other related areas where applied research may be appropriate, these include;

- Post-farm gate product management and implications for disease spread
- Developing 'trace-back' systems to determine disease outbreak locations
- Independent vs contract farmers; role and perception of AI
- Developing best practise farm worker management systems taking into account the potential risks, costs and cultural factors
- Optimal financing methods for biosecurity adoption.

Further development of researchable issues will be undertaken during the first year of the project

*Table 3: Potential biosecurity issues and interventions*

Category	Risk	Risk explanation	Controls
A. Animals	Wild birds	Wild birds can carry or transmit virus to feed, water or poultry holding areas	<ul style="list-style-type: none"> <li>▪ Protect sheds, feed and water with bird proof netting</li> <li>▪ Use bird scaring devices</li> <li>▪ Remove habitat attractive to birds</li> </ul>
	Rodents	Rodents can carry or transmit virus to feed, water or poultry holding areas	<ul style="list-style-type: none"> <li>▪ Protect poultry sheds, feed sheds and water points with bird proof netting</li> <li>▪ Put out poison baits and traps</li> <li>▪ Remove habitat attractive to rodents ie. rubbish, overgrown areas</li> </ul>
	Pets	Pets that move freely in and out of farm area can carry disease	<ul style="list-style-type: none"> <li>▪ Fence off poultry keeping areas and keep gates closed</li> <li>▪ Enforce non trespass of pets</li> </ul>
	Flies and other insects	Flies and other insects may carry the virus	<ul style="list-style-type: none"> <li>▪ Install insect traps</li> <li>▪ Prevent water leaks that are attractive to insects</li> <li>▪ Remove habitat such as long grass and rubbish that harbours insects</li> </ul>
	Introduced poultry	May carry disease acquired at farm of origin, at the market or during transit from contacting infected birds or contaminated equipment	<ul style="list-style-type: none"> <li>▪ Establish policy of minimising introductions</li> <li>▪ Purchase direct from farm rather than markets and check that disease has not occurred on source farm</li> <li>▪ Quarantine and monitor birds for at least 21 days before mixing with other birds. Adopt strict carer disinfection to avoid disease spread within farm. Monitor closely for illness and take prompt decisive action if signs appear.</li> <li>▪ All in - all out systems plus cleaning, disinfection and spelling between batches</li> </ul>
	Sick and dead poultry	May be a source of disease	<ul style="list-style-type: none"> <li>▪ Isolate, diagnose and treat sick poultry</li> <li>▪ Dispose of dead poultry by burning and burial</li> <li>▪ Notify unexpected multiple deaths to authorities</li> </ul>
B. People	Family and friends	Must not be considered low risk	<ul style="list-style-type: none"> <li>▪ Disinfection on and off premises of people.</li> <li>▪ Shower, change into clean clothes, and rubber boots provided by farm</li> <li>▪ Minimisation of people and vehicle traffic</li> <li>▪ Locked sheds</li> <li>▪ Footbaths</li> </ul>
	Visitors	May have been in contact with poultry	<ul style="list-style-type: none"> <li>▪ Disinfection on and off premises of people.</li> <li>▪ Shower, change into clean clothes, and rubber boots provided by farm</li> <li>▪ Put up warning signage</li> <li>▪ Locked sheds</li> <li>▪ Footbaths</li> <li>▪ 24 hr poultry contact ban</li> <li>▪ Maintain visitor logbook</li> </ul>
	Farm staff	May keep poultry at home	<ul style="list-style-type: none"> <li>▪ Disinfection on and off premises of people.</li> <li>▪ Shower, change into clean clothes, and rubber boots provided by farm</li> <li>▪ Staff bird ownership ban</li> <li>▪ Staff biosecurity training</li> <li>▪ Develop and document quality assurance system</li> </ul>

	Egg and live bird traders	Highly likely to have been in contact with poultry	<ul style="list-style-type: none"> <li>▪ Disinfection on and off premises of people.</li> <li>▪ Shower, change into clean clothes, and rubber boots provided by farm</li> <li>▪ Biosecurity person-in-charge</li> <li>▪ Locked sheds</li> <li>▪ 24 hr poultry contact ban</li> <li>▪ Visitor logbook</li> <li>▪ Put up warning signage</li> </ul>
	Tradesmen and poultry vaccination or catching contractors	Highly likely to have been in contact with poultry	<ul style="list-style-type: none"> <li>▪ Disinfection on and off premises of people.</li> <li>▪ Shower, change into clean clothes, and rubber boots provided by farm</li> <li>▪ Biosecurity person-in-charge</li> <li>▪ Locked sheds</li> <li>▪ 24 hr poultry contact ban</li> <li>▪ Visitor logbook</li> <li>▪ Put up warning signage</li> </ul>
C. Inorganic things	Borrowed farm equipment	Farm equipment can be heavily contaminated with organic material such as dirt, manure and plant material	<ul style="list-style-type: none"> <li>▪ Cleaning and disinfection on and off premises of all things</li> <li>▪ No sharing of equipment between sheds and between farms</li> <li>▪ Wash down bay for returning equipment</li> </ul>
	Market equipment such as egg trays and cages	Equipment returning from markets is a very high risk	<ul style="list-style-type: none"> <li>▪ Clean and disinfect in wash down bay all returning market equipment such a cages and egg trays</li> <li>▪ Pressure wash with detergent and dry in sun</li> <li>▪ Appropriate disinfectant used</li> <li>▪ Use of sunlight and drying.</li> </ul>
	Vehicles including motorbikes and trucks	Lower risk but large amounts of organic material can be carried on wheels and in wheel wells	<ul style="list-style-type: none"> <li>▪ Clean and disinfect in wash down bay before further entry permitted</li> <li>▪ Pressure wash with detergent and dry in sun</li> <li>▪ Appropriate disinfectant used</li> <li>▪ Use of sunlight and drying.</li> </ul>
D. Organic things	Surface water	Dams, fish ponds, channels, creeks, rivers, lakes may be contaminated by virus carrying migratory water birds	<ul style="list-style-type: none"> <li>▪ Chlorinate if used as drinking water</li> <li>▪ Use bore or well water</li> <li>▪ Ensure top of bore holes and wells are protected from wild bird access</li> </ul>
	Farm manure	Moisture, spilt and uneaten feeds and organic material be attractive to flies, birds and rodents that can carry disease	<ul style="list-style-type: none"> <li>▪ Locate far away from poultry</li> <li>▪ Expose to sunlight to dry and heat to kill disease organisms</li> </ul>
	Introduced feed	Non processed feeds carry greater risk of virus contamination	<ul style="list-style-type: none"> <li>▪ Use commercial pellet feeds where possible</li> <li>▪ Store in bird and rodent proof sheds</li> </ul>
	Contaminated feed	Opened bags in non bird proof storage are high risk as are unprocessed feeds because unlike pellets, they have not been heat treated and stored	<ul style="list-style-type: none"> <li>▪ Use commercial pellet feeds where possible</li> <li>▪ Store in bird and rodent proof sheds</li> </ul>

## 5 Recommendation – ACIAR project AH/2006/169

The scoping study was mainly aimed at identifying whether or not there was the economic, social and technical incentive for communities in Indonesia to take responsibility for poultry disease control, and if there was, to develop a cooperative project proposal that would assist communities to do this. The scoping study concluded that there was potential for communities, with industry support, to take some responsibility and a project working with national and provincial level, government, industry and farmer associations was developed. The recommendation of the scoping study is, therefore, to develop ACIAR project (AH/2006/169) - Improved biosecurity for small-scale commercial poultry production in Indonesia.

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## 5.1 Project rationale

Along with Newcastle disease, Gumboro and other poultry diseases, HPAI is responsible for significant economic loss particularly in the NICPS and village poultry sectors. High mortality rates, decreases in demand for poultry and poultry products in affected areas, continuing human deaths and the risk of a global pandemic, ensure that control of HPAI remains a priority for Indonesia.

Considerable resources are being allocated by the Gol and donor agencies to control HPAI in the village poultry sector. There is, however, increasing realisation that more resources should be allocated to the NICPS in order to control HPAI. Improving biosecurity in this sector will reduce the likelihood of flocks becoming infected and, therefore, reduce the risk of large numbers of infected birds being dumped into live bird markets.

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## 5.2 Proposed project objectives

The conclusion of this scoping study was a proposal presented to ACIAR to undertake the project “**Cost-effective biosecurity for non-industrial commercial poultry operations in Indonesia** (AH/2006/169). The aim of the project is to improve the economic viability of commercial broiler and layer producers through the sustainable adoption of cost-effective biosecurity measures. The project will:

1. Develop an industry-driven and supported approach to improving on-farm biosecurity in the NICPS
2. Define the biosecurity measures that will improve the biosecurity and the economic viability of NICPS in Indonesia and
3. Facilitate adoption of cost-effective farm and community biosecurity measures in NICPS.

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## 5.3 Geographical focus

The scoping study identified significant variations in disease incidence, adoption drivers and management systems within the Indonesian poultry industry. The project has decided to focus on three specific provinces; they are Bali, South Sulawesi and West Java, for the reasons outlined below.

### 5.3.1 Bali

Bali is unique in the role that *kampung* chicken and ducks play in the local culture. The demand for these commodities at certain times of the year exacerbates the disease risk through illegal movement of birds from East Java. Bali is also a significant area of interest for other Gol and donor projects and hence provides the opportunity to develop a consistent approach to disease control. It is also the province most likely to be concerned about the price effects of HPAI outbreaks, because of potential tourist concerns about the disease.

### 5.3.2 South Sulawesi

South Sulawesi is area that has been badly affected with HPAI and which is becoming an increasingly important gateway for bird movements to Indonesia’s eastern islands. There is also increasing investment from Sector 1 companies in feed milling and poultry breeding as well as a Gol priority area for development assistance from donors. The presence of an ACIAR office and IFC project in the area of financing biosecurity adoption will also assist the project to attain its objectives.

### 5.3.3 West Java

West Java is the centre of the poultry industry, particularly with regard to Sector 1, government and farmer associations. It has a major university with an animal health faculty (IPB) which will provide useful partnerships for the project. Government research institutions (e.g. ICASEPS, Balitvet, Balitnak, ICARD) are also easily accessible. The area also the highest HPAI incidence in Indonesia.

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## 5.4 Industry focus

To encourage community-led improvements in biosecurity will require government policy support to improve poultry trading systems, particularly with regard to live bird and wet markets. *Industry-driven* describes the requirement for integration and project ownership by the poultry industry and local communities. It will require inputs from, and the development of partnerships between, all stakeholders from national poultry associations and Sector 1 companies to village collectors, wet market operators and farmers. There will need to be significant integration with other donor activities. Multi- and bi-lateral donors are providing various types of support, mostly in Sector 4 but have an increasing interest in Sector 3 stemming from a realisation of its probable role in propagation of HPAI.

It is an imperative that the project be embedded in poultry industry institutions, and incentives are built into industry policies and contracts. Industry partnerships at the national level will be managed through the Biosecurity Consultative Group (a subcommittee under the FMPI) and at the provincial level through Provincial Steering Committees (PSCs) comprising government, farmer associations, academics and commercial poultry companies. Project activities will be coordinated in each province by Provincial Project Coordinators (PPCs) employed and trained initially by the project under the direction of the PSCs and situated in appropriate support institutions to be determined by the PSC at project inception. By project conclusion these PPCs will be a useful industry resource that will provide potentially fee-for-service training, extension and poultry industry biosecurity advice. The Poultry Biosecurity Centre (PBC) will provide a national level repository and resource for poultry biosecurity advice, information and training.

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## 5.5 Community focus

The project will identify appropriate, efficient and effective poultry biosecurity measures for NICPS farms. Resources will then be devoted to training of farmers and advisors and facilitating the introduction of these biosecurity systems within communities. Trainers will be accredited, farms will be audited and accredited, and the service industry that provides loans, credit, after-sales and membership services to poultry farmers will be encouraged to introduce minimum biosecurity conditions in their contracts and pricing structures. By the end of the project there will be approximately 200 farm advisors (private and public) trained, 200 farmers trained, 600 farms adopting minimum biosecurity standards and a market in Bali for products from HPAI-free farming systems. There will be communities with private incentives to improve their on-farm biosecurity. There will be advisors providing biosecurity advice to their clients as part of 'after sales service' or on a 'fee for service' basis. There will be farmers with improved management and production systems better able to control HPAI (and other poultry diseases such as ND and Gumboro) leading to improved income and income stability. There will be a strengthened institutional environment able to support and encourage farmers to improve biosecurity. There will be a reduced likelihood of HPAI outbreaks and therefore a reduced likelihood of a pandemic. There will be the potential to further 'roll out' of the training and extension programs to other provinces in Indonesia. The project will assist with the Gol's long-term aim of removing the risk of spread of HPAI and other zoonotic poultry diseases by the NICPS.

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## 5.6 A whole market-chain approach

Understanding the market chain for the various poultry commodities and the roles and relationships of stakeholders is vital if commercial forces are to drive adoption of biosecurity. The project will work with all stakeholders in the industry to define and implement improvements to post farm-gate marketing systems to overcome constraints to adoption of biosecurity.

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## 6 References

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## 7 Appendices

### 7.1 Appendix 1: People and organisations consulted

Name	Position	Organisation
1. Anton Supit	Chairman	Association of Indonesian Poultry Producers (GAPPI)
2. Arend Nell	Coordinator, Indo-Netherlands HPAI project	AN Wageningen Netherlands
3. Arief Daryanto	Director, Graduate Program of Mgt and Business	IPB
4. Atien Priyanto		Central Research Institute for Animal Science CRIAS
5. Don Utoyo	Direktur (GAPPI) and Koordinator, (FMPI)	GAPPI and FMPI
6. Abdul Muthalib	Head	Provincial Livestock Services NTB
7. Abdullah Bamualim	Director	Indonesian Centre for Agriculture Research and Development
8. Anak Agung Gde Putra	Research coordinator	Disease Investigation Centre VI, Bali
9. Bagoes Poermadjaja	Head , Surveillance Unit	
10. Bess Tiesnamurti	Head, Program & Evaluation Section	Indonesian Centre for Agriculture Research and Development
11. Budi Santosa	Lecturer, Brawijaya Uni	Faculty of Economics, Brawijaya University
12. Chalid Talib	Head, Research Collaboration & Dissemination	Indonesian Centre for Agriculture Research and Development
13. Didin Sudiana	CMU Counterpart	Directorate General Livestock Services
14. Elly Sawitri	Coordinator, Campaign Management Unit for HPAI	Directorate General Livestock Services
15. Triastuti Andajani	Head, Poultry farming division	DGLS
16. Djajadi Gunawan	Director, Non-Ruminant	DGLS
17. Eric Brum	Field Program Facilitator	FAO
18. Erna Maria Lokollo		ICASEPS
19. Hardi Prasetyo	RIAP – livestock breeding, quantitative genetics	
20. Iwan Willyanto	National Epidemiologist	National Commission for Bird Flu
21. Jim McGrane	Team Leader, Avian Influenza Program	FAO
22. John Weaver	Chief Technical Advisor Avian Influenza Program	FAO
23. Jonathan Gilman	Economist	FAO
24. Leo Loth	Veterinary Epidemiology	FAO
25. Mohamed Iqbal Rafani		ICASEPS
26. Muktasam Abdurrahman	Research Centre for Rural Development	Research Centre for Rural Development, Mataram University
27. Musni Suatmodjo	Director of Animal Health, DGLS	Directorate General Livestock Services
28. Nanda Moezahar Thalib		Directorate General Livestock Services

29.Noeri Widowati	Counterpart Project Leader	Directorate General Livestock Services
30.Peter Horne	Manager, Support for Market Driven Adaptive Research (SMAR) Sub Program, (SADI)	SADI, Makassar
31.Peter Rolfe	Program Manager, Animal Health	ACIAR
32.Pius Ketaran	Nutritionist	RIAP
33.Robyn Alders	Avian influenza Technical Advisor	FAO
34.Sofjan Iskandar	Director	Indonesian Research Institute for Animal Production
35.Syafril Daulay	Head	Animal Quarantine, East Java
36.Tata Hutabarat	National Commission for Bird Flu / Centre for Veterinary Analytical Services	National Commission for Bird Flu
37.Teguh Prajitno	Vice President	JAPFA Comfeed Company
38.Wawan Sutian	Hd Div Operational Service	Animal Quarantine, East Java
39.Wiwiek Bagja		Indonesian Veterinary Medical Association
40.Hartono	Director	PINSA, Indonesian Poultry Information Centre
41.Wayan Sukanadi	Departemen Pertanian Coordinator LDCC, Bali	Provincial Livestock Services
42.Eddy Dharmawan	Dep Managing Dir, Poultry	
43.Hadi Gunawan	Business President	Charoen Pokphand Indo
44.Idqan Fahmi	Secretary, Academic Directorate	IPB
45.Erwin Soetirto		
46.Tjeppey Soedjana	Director General DGLS	Directorate General Livestock Services
47.Wahida	Collaborative Research Collaborator,	ICASEPS
48.Jemmy Wijaya	Reg Head, West Java	Charoen Pokphand Indo
49.John Murray	Country Manager-Indonesia	Aust Embassy
50.Lynleigh Evans	Emerging Infectious Disease Coordinator	Aust Embassy
51.Maureen Kalona-Kandou	Director	Vaksindo
52.Max Coats	Director	USDA Indonesia HPAI Office
53.Mongkol Thongsiri	Sen VP, An. Health and Tech. Service	CPI
54.Ms Mirah Nuryati	Assistant Manager	c/- Australian Embassy, Indonesia
55.Paulus Setiabudi		Indonesian Poultry Breeders Association (UPPI)
56.Tri Hadiyanto	Director	GOPAN
57.Nyoman Suparta	Head,	Indonesian Farmer' Union
58.I Ketut Yahya Kurniadi	Head	Poultry Farmer's Association, Bali
59.Suryawan Dwimulyanto	Secretary	Poultry Farmer's Association, Bali

## 7.2 Appendix 2: Acronyms used in this report

ASOHI	Association of poultry drug and vaccine suppliers
BCG	Biosecurity Consultative Group
CMU	Central Management Unit
DGLS	Directorate General Livestock Services
DOC	Day old chicks
FAO	Food and Agriculture Organisation
FMPI	<i>Forum Masyarakat Perunggassan Indonesia</i> (Indonesian Poultry Industry Forum)
GAPPI	<i>Gabungan Perusahaan Perunggassan Indonesia</i> (Association of Indonesian Poultry Producers)
Gol	Government of Indonesia
GOPAN	<i>Gabungan Organisasi Peternak Ayam Nasional</i>
HPAI	Highly pathogenic avian influenza
ICARD	Indonesian Centre for Animal Research and Development
ICASEPS	<i>Deptan, Badan Penelitian dan Pengembangan Pertanian Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian</i> (Indonesian Centre for Agriculture Social Economic and Policy Studies)
IRF	Institute for Rural Futures, UNE
IPB	<i>Institut Pertanian Bogor</i> (Bogor Agricultural University)
KOMNAS	Indonesia National Committee for HPAI Control and Pandemic Influenza Preparedness
NICPS	Non-industrial commercial poultry sector
PBC	Poultry Biosecurity Centre
PINSAR	Indonesian Poultry Information Centre
PPC	Provincial Project Coordinator
UNE	University of New England
UNUD	Udayana University
UPPI	Indonesian Poultry Breeders Association