

working paper

HOW CAN ANIMAL HEALTH SYSTEMS SUPPORT SMALL-SCALE POULTRY PRODUCERS AND TRADERS?

Reflections on experience with HPAI



Cover photographs:

Left image: FAO/Hoang Dinh Nam

Centre image: FAO/S. Sarkar

Right image: FAO/R. Grisolia

HOW CAN ANIMAL HEALTH SYSTEMS SUPPORT SMALL-SCALE POULTRY PRODUCERS AND TRADERS?

Reflections on experience with HPAI

Ilia Rosenthal
Anni McLeod

Recommended Citation

FAO. 2012. *How can animal health systems support small-scale poultry producers and traders? Reflections on experience with HPAI.* Animal Production and Health Working Paper. No. 10. Rome.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

E-ISBN 978-92-5-107237-0 (PDF)

All rights reserved. FAO encourages reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all queries concerning rights and licences, should be addressed by e-mail to copyright@fao.org or to the Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

Contents

<i>Acknowledgements</i>	<i>vii</i>
<i>Preface</i>	<i>viii</i>
<i>Acronyms</i>	<i>ix</i>
<i>Definitions</i>	<i>x</i>
<i>Summary</i>	<i>xii</i>
BACKGROUND	1
WHY PEOPLE KEEP POULTRY	3
POULTRY IN THE HOUSEHOLD ECONOMY	3
SOCIAL FUNCTIONS	6
POULTRY AND NATURAL RESOURCES	6
POULTRY HEALTH PROBLEMS AND THEIR IMPACT ON FARMER LIVELIHOODS	7
COMMON HEALTH PROBLEMS	7
HPAI	8
IMPACTS OF HPAI DISEASE AND EMERGENCY RESPONSE MEASURES	9
IMPACTS OF MARKET SHOCKS	10
EFFECTS OF POOR COMMUNICATION	11
IMPACT RELATED TO LONG-TERM CONTROL MEASURES	11
COMPLEX IMPACTS	13
SPECIAL FEATURES OF LIVESTOCK DISEASE EMERGENCIES	14
THE RELATIONSHIP BETWEEN FARMERS AND ANIMAL HEALTH SYSTEMS	17
THE PUBLIC SECTOR: STATE VETERINARY SERVICES AND LICENSING AUTHORITIES	17
THE PRIVATE SECTOR: PRIVATE VETERINARIANS AND PARA-VETERINARY PROFESSIONALS	18
THE INTERNATIONAL COMMUNITY	19
RELATIONSHIPS	20
RECOMMENDATIONS FOR PEOPLE-CENTRED ANIMAL HEALTH SYSTEMS	24
1. DEFINE, CHARACTERIZE AND QUANTIFY RISK BEFORE TAKING ACTION	25
2. PUT SMALLHOLDERS AND INTERMEDIARIES AT THE CENTRE OF ANIMAL HEALTH PLANNING: INVEST IN PARTNERSHIPS BETWEEN POULTRY OWNERS, PRIVATE ANIMAL HEALTH AND STATE SERVICES	27
3. MAKE SURE THAT LONG-TERM SUPPORT AND EMERGENCY PLANNING GO HAND IN HAND	30
4. MAKE THE MEDIA A PARTNER RATHER THAN THE ENEMY	31
ANNEX 1	
EXAMPLES OF COMMUNITY ANIMAL HEALTH PROJECTS	33
ANNEX 2	
EXAMPLES OF CHANGES IN LEGISLATION IN COUNTRIES AFFECTED BY HPAI	35
ANNEX 3	
EXAMPLES OF GOOD PRACTICE IN BUILDING LOCAL ANIMAL HEALTH SYSTEMS.	38
REFERENCES	40

FIGURES

1. H5N1 HPAI outbreaks in domestic poultry between 01 July 2005 and 30 June 2006	9
2. Relationship between animal health systems and small-scale poultry systems during HPAI	20
3. People centred / integrated animal health system	26

TABLES

1. HPAI risks and ways of addressing them	15
---	----

BOXES

1. Poultry contributing to livelihoods	5
2. Thailand X-ray surveys (Safman, 2009)	22
3. Lao PDR village based surveillance (Mondry, 2008)	23

Acknowledgements

We would like to thank the following people for having provided ideas or references or contributed to the review process:

Vinod Ahuja, Robyn Alders, Cristina Amaral, Philippe Ankers, Charles Bebay, Santanu Bandyopadhyay, Sigfrido Burgos, Nicoline de Haan, Phil Harris, Nick Honhold, Ruchita Khurana, Tim Leyland, Nancy Morgan, Flore Murard, Clare Narrod, Christine Okali, Joachim Otte, Christie Peacock, Karin Schwabenbauer, Les Sims and Astrid Tripodi. The preparation of the paper was financed jointly by FAO's regular programme and the DFID-funded Pro-Poor HPAI Risk-Reduction Project.

Preface

Around 2.6 billion people in the developing world are estimated to have to make a living on less than \$2 a day and of these, about 1.4 billion are ‘extremely’ poor; surviving on less than \$1.25 a day. Nearly three quarters of the extremely poor – that is around 1 billion people – live in rural areas and, despite growing urbanization, more than half of the ‘dollar-poor’ will reside in rural areas until about 2035. Most rural households depend on agriculture as part of their livelihood and livestock commonly form an integral part of their production system. On the other hand, driven to a large extent by increasing per capita incomes, the livestock sector has become one of the fastest developing agricultural sub-sectors, exerting substantial pressure on natural resources as well as on traditional production (and marketing) practices.

In the face of these opposing forces, guiding livestock sector development on a pathway that balances the interests of low and high income households and regions as well as the interest of current and future generations poses a tremendous challenge to policymakers and development practitioners. Furthermore, technologies are rapidly changing while at the same time countries are engaging in institutional ‘experiments’ through planned and un-planned restructuring of their livestock and related industries, making it difficult for anyone to keep abreast with current realities.

This ‘Working Paper’ Series pulls together into a single series different strands of work on the wide range of topics covered by the Animal Production and Health Division with the aim of providing ‘fresh’ information on developments in various regions of the globe, some of which is hoped may contribute to foster sustainable and equitable livestock sector development.

Acronyms

ACI	Agrifood Consulting International
AVSF	Agronomes et Vétérinaires Sans Frontières
BRAC	Bangladesh Rural Advancement Committee
CAHW	Community Animal Health Worker
GEMP	Good Emergency Management Practice
HPAI	Highly Pathogenic Avian Influenza
OIE	World Organisation for Animal Health
WTO	World Trade Organization

Definitions

Animal health workers, community animal health workers (CAHWs) and paraveterinarians are considered as sharing the same professional profile in this paper although they have a highly variable level of technical skill. Most often they are not salaried by government. They usually have an array of livelihoods activities. Although they charge for the services they provide, this is rarely their main source of income. Their clients are mostly other members of their community. They may be contracted by government to perform specific tasks, such as vaccination campaigns or surveys. In most cases, they have received a few weeks of training. In some countries, they operate under the authority of a private veterinarian.

Animal health systems encompass the public and private sectors. National systems include state veterinary services, private veterinarians, paraveterinarians, community leaders, community animal health workers (CAHWs), input and technology suppliers, licensing authorities, professional bodies, and the laws and regulations that bind them.

Capacity. A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster. Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.

Culling is the killing of sick and potentially infected livestock as part of an official disease control campaign. This results in culled animals not entering the human food chain and may prevent disease spread between flocks and herds but may also negatively impact producers and traders' livelihoods and food security. Depending on national law and policies, farmers may or may not be compensated for the value of culled animals.

Disaster risk management encompasses all the phases of the emergency cycle: prevention, preparedness, mitigation, response and recovery.

Disaster risk reduction refers to elements considered to possibly minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broader context of sustainability and sustainable development.

A **livelihood** comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the resource base.

HPAI (Highly Pathogenic Avian Influenza). A disease caused by a virus that is rarely found in wild waterfowl and causes severe disease in domestic poultry. The H5N1 virus is the strain of avian influenza that has infected numerous species of birds in Asia, Europe and Africa since the end of 2003. It has not been found in birds in North or South America, including the Caribbean. It may cause disease in chickens and some other species of birds that affects multiple internal organs and has a mortality rate that can reach 90-100 percent, often within 48 hours.

Small-scale poultry producers are people who own or look after birds in any small-scale poultry flock (this includes scavenging, backyard, family, micro-commercial and small-scale flocks). They may also trade birds.

Small-scale poultry traders are people who collect birds from producers and usually carry them with bicycles and motorcycles to peri-urban and urban markets and make a living from the value added by poultry trading.

Stakeholder analysis is a process where all the individuals or groups that are likely to be affected by a proposed action are identified and ranked according to how much they can affect the action and how much the action can affect them. This information is used to assess how the interests of those stakeholders should be addressed in a project plan, policy, programme or other action.

Transboundary animal disease, disease that crosses borders. For HPAI this takes place mostly through trade and spread by wild birds. Economic, health and other types of impact influence how countries deal with these diseases. H5N1 HPAI is an example.

Wet market is a market where live animals are sold.

World Organisation for Animal Health (OIE). An intergovernmental organization founded in 1924 to improve animal health control, under the authority of a World Assembly of Delegates from member countries (178 in number at the time of writing). Its headquarters is in Paris. The OIE is recognized as a reference organization by the World Trade Organization.

Zoonotic disease is a disease that can be passed between animals and humans. H5N1 HPAI is such a disease.

Summary

This paper builds on lessons learned from the world's reaction to HPAI in order to identify ways in which animal health systems may better include smallholders in disease monitoring, surveillance and control activities both in “peace time” and in emergency situations. It argues that only by fully engaging poultry keepers can the negative impacts of disease be reduced. However, this is not a trivial enterprise and calls for re-drawing the map of animal health institutions.

WHY PEOPLE KEEP POULTRY

Rural and semi-urban populations throughout the world keep poultry. Small flocks of domesticated birds play an important, albeit modest economic role by converting low value inputs into high value products, enhancing household diets and providing income. Their social and environmental roles vary depending on location, but they invariably contribute to the social status and health of their owners.

POULTRY HEALTH PROBLEMS AND THEIR IMPACT ON FARMERS' LIVELIHOOD

Poultry smallholders in developing countries rarely apply biosecurity measures or vaccinate their birds because they are accustomed to some regular losses from disease or other causes. HPAI, however, has had a more dramatic impact due to market shocks and the unprecedented measures that were taken by authorities, such as culling and banning the movement of birds. Some countries have been promoting long-term changes that oblige smallholders to find other revenue-generating activities and have resulted in loss of income and disruption of households. Containment efforts were driven by the international community in reaction to the potential threat of a human pandemic and little or no attention was given to smallholder livelihoods.

Moreover, this livestock disease emergency has been complicated by the fact that in many countries the problem continued to grow even while emergency containment and relief efforts were under way. HPAI has become endemic in some areas.

THE RELATIONSHIP BETWEEN FARMERS AND ANIMAL HEALTH SYSTEMS

Before the HPAI crisis there was a rather distant connection between government and small-scale poultry farmers, and this is still the situation in places that have been little affected by HPAI. In most developing countries, state veterinary services and licensing authorities had little contact with small-scale poultry producers until the advent of HPAI. The main animal health contact for smallholders was with para-veterinary professionals and the owners of feed and drug shops. Countries exporting poultry products developed a relationship with international organizations around trade regulations. The international community also provided development assistance through local projects that promoted poultry production or trained para-professional animal health workers.

This pattern changed in countries that experienced HPAI outbreaks. The international community became more direct in its approach, providing advice and emergency finance to state veterinary services, which mounted rapid and sometimes

very extensive control operations, usually involving wide-scale culling with no or inadequate compensation, closure of markets and restricted movement of birds. In some countries, certain types of production systems or production in certain areas were banned. All of this meant that the first contact that many small-scale producers and traders had with state veterinarians was during destruction of their poultry, or campaigns to ask for information, stop trading or take blood samples at markets. The extent of the engagement raised the profile and capacity of veterinary services but it also diverted attention, national human resources and finances into outbreak control operations, reducing what was available for development work. Very little resource was directed towards post-outbreak rehabilitation.

After the first outbreaks, some governments modified their approach to be more smallholder-friendly and engaged para-professionals in disease surveillance and reporting. Nevertheless, the most vulnerable stakeholders, the smallholder poultry producers and traders and particularly women, have very rarely been consulted and even less integrated in elaborating preparedness and response strategies. Moreover, safety nets such as food aid, cash grants, cash/food for work and interventions to create alternative revenue-generating activities were generally not used.

RECOMMENDATIONS FOR PEOPLE-CENTRED ANIMAL HEALTH SYSTEMS

Reflecting on the experience of HPAI and our improved knowledge of smallholder poultry keeping, shows that changes are needed within animal health systems if they are to provide a better service to poultry producers, and particularly to improve emergency responses and make them less damaging to poor people's livelihoods and dignity.

The paper recommends a more "people centred" approach to poultry health issues. This implies making the livelihoods of farmers and traders the primary objective of the actions taken by animal health systems, with the control of disease as a second and supporting objective. Most of the time these two objectives are very well aligned but the strategy for animal health could sometimes be different if livelihoods were the primary focus. For example, it would always pay attention to more than one animal health problem simultaneously, because focusing on one disease at a time is costly and time-consuming and does not consider the reality of farmers' lives. It would also try to assist small-scale livestock producers and traders even when there is no major disease outbreak. Animal health services would work with other government departments to find ways to mitigate long-term impacts of regulatory changes on smallholders' livelihoods. A stronger two-way communication between farmers and veterinarians, a more integrated approach to providing technical assistance and more concerted action at local level would be built into animal health systems. The primary role of the international community would be as a supporter of coordinated initiatives that strengthen public and private service provision, with emergency response as a supporting role.

The following four recommendations are made in relation to the poultry sector, because poultry plays a very specific and crucial role in smallholders' livelihoods. However, most of them are relevant not only to poultry but to any small-scale livestock keeping.

1. Define, characterize and quantify risk before taking action. The rationale for doing this is to make animal disease control actions proportional to risk so that they are as effective as possible while concurrently causing minimal damage.

2. Put smallholders and intermediaries at the centre of animal health planning, and invest in partnerships between poultry owners, private animal health and state services. The rationale for doing this is that measures applied will be more cost effective if they are more "people-friendly". If people see that there is added value for them, they may change the way they raise and handle poultry. More effective disease control will result from stronger partnerships.
3. Long-term support and emergency planning need to go hand in hand. This is important to ensure that emergency and long-term efforts reinforce and do not destabilize each other.
4. Make the media a partner rather than the enemy. The objective of doing this is to mitigate market shock impacts through effective communication and promote good poultry husbandry practices.

Background

Since 2004, when the world was concerned that the next influenza pandemic would originate from poultry, the relationship between animal health systems and small-scale poultry owners has been transformed. Before H5N1 highly pathogenic avian influenza (HPAI) began to spread, contact between smallholder farmers who enriched their livelihoods by rearing and trading poultry and those who provided animal health services was sporadic and very little was formally recorded about small scale flocks or the problems experienced by their owners. In developing and developed countries, smallholders kept poultry with little supervision, regulation or assistance from authorities.

HPAI has brought about irrevocable changes in this relationship. Governments have found themselves obliged to try to discover the role that small-scale producers and traders play in the persistence of infectious poultry diseases, particularly those that affect humans. Some countries have applied strict control measures on an unprecedented scale that have damaged livelihoods and raised questions about the future of poultry as a “pathway out of poverty”.

While considerable progress has been made in controlling avian influenza, and animal health systems have increased their resources and knowledge, control efforts have resulted in damage to smallholders that could have been lessened with more effective interaction and greater prior knowledge.

The recommendations from the 6th International Ministerial Conference on Avian and Pandemic Influenza, held in Sharm el Sheikh in October 2008, reflected a growing recognition that a modified approach was needed: “An intensified effort is needed to identify and recognize the impacts of interventions on vulnerable people and define ways to mitigate negative impacts.”(6th Int Conf, 2009). Part of this intensified effort will need to focus on emergency planning to deal with crises in the poultry sector. But it is not enough only to consider emergencies. For most livestock producers and traders animal health emergencies are rare, and their greatest concern is the day-to-day generation of sufficient income and food to meet household needs.

Poultry are vital to global food security, supplying 33 percent of the meat consumed worldwide based on 2007 figures from FAOSTAT. The consumption of poultry meat and eggs per person has grown faster than that of any other source of livestock protein. Poultry products are acceptable foods in many cultures and poultry are raised at home even by families with very little land or capital, making them easily accessible to the poor. Family-based poultry contribute to wellbeing in the lives of their owners and the food supply of growing populations in developing countries.

It is important, therefore, that the recommendation from Sharm el Sheikh is taken seriously and that the experience of HPAI guides future planning for safeguarding the health of poultry and the people who depend on them. Perhaps the most important lesson to be learned from HPAI is that, while science is essential to animal health, it has limits. Equally important is an understanding of the relation-

ship between animals and humans that creates the conditions for livestock diseases to emerge and also makes it possible for them to be prevented and controlled.

Against this background, the paper draws from research over a four year period, an electronic consultation and a wide review of literature, to examine the roles that small-scale poultry flocks play in the lives of their owners and traders. It examines relationships within animal health systems that affect how they function. It describes the impacts of poultry diseases including HPAI, the way they are perceived, and the efforts to control them. Finally it makes recommendations for progress towards animal health systems that are more people-centred and, because of that, more effective at what they do, in supporting livelihoods as well as disease prevention and response.

The paper aims to provide straightforward proposals for planners and policy-makers and those who advise them. It is also intended for people who have an interest in rural development, livestock development or animal health systems.

Why people keep poultry

For the last 10,000 years, people have considered domestic birds to be an integral part of rural life and today in many countries small flocks are raised in peri-urban and urban settings to provide food and a secure income and as a way for families to build assets. Although poultry are rarely the main source of income for smallholders, and especially poor people, they still play a specific and important role in the lives of many people in countless places in the world. No accurate data exist on their numbers because small flocks tend to be disregarded and unregistered. Household surveys and agricultural censuses show that, in the developing world, most rural households and many urban households own poultry, with chickens making up 80 percent of the poultry population, except for a few Asian countries such as Bangladesh, China and Viet Nam that have large duck populations.

POULTRY IN THE HOUSEHOLD ECONOMY

In developing countries, 50 to 95 percent of sedentary and poor members of rural societies own small scavenging flocks (Burgos *et al.*, 2008a; Burgos *et al.*, 2008b; Burgos *et al.*, 2008c; Guèye, 2000; FAO, 2010c) with a few birds or, more rarely, as many as 20 or 30. These poultry serve as a buffer against vulnerability (McLeod *et al.*, 2008) by making it possible to quickly respond to shocks with immediately available cash through sales. They may also enhance the household diet, and regularly provide income by converting low value inputs into high value products (Otte, 2006). When poor people raise a few birds, this can create a substantial improvement in their daily lives (Ahuja *et al.*, 2008). For some extremely poor women, their main economic activity is trading eggs and birds in local markets to provide food security for the children and elderly they have under their care (Randriamanana *et al.*, 2006).

Poultry are a source of protein through home consumption (Sonaiya, 2008), and are important for essential micronutrients, such as iron and zinc, which are crucial



A young girl with her chickens in Liberia (S. Sakyar)



Woman tending to her chickens in Java (FAO photo library)



Smallholder in Madagascar on his way to the market (I. Rosenthal)

especially for child nutrition and health (Iannotti *et al.*, 2008). Eggs also supply an array of vitamins such as A, B12, and K (a bone-boosting nutrient) and also provide choline which plays a role in brain development. In addition, eggs can be stored for several days under village conditions (Alders and Pym, 2009). Households raising small livestock are less likely to hunt bush meat (Loibooki *et al.*, 2002).

However, in a number of countries such as Benin, India, Madagascar or Peru (Rosenthal *et al.*, 2005), very poor people may sell most of their production and only consume what they cannot sell. In this case, poultry still plays a role in food security because it enables people to buy other foods. Marginal producers and landless people sell poultry products in local markets to generate as little as 4.3 percent (Mensah-Bonsu and Roy, 2009) or as much as 100 percent of their cash income (ACI, 2006; Geerlings *et al.*, 2007; Sonaiya, 2008). In all settings, poultry can be sold easily and quickly to raise cash to meet basic expenses for food, household items, school fees and materials for children, clothing and shoes, and medical expenses (Miers, 2008). When the head of the household is afflicted with a long-term health problem, small-scale poultry production provides the household with a source of income with little labour input (IIED, 2009). Some smallholder poultry producers, particularly those with scavenging flocks, specialize in traditional bird varieties, which command higher prices because of their taste and are well suited to traditional low-input systems (Heft-Neal *et al.*, 2009; Ifft *et al.*, 2009a).

Flocks of more than 20 birds are most often kept primarily for sale, helping their owners to build income and capital. These flocks also play an important role in providing protein to growing human populations. Small-scale traders with bicycles and motorcycles carry these birds to peri-urban and urban markets and make a living from the value added by poultry trading (AVSF, 2006).

Poultry production benefits from economies of scale and the large regional and global industrial producers are capable of establishing strong competition in any market where it is favourable for them to invest, but they have not usually tried to compete with the localized production of highly specialized products such as single coloured chickens, extensively reared ducks or embryonated eggs. Even in the industrialized world there is a niche market for scavenging poultry meat and eggs (FAO, 2010b).



Market trader in Togo (A. Tripodi)



Vendor in Viet Nam (FAO)



Pheriwala (vendor) in West Bengal, India (M. Dhawan)

Box 1. Poultry contributing to livelihoods

In Madagascar, Peru and Benin, extremely poor women rarely own more than five hens but one of their main activities can be trading eggs and birds in local markets. Without this source of income, their food security and that of the children and elderly under their care would be non-existent. (Randriamanana et al., 2006; Rosenthal and McLeod, 2008)

In Western Kenya, poultry are the first livestock asset, allowing families to save and buy either a sheep or a goat and subsequently a cow. (Omiti and Okuthe, 2008)

In the Forest Zone of Ghana, the poorest backyard producers derive 40 percent of their income from chicken sales. (Biral and Asare-Marfo 2008)

In Egypt, women are responsible for the care and feeding of poultry and derive a substantial part of their income from eggs and poultry sales. The income allows families to send their children to school and to have more adequate food security. Moreover, mothers are expected to eat one chicken a day for 40 days after giving birth, and the maternal family is responsible for providing the birds. (Hosny, 2006). The importance of poultry became obvious after the extensive culling (killing of infected and suspect animals) following HPAI outbreaks, when the standard of living for many poor and lower middle class households dropped substantially. (FAO, 2010a)

In West Bengal, where women have the power to decide how to spend the money earned through poultry-keeping, a survey revealed that for more than 40 percent of women smallholders child nutrition was the most important reason to rear poultry, followed by sales when the need arises. In some female-headed ultra-poor households, this activity prevented young girls from migrating to look for casual wage employment or reverting to labour intensive and less remunerative activities and ensured their status within the community. (Hinrichs, 2008)

In Myanmar, a 9-month-old trained fighting cock's value will be at least twice the value of a rooster and a competition-winning bird may be sold for ten times the value. (Henning et al., 2006)

In Uganda, men may marry off their daughters in exchange for a considerable number of chickens that they sell to pay for their sons' education. (Kyomugisha, 2008)

In Thailand, workers, who had emigrated to cities and then lost their jobs during the economic crisis in 1997, went back to their communities of origin and started extensive duck-rearing, thereby creating a stable livelihood for themselves while allowing sedentary farmers to keep farming all of the rice land. (Safman, 2009)

In Africa and in Asia, there is a distinct preference to consume free-range poultry when it is available. This takes on another dimension in certain countries such as Benin, Ethiopia, Uganda or Viet Nam where different indigenous species are used for different rituals and special days and may play a fundamental role in traditional health practices. Other species are simply not suitable for these rituals. (FAO, 2010c)

In West Bengal, Keggfarms introduced a hybrid chicken 'Kuroiler' in 1993 and set up a value chain that comprised around one million households prior to HPAI. Small entrepreneurs set up units to rear one-day-old chicks and then sell them to mobile traders. Over 60 percent of these traders were landless and previously unemployed and for 75 percent of them this livelihood has been their sole source of income. (Ahuja et al., 2008)

SOCIAL FUNCTIONS

Poultry play important social roles in rural and urban settings and city dwellers often purchase birds for social or religious occasions from the countryside. They are used as food for family and guest visits and for special days throughout the year. For the most vulnerable, elderly and poor members of rural communities, owning and consuming poultry is a status symbol. They may even form part of marriage arrangements. Poultry also have an often-overlooked function as children's pets.

In a number of countries such as India, Indonesia, Kenya, Mexico, Nigeria, Pakistan, the Philippines, Puerto Rico, Thailand and Viet Nam (Burgos *et al.*, 2008a; Burgos *et al.*, 2008b; Safman, 2009) cock-fighting is still an integral part of male society. Owners of fighting cocks have a very close relationship with their birds and treasure the social status this gives them. Moreover, fighting cocks have a high monetary value.

POULTRY AND NATURAL RESOURCES

In rural environments, poultry are a natural predator for insects and other "pests", including some snakes. In countries where rice is produced in paddy fields, there is often a synergy between duck-rearing and the rice production cycle. Extensively grazed domestic ducks in particular act as natural predators against insects, slugs and snails and also feed on grain which would otherwise be lost during the harvest and winnowing process. This integrated system is relevant at a time when the world faces grain shortages. The role of the ducks as predators and as natural fertilizers with the manure they deposit on the rice fields contributes to higher yields (Hossain *et al.*, 2005). This has resulted in strong cooperation between rice growers and duck producers.

Small-scale flocks reflect the preferences of owners and consumers depending on their use (food, rituals and social customs) and therefore contribute to preserving the genetic resource. This important function is illustrated by the diversity and competitiveness of domestic poultry production in developing countries.

Poultry health problems and their impact on farmer livelihoods

The impact of poultry health problems stems from four sources:

- the problem itself
- the ability and interest of farmers to deal with it
- the response of authorities
- consumer reactions

While many diseases are widespread and some are taken seriously by farmers, the responses to HPAI by state veterinary services and consumers have been very different from those for other poultry health problems, and for this reason HPAI is considered separately in the discussion that follows.

COMMON HEALTH PROBLEMS

Poultry are susceptible to a myriad of animal health problems ranging from external parasites like lice, mites and ticks that are very common but have a limited effect on production to diseases like Newcastle disease and HPAI that occur more rarely but may cause death of the entire flock. A list of possible problems would include lice, mites, roundworms and tapeworms, Newcastle disease, Gumboro disease, fowlpox, fowl cholera, Marek's disease, Pullorum disease, fowl typhoid, infectious coryza, mycoplasmosis, colibacillosis, salmonellosis, coccidiosis and mycotoxicosis (Permin, 2009).

Poor nutrition can exacerbate the effect of some diseases by making birds less able to resist infection or by reducing the effectiveness of vaccine. Responses to the above problems depend on a number of factors including the availability of vaccines and treatments and complications caused by multiple infections.

Most poultry health problems are treated as a private good, meaning that owners decide whether or not they want to invest in prevention and treatment and truly make use of whatever animal health service is available to them. The exceptions are outbreaks of diseases that spread rapidly and affect trade or human health, and which a government may attempt to control by culling infected or potentially infected flocks and imposing a movement ban to stop the disease from spreading. However, these measures have seldom been applied in developing countries for poultry diseases other than HPAI. Newcastle disease is considered to be one of the most important diseases in commercial and backyard poultry (Rushton, 2009), yet control in village flocks is done through local vaccination programmes in which farmers are encouraged but not required to participate.

Commercial companies recognise the value of poultry health by investing heavily in prevention of disease. This may include "biosecurity" measures like enclosures, restricting the entry of people to poultry houses and cleaning of hands, feet and equipment to prevent disease agents entering the flock, as well as vaccination, de-worming, and routine provision of antibiotics where this is permitted. Small-scale poultry producers, however, generally invest little in poultry health. Small-scale traders may ignore health problems or in some cases help to spread them by

unknowingly transporting disease agents through sick birds, their shoes or on the wheels of their vehicles. There are good explanations for this behaviour - people may not be adequately informed or aware of the consequences, or if production losses are perceived to be small, disease may go unnoticed or untreated.

Diseases causing widespread mortality receive the most attention. Even though most households can withstand a one-time loss of their poultry, this may still have a negative impact on bargaining power within households and the money available to women to spend on their children (Ahuja *et al.*, 2009; Miers, 2008). To manage these risks, birds may be vaccinated against Newcastle disease or other serious diseases that owners are aware of, such as diseases that tend to occur every hot season (Hickler, 2008) or every rainy season, or are known to be in the area. Poultry may also be de-wormed seasonally. However, advice and technology are not always available or accessible to everyone. Good quality vaccines and drugs are often unavailable in rural settings, and vaccines may be sold in containers with too many doses for use in small flocks or even an entire community. Where it is not practicable to prevent them, problems may be managed or avoided by selling all birds quickly at the onset of a disease outbreak and then restocking when the problem is considered to have passed (Hickler, 2007), or by destocking and restocking seasonally depending on perceived disease patterns and feed availability (Geerlings, 2006). Most owners of scavenging flocks cope with occasional losses of their poultry by moderately increasing other activities which prevent them from tipping over into more severe food or income insecurity (Miers, 2008; Roland-Holst *et al.*, 2008).

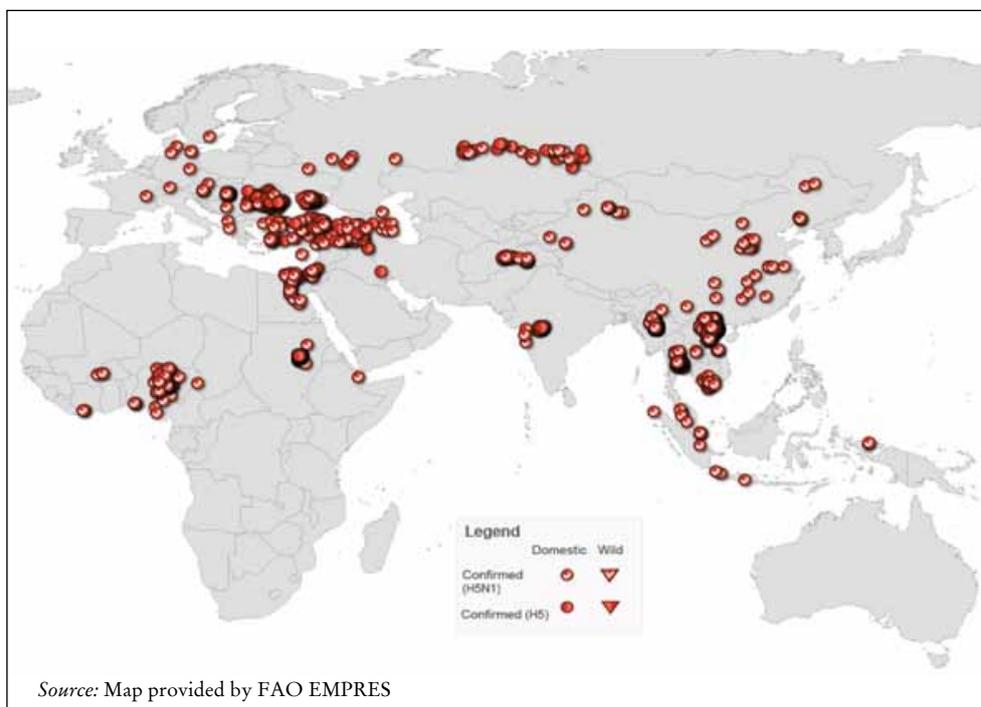
HPAI

When a new disease occurs, it may take time for it to be recognized as new. The symptoms of HPAI are very similar to those of Newcastle disease and it was not immediately recognized by producers and traders as something different. In 2007 in Cambodia, farmers did not necessarily use the specific name for HPAI in the Khmer language, even when they were describing outbreaks (Hickler, 2007). Smallholders mostly responded to HPAI outbreaks in the same way that they would to a similar existing disease; they tried to minimize losses by quickly selling, eating or slaughtering their flocks. In Kenya, for example, the 2005 and 2006 scares resulted in panic culling by 25 percent of farmers although no HPAI outbreak was confirmed in the country (Ndirangu *et al.*, 2009).

HPAI can be transmitted to humans from infected poultry through direct contact with the birds or contact with blood or mud containing the virus. It caused severe illness and even death in some of the people infected, putting it into a different category from most other poultry diseases. Reports of human deaths associated with poultry disease might be expected to affect the relationship that people have with their birds, but during HPAI outbreaks producers, and traders and people working in markets changed their behaviour less than consumers, even though they were probably exposed to greater risk. Most small-scale producers continued to dispose of or eat dead birds as they had been doing before (Kyomugisha, 2008) and continued to restock as they did when faced with other poultry diseases (Hickler, 2007).

Some governments, on the other hand, took HPAI very seriously once it became widely known in 2004. After unsuccessful attempts to maintain a low profile

Figure 1. H5N1 HPAI outbreaks in domestic poultry between 01 July 2005 and 30 June 2006



and dispose of the problem, the international community stepped in with advice, finance and pressure and concerns that the next human influenza pandemic might originate from HPAI. The measures initiated to control outbreaks – widespread culling with limited compensation; delayed restocking; movement and market restrictions; and bans on production – all had severe impacts on small-scale producers and traders, yet in some countries the disease remains in the poultry population.

IMPACTS OF HPAI DISEASE AND EMERGENCY RESPONSE MEASURES

The first visible impact of the HPAI outbreaks in poultry came in the form of birds dying suddenly in large numbers, followed by ring culling sometimes within a wide radius as the first response by veterinary services. The combination of these events resulted in devastating losses along the whole value chain, directly through asset destruction and indirectly through lost production time and foregone income.

Many smallholders were badly damaged (Ahuja *et al.*, 2009; Geerlings *et al.*, 2007; Rafani *et al.*, 2008). Intervention strategies to provide safety nets (food aid, cash grants, cash/food for work) have been used very little and usually only consist of compensation payment for culled birds, which does not cover the losses sustained by the owners of poultry between culling and restocking or compensate suppliers of inputs for their losses.

The first wave of culling often occurred well after the disease was first established with cursory explanations to smallholders on the reason for such a measure. In some countries there was only partial or no compensation distributed to producers for culled birds. In Lao PDR, Cambodia and Myanmar (Baumann, 2007; Burgos *et al.*, 2008b; Burgos *et al.*, 2008d), culling was not accompanied with compensation.

In Viet Nam, compensation in the first outbreaks, where the most extensive culling took place, was much lower than the market value of birds and given to relatively few poultry owners – although the compensation policy has since been improved (ACI, 2006). In India and Indonesia, compensation funds were not made available immediately and have not always been evenly distributed or adequate (Ahuja *et al.*, 2009). In Egypt, compensation was not given to smallholders (Geerlings *et al.*, 2007; UNSIC and World Bank, 2008; World Bank *et al.*, 2006). This often resulted in people hiding their birds or failing to report successive outbreaks. Countries generally did not include poultry collectors, traders and market sellers in their compensation schemes.

The collateral damage from these direct impacts was considerable. For example, in Egypt it included reduced household food consumption and school attendance by children, while people who used poultry as a reliable source of income and social recognition experienced stress, depression and sadness. Social relations were affected when people could no longer honour guests with a meal based around poultry (Geerlings *et al.*, 2007). In West Bengal, some households could not afford to buy replacement chicks as they received inadequate or no compensation. Chick sellers received no or limited credit support from the private sector to resume their activities. When they were able to resume business, they refused to sell chicks on credit, although this had previously been common practice (Ahuja *et al.*, 2009). Landless poultry-owning families were badly affected in West Bengal. In some female-headed ultra-poor households, young girls had to migrate in search of casual wage employment or revert to labour-intensive and less remunerative activities. Both of these options resulted in a loss of status within the community (Ahuja *et al.*, 2009).

In many places, smallholders faced with loss of poultry were slow to restock or changed to new kinds of livestock production. Some women in Egypt have been keen to restock but afraid of putting their household at risk and of losing the money they could invest in restocking, as HPAI is still very much present in the country (Geerlings *et al.*, 2007). In Viet Nam when small-scale producers were slower to restock than large ones, some lost their market share (ACI, 2006). In West Africa, people switched to pig keeping and this resulted in relatively inexperienced pig producers having to deal with unfamiliar pig diseases.

IMPACTS OF MARKET SHOCKS

When HPAI outbreaks were experienced for the first time or even feared, consumers stopped eating poultry products. The dramatic fall in demand and the drop in prices that followed had a serious impact on small-scale commercial producers in Egypt, West Bengal, Turkey and some peri-urban areas in Thailand and Indonesia (FAO, 2006; Hartono, 2004; Hinrichs, 2008; McLeod, 2010; Yalcin, 2006), many of whom were raising poultry on credit and were now faced with loss of their capital, loans they could not repay and no financial assets left to re-invest. Corresponding rises in other food prices also affected poor households (Hinrichs, 2008; McLeod, 2010). This pattern occurred in most countries faced with the first outbreaks, and was often felt by producers and consumers far from the site of the original outbreak, even across international borders. In 2006, when Nigeria was affected, there were no reported outbreaks in Cameroon, but local consumption dropped very

substantially, greatly damaging producers' livelihoods and bringing poultry prices down by over 50 percent (Ngatchou and Teleu Ngandeu, 2006).

EFFECTS OF POOR COMMUNICATION

Communication gaps of many kinds contributed to the impacts of HPAI. A research meeting held in 2010 (Pro Poor HPAI Risk Reduction Project, 2010), reflected on communication in HPAI control and concluded that while dealing with the immediate crisis:

- the science community failed to communicate sufficiently to policymakers that HPAI control is a long term effort requiring sustained investment,
- there was a lack of understanding of the real concerns of farmers and the public, which contributed to poor communication of technical information, and
- donors co-ordinated poorly in communicating with countries and each other.

All in all, the crisis was not helpful to constructing positive dialogue and communication that could lead to long term behaviour change.

When the HPAI outbreaks began, journalists were not properly briefed on the effects of HPAI and how to prevent spreading, or were differently briefed by human health and animal health representatives. Yet it appears that media can play an active and constructive role in bringing about a shift in awareness. In Turkey, there is a strong and vocal written press and almost every household has television. When there was a drop in poultry consumption following the outbreaks, industrial producers invited a well-known and respected journalist to visit their sites and publicly report on what he observed. He did not receive any payment for this in order to preserve his neutrality. Moreover, when human deaths were caused by HPAI, the population at large and smallholders became keenly aware about them because the media extensively reported them. This led rural communities to understand that the disease needed to be dealt with in a different way and was a contributory factor in controlling subsequent outbreaks (Honhold, 2009).

IMPACT RELATED TO LONG-TERM CONTROL MEASURES

In the attempt to reduce future risks from HPAI and other zoonotic diseases (diseases that can be passed from poultry to people), countries are using two approaches. One is the use of biosecurity measures to prevent diseases. These consist of physical barriers or management practices that prevent disease coming into a flock or leaving it. On a small farm, measures could include fenced enclosures, washing hands and feet before entering the enclosure, not allowing anyone to enter other than people responsible for care of birds and quarantining new birds before they enter the flock. As yet there is little information available on cost-effective biosecurity for small operations (FAO *et al.*, 2008) and therefore this approach has not been widely adopted. Market hygiene has been promoted by the international community and a few larger markets in affected countries have been upgraded to make it easier to separate birds and people and keep facilities clean.

The second and more extreme approach taken in some places is to change regulations about the type of poultry that can be kept or where they can be produced or sold. This usually has the aim of moving production away from urban locations, upgrading or closing markets where live animals are sold, upgrading slaughter facilities and sometimes of reducing the number of small scale poultry producers. It

is too soon to know what the long-term impacts of these changes will be but some effects can already be seen.

In Thailand, small chicken and duck farmers have had to conform to heightened biosecurity requirements. The government attempted to lighten the burden which these new requirements imposed by, for example, making available low interest loans to farmers who wished to upgrade their operations. However, many decided to close down their operations entirely, making 2005-2006 a period of significant consolidation and restructuring within the Thai poultry sector (Safman, 2009). The indirect results of the HPAI outbreaks continue to limit the profit to be made from small-scale commercial poultry keeping in Thailand (Heft-Neal *et al.*, 2009).

In some places, unofficial markets have persisted in spite of bans, with even less hygiene monitoring than before, while in others, small-scale stakeholders (producers, traders, transporters, slaughterers, and processors) have lost one part of their livelihood. Market restrictions have rendered small-scale commercial producers very vulnerable.

In Jakarta, a ban on poultry production had significant negative socioeconomic consequences for small-scale poultry producers. A survey conducted on 138 households showed an estimated average 32 percent decrease in household income after the ban on peri-urban duck production. Women have had to seek income earning activities outside the home to provide for medical and educational expenditures and occasional household needs. This requires them to be away from their homes and is therefore difficult or impossible for women with young children. Prior to the ban, they could raise poultry while taking care of their children and generate an income over which they had control. Household poultry meat and egg consumption decreased by 50 percent and poultry farmer groups have disbanded, destroying social networks (Rafani *et al.*, 2008).

In Egypt, prior to HPAI, smallholder poultry generated income on a frequent and regular basis. Women were not only in charge of caring for the birds but had control over the income generated by the activity. With the banning of home-based poultry production, households have fallen into more poverty going from 'medium' to 'poor' or from 'poor' to 'very poor'. The ban also led to some "illegal" poultry rearing in apartments and houses, instead of rooftops and backyards, bringing family members into even closer contact with birds (Geerlings *et al.*, 2007). Around Cairo some physical markets have been replaced by "virtual" markets, where orders are placed by phone and birds transported directly from farm to buyer (Honhold, 2009).

In Lao PDR, market bans in cities such as Vientiane most affected poor traders and processors, who lack the necessary assets to diversify, and who received no type of compensation. The impact on small commercial poultry collectors, traders and market sellers has been significant, with a total loss of income for some. This has been especially true for traders who are also widows/divorcees with dependents and do not have the flexibility to seek out alternative trade opportunities because they have few capital assets (Baumann, 2007).

In Viet Nam, new regulations on poultry production zones are being explored. They can be expected to affect small-scale stakeholders throughout the poultry market chain for whom poultry is the major income-generating activity and who do not have other assets, such as land, labour, capital or knowledge, to compete in

a reorganized sector. There is a possibility that these stakeholders will change to other jobs such as those created by large-scale slaughtering and processing enterprises. However, this may not be the case, as poor smallholders may not have the assets or skills required to shift their livelihoods (Miers, 2008).

Also in Viet Nam, demand for poultry products shifted to supermarkets and other city retail outlets in Ho Chi Minh City and, to a lesser extent, Hanoi. Traditional producers, who lack access to these outlets, lost part of their market. However, research from Viet Nam found that consumer preference for traditional poultry breeds has allowed some small-scale traditional producers to benefit. Those who had the means to re-invest following an HPAI outbreak capitalized on consumer preference for traditional breeds and were consequently only negatively affected by HPAI for a few months before they could re-start selling (ACI, 2006). This finding has wide relevance given the value placed on traditional breeds in many countries.

Banning specific activities can result in social tensions. Banning free movement of fighting cocks after HPAI brought about demonstrations in Thailand, where cock owners had been requesting proper access to vaccination and information on its effectiveness. Subsequently, fighting cock passports were introduced.

COMPLEX IMPACTS

Smallholders are constantly dealing with numerous constraints at the same time (including drought, floods, low yields, crop losses, low prices, human illness and food security issues). This means that they view the risk of diseases, including HPAI, differently from industrial producers. Most of the research done on the impact of HPAI has focussed on the poultry enterprise alone, rather than considering it as part of the household's portfolio of income generating activities and assets.

Risk mitigation strategies for smallholders tend to be geared towards diversification. They may raise several types of crops and livestock and also work off farm, keep part of the flock with a relative and, as previously mentioned, sell birds when disease is imminent rather than investing in vaccines and housing. If, however, smallholders have to deal with loss of poultry at the same time as another shock, this heavily damages their livelihoods, and may tip them over into food insecurity.

The need to maintain many sources of livelihood means that smallholders will only consider measures proposed to reduce livestock disease risk, such as improved biosecurity, in the context of their entire approach to reducing risk to their livelihood. Even when they are aware of risks linked to poultry, investment in disease prevention competes for household budget and time with other household risks and activities. Even in the face of an HPAI outbreak, they have more pressing priorities such as access to adequate and sufficient food, clean water and other staple goods and basic services and see no added value in reporting disease if there is no compensation.

It is possible that, faced with increasing demands to register their flocks and apply biosecurity and the need to travel to new and more distant markets if local ones are closed, many smallholders will simply stop keeping poultry, or greatly reduce the number of birds they keep. The long-term effects of excluding smallholders from poultry raising would certainly be damaging to the livelihoods of enormous numbers of households, and there is no conclusive evidence that eliminating scavenging poultry is the best – or even most realistic – approach to HPAI eradication.

SPECIAL FEATURES OF LIVESTOCK DISEASE EMERGENCIES

Livestock disease emergencies, unlike those caused by natural disasters such as earthquakes or floods, are complicated by the fact that the problem may continue to grow while emergency containment and relief efforts are under way. To quote FAO's experts in emergency relief, these are "disasters like no other". In emergency response, the usual steps, such as rapid needs assessments, supplying immediate recovery inputs, and short- and long-term rehabilitation mechanisms, are not easy to implement when the problem is still spreading and containment measures may cause further damage. Another difference is that people and countries that do not have the disease may still suffer from consumer and market reactions.

Because of its potential to cause a human pandemic, HPAI was treated as a global emergency well beyond an animal health crisis, justifying rapid and extensive control measures and relying heavily on the assistance of the international community to support response and control.

In the livestock sector's response to HPAI, four different types of expertise came into play, with varying effect. Veterinarians from national and international systems brought their expertise in emergency disease control, but often they were not trained or specifically required to consider people's livelihoods in their work. International response operators trained to deal rapidly with emergencies brought their knowledge of crisis response but knew little at the outset about livestock systems. Smallholder poultry producers at times brought their local knowledge and the experience of keeping their own flocks, but this was often disregarded by those in charge. And finally, people with experience in rural development and poverty alleviation had very little involvement in the early response but commented with increasing concern on the livelihoods impacts of some of the measures applied.

Relatively few humans have died of the disease while tens of millions of birds were destroyed. Moreover, in countries where governments have not managed to communicate effectively to poultry breeders the value of preventing HPAI as opposed to any other poultry disease, spread amongst birds has continued. Table 1 describes five types of risk posed by HPAI and the way each has been addressed since 2004.

The interests of stakeholders were not aligned in deciding how to address the first four risks in Table 1 and this has had important implications for the effectiveness and livelihoods impact of risk reduction strategies. The result has been that, for the poor in a number of countries, the 'cure became worse than the disease'. This has given rise to the fifth risk, namely that keeping and marketing poultry is constrained and thereby, at least partially, removed as an activity from the livelihoods and subsistence food portfolios of poor people. This may be the most serious risk poor poultry producers face from HPAI. A holistic pro-poor HPAI risk reduction strategy would mean preserving poultry rearing as an economic activity that remains within the reach of people with low initial assets. To be credible in local eyes, "second generation" HPAI strategies need to provide the means and incentives for these people to attain safety standards that are 'acceptable' with explicit reference to comparable food safety risks and livelihood requirements (Otte and Roland-Holst, 2008).

The approach recommended by FAO in its Good Emergency Management Practice (GEMP) guidelines (FAO, undated) involves four stages: planning, recog-

Table 1. HPAI risks and ways of addressing them

Type of risk	How it was handled in 2004-2006	Where it is in 2010
(I) Risk that HPAI poses to poor peoples' poultry.	Poorly understood in terms of livelihoods impact.	Varies from one country to another. Seldom a priority in long-term measures.
(II) Risk that infected poultry poses to the poor.	Probably overestimated.	Largely ignored.
(III) Risk that HPAI in poor people's poultry poses to other poultry and related business interests.	Probably overestimated, but has influenced national responses.	Largely ignored.
(IV) Risk that HPAI-affected poor people represent to humanity as initiators of a global pandemic.	Probably overestimated, but has driven the international response.	Largely ignored.
(V) Risk that keeping and marketing poultry is constrained and thereby, at least partially, removed as an activity from the livelihoods and subsistence food portfolios of poor people.	Completely ignored.	Rising awareness both about the risk and difficulty of enforcement of poultry keeping bans.

Source: J. Otte communication in Rosenthal and McLeod, 2008

dition, responding and recovery. In the planning stage, emphasis is placed on risk communication and on developing mechanisms that involve all necessary government and private sector services and farming communities in the emergency response. The recovery phase includes rehabilitation - helping farming communities recover: "special support mechanisms and programmes should be considered to allow affected farmers and farming communities to get back on their feet after a crippling disease outbreak." In most developing countries affected by HPAI, some of these important features were introduced well after the emergency had begun and some were never introduced. For most natural disaster emergencies, the focus is on mitigating people's vulnerabilities and rebuilding lost livelihoods. In the case of HPAI, the focus has been on the handling of poultry and wild birds with the aim of preventing spread of the virus.

Further analysis of good practice in emergency response was put forward in June 2009 when, during the second session of the Global Platform for Disaster Risk Reduction, the importance of utilizing local knowledge and wisdom relevant to disaster risk reduction was highlighted: "Various participants stressed the need for, inter alia: long-term policy agendas; early prevention and preparation for natural disasters beyond 2015; regular monitoring; involvement of international development sectors in disaster risk reduction; better integration of development and humanitarian efforts; and provision of positive incentives for change" (IIED, 2009).

Within HPAI infected countries, there was enormous pressure to act quickly to bring an escalating problem under control, with little time or thought given to minimizing damage to livelihoods from control initiatives, or re-building after the emergency. Control measures have often been applied without local consultation. During the first outbreak waves in most countries, culling was done on a large scale, with no or inadequate compensation, accompanied by restrictions in poultry movement, but also new regulations in the way that birds could be kept and sold.

Some of the same countries have responded to successive waves of disease in a more targeted and thoughtful way (McLeod, 2009). Each country has adopted methodologies reflecting the political environment, existing human and financial resources and technical means. However there is still very little engagement of small-scale producers and traders in planning for emergencies and even less so for emergency disease control or in implementing it in the aftermath of HPAI. The next section examines why this is so, and what the alternative may be proposed.

The relationship between farmers and animal health systems

National animal health systems include state veterinary services, private veterinarians, para-veterinary professionals, community leaders, input and technology suppliers, licensing and food safety authorities, professional bodies, and the laws and regulations that bind them. All have a role to play in protecting poultry health and poultry product standards. The relationship between national systems and international bodies is mainly based on standards developed by the World Animal Health Organisation (OIE) as encapsulated in the Terrestrial Animal Health Code, which focuses on trade regulations. This section looks at the concerns of three of the main players and then at the relationships between them.

THE PUBLIC SECTOR: STATE VETERINARY SERVICES AND LICENSING AUTHORITIES

The core of the public animal health system in all countries with a formal government is the state veterinary service, whose mandate is to improve and maintain animal health and protect human health against food-borne and zoonotic diseases. Its role has little to do with treating animals, the traditional image of the veterinarian, but is primarily that of developing and implementing policies, regulations and laws, taking part in trade negotiations, anticipating and controlling outbreaks of major diseases, and communicating about risks and responsibilities to the livestock sector, other government agencies and the general public. These responsibilities are shared with licensing and food safety authorities that may or may not be part of the same government ministry. The state service also has an important role in enabling private service delivery.

In developing and emerging economies, the numbers and skill levels of veterinary services are often limited. Each veterinarian (and paraprofessional) is expected to serve an enormous number of farmers and their animals. Few public veterinarians have practical experience in poultry health and there are limited opportunities for continuous professional development. Since the early 1990s, agriculture ministries have concentrated on other livestock rearing and crop production and tended to ignore poultry.

Controlling HPAI has required some countries to update their animal health policies and laws. These have covered outbreak control contingency planning, compensation for culled birds and in some cases temporary or long-term banning of certain types of production [ducks] or production in certain places (ACI, 2006; Thieme and Hinrichs, 2007). Legislation updates have been made in several countries regarding vaccination policies, slaughter facilities, market closures and movement regulations. Annex 2 provides some examples.

THE PRIVATE SECTOR: PRIVATE VETERINARIANS AND PARA-VETERINARY PROFESSIONALS

Although there are significant differences in national animal health systems, the activities and responsibilities of private and public veterinarians often overlap. Private veterinarians deliver day-to-day care of animals and can also take on government contracts for the routine work of searching for disease and for the supervision of emergency operations such as culling of birds, investigation of disease outbreaks, vaccination (although this is more often done by less skilled workers trained specially or by farm workers), and collecting samples of faeces or blood in farms and markets for analysis. They have grown in number in developing countries after “restructuring” (downsizing) of the public sector, flourishing in areas close to towns but uncommon in remote rural areas. Some are former government employees, some work part-time for the government and part-time in private practice and a few are veterinary graduates who have gone immediately into private practice. They may also collaborate with non-governmental organizations (NGOs) on programmes to fight diseases that are not covered by national animal health programmes.

In some developing countries where qualified veterinarians are too few in number for the farmers needing their services, the development community and governments have made an effort to fill the gap by setting up programmes to train animal para-veterinary paraprofessionals (paraveterinarians, animal health technicians and community animal health workers), which have grown in number and acceptance over the past 20 years or so (Catley *et al.*, 2004). In other settings, traditional animal health “doctors” still play an important role.

Para-veterinary professionals are much more accessible and cheaper than veterinarians, but their training and experience are very variable in quality, from a week or two of basic animal health care to a few months of community animal health worker (CAHW) training or, much more rarely, two years of college training. Unlike veterinarians, they usually do not belong to professional associations that certify and monitor their competence, making it difficult to know their numbers and accurately evaluate the quality of service they provide. The OIE recommends that para-veterinary professionals be supervised and regulated by veterinary statutory bodies but these organizations are often reluctant to recognize paraprofessionals. Like fully trained veterinarians, para-professionals often prefer to work with larger livestock because potential poultry revenue may be too low.

Many paraprofessionals receive basic training through development projects or NGO programmes, which also provide them with tool kits and at times a bicycle or in rare cases a motorcycle. Recurring refresher trainings, regular availability and easy access to drugs and vaccines, and overall monitoring of CAHWs’ practice by local authorities or veterinarians are important elements of these programmes, although difficult to implement and not always provided. Government contracts for certain types of work can also provide additional income that allows CAHWs to remain in their work even when private income is less reliable (Ahuja, 2004).

There is an emerging pattern of multi-level services where public and private veterinarians train or collaborate with para-veterinary professionals (ASVF, 2006; World Bank, 2010). In Africa, one of two models tend to operate. In Eastern and Southern Africa, where population density varies and can be quite low over large expanses of land or where internal strife makes it unattractive for veterinarians to

practice outside of major city centres, CAHWs have tended to operate independently in villages. They experience difficulties in deriving a steady stream of income from this activity and often need to dedicate much time to travelling long distances between input providers and clients. Their status is rarely recognized or regulated by government or private animal health authorities. However, some NGOs have been working with pastoral communities and CAHWs to set up networks (Baumann, 2007; Community Animal Health Network, undated) and there are examples of CAHWS working under the supervision of private vets (discussed by Bekele and Akumu 2009). A second model is applied mainly, although not exclusively, in francophone countries like Togo and Burkina Faso, where paraprofessionals work under the authority of a private veterinarian who may employ them and with whom they have regular contacts. Professional standards tend to be better adhered to and drugs and vaccine distribution and quality are more closely monitored, although fake drugs still pose problems throughout most of the developing world. These animal “nurses” usually work full-time and derive a large portion of their income from this activity.

Both public and private animal health services in developing countries usually have a distinct lack of expertise in poultry health; the most specialized poultry veterinarians are usually those working for the industry. Veterinarians tend to specialize in pets and larger animals. Para-veterinary professionals receive little information about poultry health in their training, and have few experts on whom they can call for advice, although they often have a good understanding of local production systems and may be poultry owners themselves. Moreover, they deal with systems in which producers are not only numerous but often practise poor management and include many smallholders who invest very little in animal health inputs for their flocks.

THE INTERNATIONAL COMMUNITY

Normally the role of the international community falls into two parts; developing international regulations governing trade such as those under the WTO Agreement on Sanitary and Phytosanitary Measures (WTO, 1998) and providing development assistance to rural communities that can include poultry development or support to community animal health services.

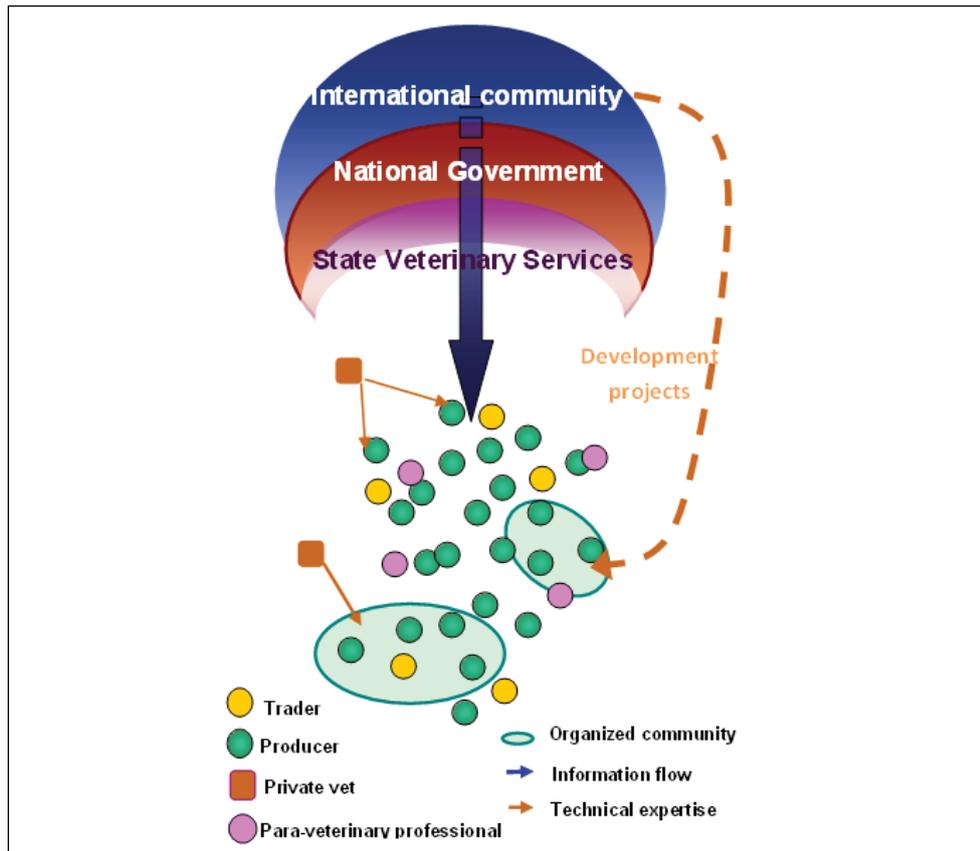
During an outbreak of a major disease, this changes to a mixture of fire brigade and advocate. A number of countries have called on the international community for assistance to deal with HPAI outbreaks and in some cases to develop better management practices in markets and farms. Since 2003, the OIE has also introduced new guidelines relating to how countries are declared free from infection, laboratory testing for diagnosis and the use of compartments in the livestock sector (OIE, 2007; OIE, 2009).

At the same time, the international community has taken a strongly proactive approach in advocating for more determined action to control and even eradicate HPAI. This is driven by industrialized countries which have fewer immediate health crises than developing countries and where there was and still is a fear of a global human influenza pandemic with the avian influenza virus as its source.

RELATIONSHIPS

Before the HPAI crisis there was a rather distant connection between government and small-scale poultry farmers, as illustrated in Figure 2, and this is very much the situation in places that have been little affected by HPAI.

Figure 2. Relationship between animal health systems and small-scale poultry systems during HPAI



The owners of small poultry flocks are accustomed to their poultry dying from a number of causes and, if they seek help, tend to call first on the animal health service providers in their own community, such as the para-veterinary professionals who own feed and drug shops in villages, or the suppliers from whom they buy chicks, or traditional healers. Almost never will they go to the state service.

Although the state veterinary service should consider the needs of all groups within society, small-scale producers take up little of its attention when there is no human health or trade threat emanating from small-scale farms and no demand for services. It has a slightly stronger relationship with the commercial poultry producers associations, particularly in countries that export.

Governments often welcome development projects that promote poultry production for smallholders in developing countries. Development agencies provide direct assistance to animal health systems in developing countries through projects to build capacity in para-veterinary professionals (see Annex 1) and livestock development projects as well as strengthening in-country laboratory capacities.

There is also a relationship between governments that trade internationally and international bodies based on OIE trade regulations for animals and animal products. This takes little account of the local context and the array of risks faced by smallholders, who are only impacted by regulations affecting export and import if these result in major changes to domestic production and marketing chains.

This pattern changed in countries that experienced HPAI outbreaks. Emergency finance was injected into state veterinary services, without consultation with other departments or ministries, such as social services, trade or development. Veterinary services mounted rapid and sometimes very extensive control operations, usually involving wide-scale culling with no or inadequate compensation, closure of markets and restricted movement of birds. In some countries, certain types of production systems or production in certain areas were banned (ACI, 2006; Rafani *et al.*, 2008). This meant that the first contact that many small-scale producers and traders had with state veterinarians was when those people came to supervise the destruction of their poultry, to ask them for information on their neighbours' poultry and to disturb trading to take blood samples at a market, or to tell them that they could no longer raise birds.

The international community put pressure on governments to mount rapid emergency response actions and also provided advice, finances and technical assistance to state veterinary services. The extent of this engagement raised the profile and capacity of veterinary services but it also diverted attention, national human resources and finances into outbreak control operations, reducing what was available for development work. Even with international guidelines (FAO, undated) that recommended building rehabilitation into contingency planning, very little international resource was directed towards this effort. Certain donors concentrated their support to emergency response equipment and consumables with limited concern about whether countries had the capacity to utilize it efficiently.

The Bellagio Statement of Principles recommends: "Planning and response should facilitate public involvement in surveillance and reporting of possible cases without fear of discrimination, reprisal or uncompensated loss of livelihood. Recognizing their vulnerability, special efforts are needed to foster reporting by disadvantaged groups, as well as to protect them from negative impacts which could worsen their situation." (The Bellagio Meeting, 2006) Although the most vulnerable principal stakeholders in many HPAI emergency control operations have been smallholder poultry producers and traders – particularly women – they have very rarely been consulted and even less integrated in elaborating preparedness and response strategies. Moreover, safety nets such as food aid, cash grants, cash/food for work and non-poultry interventions resulting in alternative revenue-generating activities may have been considered by the emergency decision-makers but generally were not applied.

After the first outbreaks some governments modified their approach, introducing or improving compensation plans, training staff and sometimes initiating detailed disease searching which meant that culling could be more targeted and greatly reduced (see the Thai "x-ray" surveys described below). Another new development in some places was that paraprofessionals became more engaged in disease surveillance and reporting when it became apparent that traditional methods were not effective in finding disease because the existing system proved lacking in the human resources to do so (Mondry, 2008).

In a few cases, community networks have been set up, strengthened and given a key role in the surveillance and control of the disease. The Thai and Lao PDR examples below illustrate approaches that are very much context-specific and reflect the local political, geographical, cultural and economic situation. Both illustrate the value of using existing and well-embedded networks and institutions, rather than setting up new mechanisms that people may take time to trust and rely upon. The Lao PDR example follows a pattern used in other places, but previous initiatives have tended not to target poultry and not to emphasize disease reporting. The Thai example illustrates efficient collaboration between the animal health system and human health workers.

Box 2. Thailand X-ray surveys (Safman, 2009)

In Thailand, the collaboration among village human health workers (there were relatively few CAHWs prior to the outbreaks) to identify HPAI at the village level was successful in greatly reducing outbreaks. Thailand is a middle-income country and the fourth largest poultry producer and exporter in the world. At the time of the outbreaks, it endeavoured to rely as little as possible on the international community. Building upon the existing strengths and complementarity of the Ministry of Agriculture and Cooperatives and the Ministry of Public Health, a system of more than 1 000 surveillance and rapid response teams was set up and worked in tandem with the ministries' trained personnel in conducting "X-ray surveys" which provided disease control personnel with almost real-time information on the prevalence and precise location of HPAI outbreaks nationwide. These surveys were conducted on a semi-annual basis from October 2004 through December 2006 and the analysis of the data led to identifying the role of ducks in HPAI spread.

The teams have remained in place, carrying out passive surveillance, health education efforts and other X-ray surveys. They comprise people from Thailand's village health volunteer network, established in 1973 and constitute a key component of the country's primary health care delivery system. Their involvement in the campaign served a secondary, but very important, function, which was public education and public relations. This promoted a more positive and cooperative attitude toward disease containment efforts among the rural population as a whole.

Both examples demonstrate that there is a niche for paraprofessionals in the delivery of livestock services, where they bring the benefit of being members of their community, with long-standing trust relationships (this, however, is also a deterrent to disease reporting). From this position, they can assist farmers to develop better animal health care practices and improve outbreak detection for major diseases by improving the linkage between farmers and state veterinary services. However, fulfilling both roles together is a delicate balance. If state veterinary services do not respond to reports, or respond in a way that is damaging to livelihoods, this can destroy the trust between farmers, paraprofessionals and veterinarians.

Box 3. Lao PDR village based surveillance (Mondry, 2008)

After the appearance of HPAI in Lao PDR, village surveillance networks were set up as the main strategy to strengthen effective disease detection and control. Over 4 400 CAHWs were trained through participatory training techniques on identification of infectious diseases and major poultry diseases, including HPAI, as well as reporting. They were also organized in a surveillance network supported by and linked to the district and provincial level veterinary services, which conduct disease investigations, including sample collection of poultry. The Department of Livestock and Fisheries through its veterinary epidemiological and laboratory diagnostic services ensures further HPAI investigation, early detection and control measures. When the reported suspicion is confirmed as HPAI, people receive T-shirts or small cash amounts as incentives.

CAHW trainees were chosen by their communities, which designated two highly motivated livestock farmers between the age of 16 and 45 and, whenever possible, one man and one woman. Because CAHWs are part of their community and will only report suspicion of an HPAI outbreak with the full support of their community, extensive public awareness campaigns on HPAI for farmers along with information on better poultry husbandry were carried out with 160 000 men and women farmers. 200 provincial and district livestock staff received the same training as the CAHWs, along with sample collection and disease control. 42 livestock staff with higher education were trained in HPAI epidemiology, active and passive surveillance strategies and surveillance and control after outbreaks.

Studies following the trainings showed a significant increase in the knowledge of HPAI prevention for poultry and for humans. CAHWs not only provide information on HPAI but have more and more been considered as resource persons when problems occur and are an important reservoir of human capacity, which is essential given existing limited veterinary capacity. This report system, combined with a rapid disease investigation including sample collection by the District Agriculture and Forestry Office staff, seems to be the most cost effective approach to early HPAI detection. However, given the limited human resources in Lao PDR's veterinary services, sustainable funding for recurring costs remains a problem and some district veterinary staff still need to grasp that a good diagnosis outcome means reporting and follow up of every suspicion, even those that turn out to be negative. Easily available and adequate compensation funds are also indispensable. (Schwabenbauer, 2009)

The role of village leaders and farmers in emergency disease control is still neglected. Farmers are the first to see a disease outbreak, followed by owners of drug shops, market operators and local animal health practitioners who may notice an unusual situation but be unsure how to deal with it or unwilling to report it. The role of producers in reporting disease is an essential part of animal health systems but it was not integrated in pre-HPAI disease monitoring systems and very little has been done to change the situation.

Recommendations for people-centred animal health systems

Reflecting on the experience of HPAI and our improved knowledge of smallholder poultry keeping, it is obvious that changes are needed within animal health systems if they are to provide a better service to poultry producers, and particularly to improve emergency responses and make them less damaging to poor people's livelihoods and dignity.

One way of approaching this is to make the livelihoods of farmers and traders the primary objective of the actions taken by animal health systems, with the control of disease as a second and supporting objective. Most of the time these two objectives are very well aligned but the strategy for control could sometimes be different if livelihoods were the primary focus. For example:

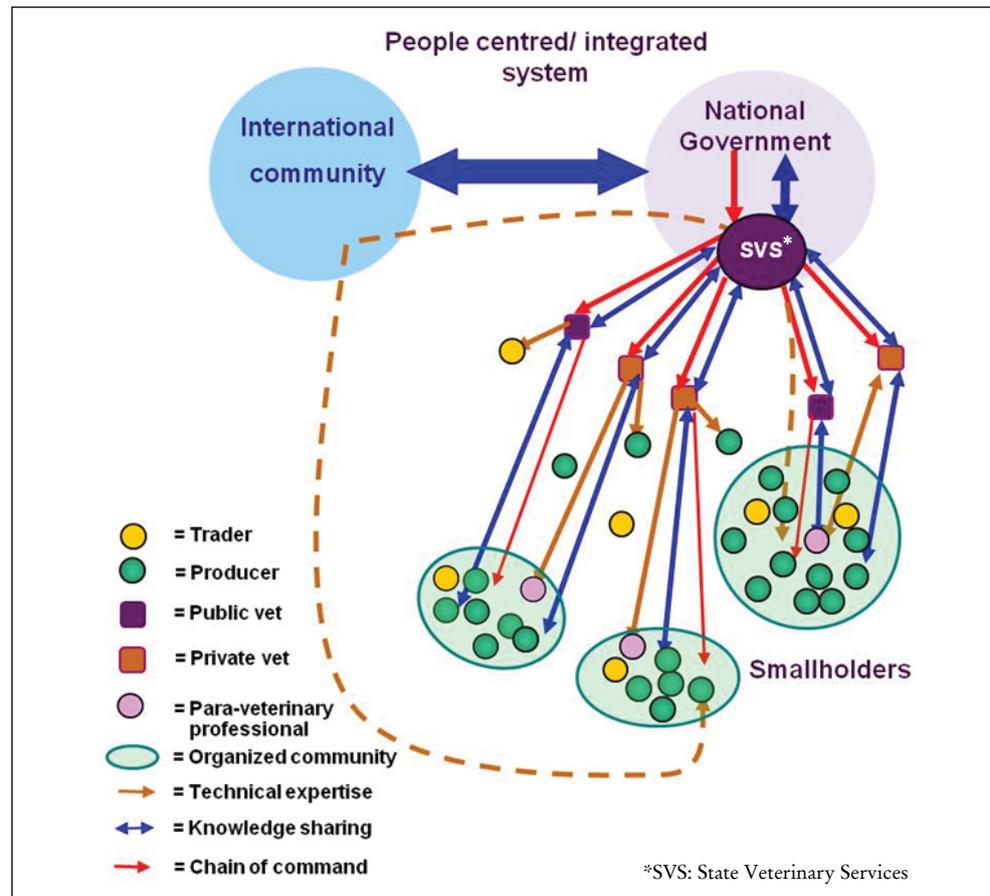
- An effective animal health system with livelihoods as the primary objective will pay attention to several major animal health problems simultaneously, because focusing on one disease at a time is costly and time-consuming and does not take consider the reality of farmers' lives.
- A people-centred animal health system will encompass assistance to small-scale livestock producers and traders even when there is no major disease outbreak, with strategies for poultry sector development that provide space for small-scale operations.
- Animal health systems with people at the centre of their objectives will work with other government departments to find ways to mitigate long-term impacts of regulatory changes on smallholders' livelihoods, developing an integrated and farsseeing animal health strategy that takes into account poverty reduction and food security and incorporates long-term prevention and sound production practices (Sproul *et al.*, 2009b; Alders and Pym, 2009).

The *laissez-faire* approach that prevails in peacetime and the top-down model that swings into place during a disease crisis would be replaced by something more like Figure 3. While this is complex to interpret, it reflects the complexity of the real world. It includes a stronger two-way communication between farmers and veterinarians, both private and public, a more integrated approach to providing technical assistance and more concerted action at local levels. The international community is not primarily a driver of emergency response but a supporter during both peacetime and emergencies of co-ordinated initiatives that strengthen public and private service provision.

The national and international media, although not shown in the figure, could play an important role by disseminating accurate rather than alarmist information and contributing to local education through radio and local newspapers.

State veterinary services with newly enhanced training and financing should be in a strong position to plan better how they will control disease outbreaks with minimum damage to livelihoods, and how to strengthen surveillance systems so that disease outbreaks can be spotted more quickly making them less likely run out of control.

Figure 3. People centred / integrated animal health system



The following four recommendations for animal health span long-term development and better preparedness for animal health emergencies. Although the actions are described for the poultry sector, most of them are relevant not only to poultry but to small-scale livestock keeping as a whole, while acknowledging that poultry plays a very specific and crucial role in smallholders' livelihoods.

1. DEFINE, CHARACTERIZE AND QUANTIFY RISK BEFORE TAKING ACTION

The rationale for doing this is to make animal disease control actions proportional to risk so that they are as effective as possible while at the same time cause minimal damage.

In the GEMP guidelines (FAO, undated), FAO recommends using OIE's risk analysis procedure, which advises taking into consideration the results of an evaluation of veterinary services, zoning, compartmentalisation and surveillance systems in place for monitoring of animal health in an exporting country.

However, in order to have a complete understanding of risk, it is important in addition to consider both the risk to the livelihoods of different smallholders and the way that people perceive risk. This should be built into the framework of a formal risk analysis although it usually is not. Actions to control animal diseases should be proportional to the risk they pose. Only major infectious diseases tend

to receive serious and widespread attention by governments, but even for these it is important to clearly describe the nature of the risk – whose risk, what type of risk and how great a risk? – before deciding on actions to minimize it.

- The ideal is a holistic approach to disaster risk management (Baas *et al.*, 2008) that not only encompasses risk reduction and response, but changes the focus of thinking from reactive emergency relief to pro-active disaster risk management. This entails identifying and implementing the best possible preparedness measures that will save livelihoods, rather than just saving lives.
- Part of the understanding of disease risk is distinguishing between risk of a flock being infected and risk of spreading disease. The first priority in a disease emergency should always be to find and cull flocks that are most likely to spread disease (e.g. those where no adequate biosecurity measures are used, or where there is a great deal of contact between the flock and the outside world), rather than spending time locating and culling those that become infected but are dead ends for disease spread. To be effective and efficient, control strategies should be focussed on places where most disease transmission is most likely to occur (Gilbert *et al.*, 2008; Kasemsuwan *et al.*, 2009; Pfeiffer *et al.*, 2007). This requires good descriptive analyses of HPAI transmission routes/networks within and between countries and an assessment of the likely amount of transmission through different routes (Rosenthal and McLeod, 2008).
- Building in an understanding of livelihoods risk will flow from what is proposed in recommendation 2 below. Essentially it means balancing the wish to eradicate disease against the risk that vulnerable people will lose an important part of their livelihood and food security because of the measures taken to control disease.
- As well as understanding the “real” risk faced by each main stakeholder (i.e. the risk that their birds may contract and spread disease), it is important to understand the way that each one perceives risk. As previously discussed, the perception of a small farmer about the risk posed by a disease may be very different from that of the veterinary service or the community at large. Without this understanding, there is a great danger of proposing a response that is impossible to implement.
- Within all of the above, there is a need to understand the dynamics of the livestock sector: where the animals are; how many are there; what economic value they have; what social value they have; in what systems they are kept; where, when and by what means animals and products move. Power dynamics along the poultry production and marketing chain may influence the way that stakeholders define and react to risk and need to be carefully analysed when defining short- and long-term control measures. (Burgos *et al.*, 2008a; Burgos *et al.*, 2008b; Burgos *et al.*, 2008d; Ear, 2009; Forster, 2009; Safman, 2009; Vu, 2009).
- Carefully designed enquiry and planning need to include qualitative and social science skills. Tools such as stakeholder analysis can unmask possible synergies as well as potential or existing conflicts of interests between the different actors.

While these points may seem obvious, policy-makers have yet to fully grasp people's motivations in relation to how they interact with their animals, and many emergency animal health plans appear to be very naïve in their assumptions about risks in the livestock sector and human behaviour in the face of risk. Much of the necessary information and understanding needs to be built up routinely if it is to be reliable and available for emergency planning (Rosenthal and McLeod, 2008). For HPAI, an understanding of disease transmission was built up many months after the crisis had started and is still nowhere near complete. Readily usable and summarized information has not been made available for pig and small ruminant systems.

2. PUT SMALLHOLDERS AND INTERMEDIARIES AT THE CENTRE OF ANIMAL HEALTH PLANNING: INVEST IN PARTNERSHIPS BETWEEN POULTRY OWNERS, PRIVATE ANIMAL HEALTH AND STATE SERVICES

Measures applied will be more cost effective if they are more "people-friendly". If people see that there is added value for them, then they may change the way they raise and handle poultry. More effective disease control will result from stronger partnerships.

If smallholders are treated as part of the solution to an animal health problem rather than (as has often been the case) the cause of it, or an intractable problem, it is likely that they will be more constructively engaged in solving the problem (Miers, 2008; Rosenthal and McLeod, 2008). In their daily lives, small-scale poultry producers and traders face an array of challenges to make a living. Their approach to dealing with livestock diseases is understandably driven by the question "what's in it for me?" But the control of major diseases also requires actions for the good of society. Regulations that define what should be done to reduce the risk of disease spread are necessary but it is impossible to fully regulate the behaviour of millions of small-scale producers even during an outbreak, let alone in daily life, and it is pointless to try. They need positive reasons to take action to minimize disease risk.

When faced with disease emergencies in small poultry flocks, state veterinary services have to cope with limited staff on the ground, limited finances and logistics, and small-scale farmers and traders whose perspective on disease control is at variance with that of the government. Veterinarians in developing countries at all levels require support and timely epidemiological information (Azhar *et al.*, 2010). Yet the chances of meeting these conditions through the public sector alone are slim. State veterinary services need to be willing to build relationships with poultry producers, traders and the industry that will then serve to improve responses during emergencies. International organizations also need to be willing to provide financial and technical support on a continuing basis and not only when motivated by a new crisis.

Taking these perspectives implies the following:

- Systematically involving and consulting smallholders and intermediaries about both emergency and long-term animal health plans. Many of the necessary tools are already available in the development literature and experience. There are countless examples of community engagement and action in livestock development projects and projects to build capacity in para-veterinary professionals, whether this be simply consulting local people or facilitating them to develop their own projects. The spread of information and communi-

cation technology into rural areas also makes it possible for village communities to exchange information with government and with each other. There has even been some success in using mobile phones for HPAI reporting. Tools to promote participation are used for longer-term initiatives where there is time to plan and space to accommodate different viewpoints but they need to be refined for emergency situations.

- Acknowledging that there may not be existing mechanisms for consulting with smallholders equivalent to those that exist for commercial livestock sectors in industrialized countries. There, mechanisms for communication between producers and government are available through associations, unions or private-public joint ventures. There is also a requirement in some countries to hold public consultation on certain issues. Partnerships and consultations are more difficult to organize when smallholders and small-scale traders are numerous, widely dispersed and have no formal bodies to represent them. Special efforts in communication need to be made to accommodate a dispersed population, and all of those involved need to be in a position to make well-informed decisions (in the opinion of many experts interviewed).
- Taking on board the value of farmers' and traders' knowledge about the risk and profit from their birds. Farmers know more than anyone why they keep their birds the way that they do and this information is not easily available from published material. Involving smallholders in planning the control of major livestock diseases means that more information about their systems becomes available while at the same time they have an opportunity to learn about new risks and reasons to comply with control measures.
- Appreciating that people must see added value for them in changing the way they raise and handle poultry – in other words, a tangible improvement in their well-being.
- Giving due attention to social and cultural values associated with poultry. Some values are common but others may be quite different from one place to another as seen in Cambodia, Egypt, India, Kenya, Myanmar, Nigeria, Thailand or Uganda (Ahuja *et al.*, 2008; Geerlings *et al.*, 2007; Hickler, 2007; FAO, 2010c; Kyomugisha, 2008; Obi *et al.*, 2008; Omiti and Okuthe, 2008; Safman, 2009). The economic value of specialist local products must also be appreciated; they suffer less from competition than mainstream commercial products (Burgos *et al.*, 2008a; Omiti and Okuthe, 2008). Moreover, proposed measures have to blend in with smallholders' wider priorities – food security, education, access to jobs, health and clean water.
- Accommodating those farmers who may decide to leave poultry production because the risks for them outweigh the advantages – something that is often forgotten in long-term disease control planning. Such farmers may need assistance to make a dignified and smooth transition to other livelihoods (McLeod, 2007).
- Involving communities to find ways to reduce disease problems which could be put in place at the onset of a disease outbreak. One concrete example was seen in Thailand when, after much negotiating with cock fighters, the authorities adopted a system of identification based on the unique characteristics that fighting birds possessed and devised an official travel document (Safman, 2009).

- Finding a balance between centralized and local action that will work in emergency situations. The commonly used term for the structure of emergency control is a “chain of command” from central to local levels. However, if any of the links in the chain is not functioning, then the response will be ineffective – and if the chain is constructed without knowledge of local institutions, then livelihoods will suffer. An approach that puts people at the centre helps to create a clear understanding of the best fit between centralized and local action under prevailing conditions (Sims, 2009), and ensures that both the centre and the local levels are well resourced.
- Embedding positive incentives with good information to consumers about products and to producers and traders about biosecurity measures that they can realistically apply. Positive incentives come from markets that support consumers to make decisions to buy poultry from safe sources. In small local markets they do this by knowing the provenance of birds and by choosing live birds that appear healthy. In longer market chains where the consumer buys meat or eggs from an unknown source, positive signals can be provided by a hygienic environment in the market or store, or by certification of products that is done in a way that people can trust (Ifft *et al.*, 2009b; Rafani *et al.*, 2008).
- Applying regulations only where they are needed and can be enforced, that take account of people’s concerns and minimize the damage to their livelihoods, are also more likely to be followed. Examples used during outbreak control (Hosny, 2006; Rosenthal and McLeod, 2008; Sims, 2007; Sproul *et al.*, 2009a) included targeted culling instead of ring culling, well-managed compensation schemes, cash grants for poultry development and “passports” to protect valuable birds that have certificates showing that they have been vaccinated.
- Acknowledging human interests when designing disease reporting and surveillance systems. Rapid reporting is the first crucial step to initiating rapid response when a new disease outbreak starts. A surveillance network through local animal health systems is one mechanism for improving disease surveillance, but those involved may be faced with a conflict of loyalties between their private clients and the government. This conflict can be reduced if producers are explicitly made part of the surveillance system and response planning and when the response that follows is rapid (so that disease is controlled quickly) and proportional to the risk (so that the loss of livelihood is minimized). It is also possible to devise mechanisms whereby communities have some part in planning the response (Sproul *et al.*, 2009b; Wieggers and Curry, 2009).

Planning alternative revenue-generating activities with smallholders to give them options to exit from poultry keeping, taking into account the local situation and the extent to which poultry are crucial to household food security.

Being more proactive in building systems at community level and equipping them with technical knowledge on basic biosecurity measures and good poultry management practices so that farmers will demand their services and trust the quality of what is being provided. Private veterinarians and perhaps particularly para-veterinary professionals have a key role in this.

Building upon existing and potential private–public partnerships, where each

partner brings their own mandate, skill and resources, such as:

- Disease surveillance networks involving private practitioners and/or communities.
- Assisting private animal health providers in rural areas to become more sustainable and at the same time improving disease surveillance and emergency disease control programmes by providing them with contracts to carry out publicly funded animal health activities.
- Improving para-veterinary professional programmes to make them more self-sustainable in terms of good business practice. This includes improving, recognizing and regulating the status of para-professionals through legislation, including licensing, defining how professional veterinarians can supervise and work with them, ensuring that continuing professional training is available to them, and enabling state veterinary services to have the means to monitor their standards of service. Annex 3 provides suggestions for good practice drawn from project experiences.
- Supporting development and distribution of good quality drugs and vaccines with a small market (through international funding).

3. MAKE SURE THAT LONG-TERM SUPPORT AND EMERGENCY PLANNING GO HAND IN HAND

Emergency and long-term efforts should reinforce and not destabilize each other.

FAO's own recommendations in its Good Emergency Management Practice state that rehabilitation should be part of planning an emergency disease response. This implies that those working on long-term development efforts will communicate with those planning the emergency response. However in the HPAI response this often did not happen; most contingency plans still do not include a rehabilitation component and the longer-term responses such as closing of markets and restructuring have taken little account of livelihoods impact.

- A viable and good surveillance and response system should deal with all major livestock diseases. Dealing only with one type of animal or disease is too costly and time-consuming.
- Planning ahead is key to identifying and controlling problems at an early stage, ensuring that the response is more efficient while better taking into consideration poor livestock producers and traders. Although it is not possible to anticipate every emergency, it is possible to make contingency plans for financing and responding to particular types of emergency, with clear trigger points that show when an emergency needs to be declared. Risk analysis is an integral part of planning ahead, anticipating and understanding problems and the potential impact they may have; it will contribute to planning prevention and control measures effectively (also see recommendation 1).
- Good animal health planning calls for four types of experts - veterinarians with expertise in emergency disease control, emergency response operators, poultry producers and people with experience of poverty alleviation - to be brought together at the early stage of planning and emergency response, and to keep working together when the response has passed and daily life resumes (Wiegiers and Curry, 2009).
- One size does not fit all – there is a need to identify and implement the best

possible preparedness measures for the context that will save livelihoods, rather than just saving lives. Interventions that fit the local situation rather than blueprints, cross-sectoral perspectives, and time to learn and reflect are important elements of pulling together long-term and emergency anti-poverty actions.

- Poultry industry companies should be encouraged to promote small-scale production, especially those fitting a specific market niche by providing extension services and market access to ensure affordable biosecurity measures for all.
- Important but often neglected parts of emergency disease control are:
 - ensuring that financial and human resources will be available quickly, perhaps by accessing natural disaster funds, perhaps by ensuring that a global fund is always available for animal health crises with potentially high externalities;
 - ensuring that plans are made in advance for rehabilitation of rural populations and farming systems once the emergency phase has passed – ongoing poultry development initiatives need to be brought into the planning since they may be an important vehicle for restocking and controlling its quality (Baas *et al.*, 2008; FAO, undated);
 - ensuring that vulnerable people will be protected – this means taking the time to consult them before a crisis occurs and during the emergency phase, and thinking through the aftermath of the emergency response when choosing response measures (Baas *et al.*, 2008; FAO, 2009);
 - ensuring that supporting institutions – surveillance networks, communication, links between central and local authorities, and legislation updates – are put in place in “peace time” (Ahuja, 2004; Alders, 2001; World Bank *et al.*, 2009).

4. MAKE THE MEDIA A PARTNER RATHER THAN THE ENEMY

Mitigate market shock impacts through effective risk communication (FAO, in preparation; Geerlings, 2006; Honhold, 2009; Safman, 2009) and promote good poultry husbandry practices.

H5N1 has demonstrated that the media can be a destabilizing element or a valuable ally during a livestock disease emergency, depending on the way that risk communication is handled. They can also be an ally outside of emergencies by helping with awareness building.

Important elements in building up a partnership:

- The need to build trust between government, industry and media during peacetime in order for state veterinary services to be perceived as trustworthy and the expert source of information when an emergency does occur (FAO, in preparation; World Bank *et al.*, 2009). Private practitioners including paraprofessionals are often regarded as a trusted source by farmer and traders and can be useful intermediaries.
- The need to train key people in media response and risk communication. These will include members of veterinary services, press attachés, high-level government officials, government spokespeople, donor representatives and other influential figures in media response and risk communication. This will contribute to harmonizing the content of messages during “peacetime” and

outbreaks (FAO, in preparation; World Bank *et al.*, 2009).

- The potential for media to help in training of communities. Specific training on zoonotic diseases and their contamination patterns should be proposed to journalists and reporters so that the media may play an active role in explaining what the nature of risks linked to diseases may be to people whose livelihoods partially depend on livestock and to the public at large. The role of public and rural radio in disseminating educational information has been proven time and time again.
- The spread of information and communication technology into rural areas, which makes it possible for village communities to exchange information with government and with each other.

Examples of community animal health projects

VSF – Belgique

<http://www.vsf-belgium.org/dzf/view/en/391>

- Food security interventions to assist vulnerable livestock dependant communities in Southern Sudan
- Karamajo Livelihood Support Program
- Projet de mise en oeuvre d'un réseau de santé animale et de conseils de proximité en élevage au Niger
- Projet d'appui au développement du zébu Peul au Sahel-ZEPESA

Kyeema

<http://www.kyeemafoundation.org/>

- Village poultry specialist for the design of Participatory Livestock Development Project in Laos
- Train-the-trainer workshop and follow-up activities for full-time village chicken-keeping workers, Solomon Islands
- Malawi Newcastle Disease Control Consolidation Project
- Village poultry trainer for village chicken workshop in Mphanama and Strydkraal Districts, South Africa
- Mama Mkubwa project, Tanzania
- Newcastle disease control in chickens in Ethiopia
- Junior Farmer Field Schools Pilot Project, Zimbabwe

Agronomes & Vétérinaires Sans Frontières

<http://www.avsf.org/>

- Capacity building on management of avian influenza in South East Asia
- SLPP Takeo Project, Cambodia
- Projet Arkhangai-Bayankhongor, Mongolia

Farm-Africa

<http://www.farmafrica.org.uk/>

- Kenya Dairy Goat and Capacity Building Project
- Community Animal Health Network (CAHNET)
- Integrated Pastoralist Project, South Omo
- Moyale Pastoralist Project
- Northern Tanzania Pastoralist Project

Practical Action

<http://www.itdg.org/>

- Traditional conflict resolution mechanisms (Pokot, Turkana, Samburu and Marakwet communities)

BRAC

<http://www.brac.net/>

- Poultry Programme in Bangladesh, 2000
- Poultry and Livestock Programme
- Support enterprises for livestock and poultry farming

Examples of changes in legislation in countries affected by HPAI

Country	General measures regarding animal disease	Specific measures regarding HPAI
Burkina Faso	<p>Arrêté du 20 janvier 1999 portant création du Réseau de surveillance épidémiologique des maladies animales au Burkina Faso (RESUREP). (<i>Founding of an epidemiology surveillance network</i>)</p> <p>Arrêté du 14 février 2006 portant création, attribution, composition et fonctionnement du comité des épizooties (<i>Founding of a committee on zoonotic diseases</i>)</p>	<p>Arrêté Interministériel du 14 février 2006 portant interdiction provisoire d'importation, de distribution et de commercialisation de volaille, de produits aviaires et de leurs dérivés d'origine ou en provenance des pays infectés par la grippe aviaire (<i>Regulations temporarily banning import, distribution and trading of poultry products from HPAI infected countries</i>)</p> <p>Arrêté Interministériel du 22 février 2006 portant création du comité technique de prévention et de riposte contre l'IAHP. (<i>Founding of a technical task force to prevent and respond to HPAI</i>)</p>
Côte d'Ivoire	<p>Arrêté n°13 du 06 septembre 2000 portant création d'un système national d'alerte précoce et de prévention des maladies animales en côte d'ivoire (<i>Founding of a national early warning system for animal diseases</i>)</p> <p>Décision n° 110 du 23 août 2001 portant création du comité scientifique relatif au système national d'alerte précoce et de prévention des maladies animales en Côte d'Ivoire (<i>Founding of the scientific committee for the national early warning system for animal diseases</i>)</p> <p>Arrêté n° 52 du 10 décembre 2001 créant la commission nationale d'intervention rapide et de prévention des maladies animales en côte d'ivoire. (<i>Founding of a national rapid response commission for animal diseases</i>)</p> <p>Arrêté n° 253 du 31 décembre 2001 portant création du comité de pilotage du projet programme panafricain des épizooties en Côte d'Ivoire (PACE). (<i>Founding of the steering committee of the PACE programme</i>)</p>	<p>Arrêté du 26 octobre 2005 portant interdiction provisoirement d'importation d'oiseaux vivants, des viandes de volailles, de poussins d'un jour, d'œuf à couvrir et de plumes en provenance des pays infectés par la grippe aviaire. (<i>Regulations temporarily banning import of live birds, chicks, eggs, feathers and poultry meat from HPAI infected countries</i>)</p> <p>Décision n° 024 du 02 novembre 2005 portant création d'une cellule technique de prévention et de surveillance de la grippe aviaire en Côte d'Ivoire dénommée « cellule de grippe aviaire ». (<i>Founding of a technical task force to prevent and monitor HPAI</i>)</p> <p>Arrêté n° 23 du 25 mai 2007 portant obligatoire de la vaccination contre l'Influenza Aviaire des volailles domestiques dans les départements de l'Est de la Côte d'Ivoire. (<i>Regulation making HPAI vaccination mandatory for domesticated birds in the Eastern departments of Côte d'Ivoire</i>)</p>
Ghana	<p>Création d'un réseau épidémiologique au sein des services vétérinaires – références administratives non communiquées (<i>Founding of an epidemiology surveillance network</i>)</p>	<p>Interdiction d'importation de volailles, de produits avicoles et d'équipements avicoles de tout pays déclaré infecté. (<i>Regulations temporarily banning import of birds, poultry products and equipments from HPAI infected countries</i>)</p>
Togo	<p>Arrêté N° 21/MAEP/SG/DEP du 2/10/2003 portant création du Réseau d'Epidémiosurveillance des Maladies Animales du Togo (REMATO). (<i>Founding of an epidemiology surveillance network</i>)</p>	<p>Arrêté du Premier Ministre du 15 février 2006 portant création du comité Interministériel de prévention et de lutte contre la grippe aviaire. (<i>Founding of a inter-ministry committee for the prevention and control of HPAI</i>)</p> <p>Arrêté interministériel du 25 octobre 2005 portant interdiction d'importation de volailles vivantes et de viandes de volailles et de leurs dérivés en provenance des pays touchés par l'Influenza Aviaire Hautement Pathogène (<i>Regulations temporarily banning import of live birds, poultry meat and products from HPAI infected countries</i>)</p>
Democratic Republic of Lao	<p>New law on livestock production and veterinary matters adopted in July 2008</p>	

Country	General measures regarding animal disease	Specific measures regarding HPAI
Vietnam	<p>Veterinary Ordinance No.18/2004/PL-UBTVQH, dated 29/04/04</p> <p>Decree of Government No. 33/2005/ND-CP, on detailed stipulation about some articles of the Veterinary Ordinance, dated 15/03/05</p> <p>Decision, No. 45/2005/QD-BNN, on promulgation of list of objects liable to the animals, animal product inspection, dated 25/07/05</p> <p>Decision, No. 46/2005/QD-BNN, on promulgation of list of objects liable to the veterinary hygiene control, dated 25/07/05</p> <p>Decision, No. 47/2005/QD-BNN, on stipulation of number of animals, animal product volume liable to be inspected when is being transported out of the district, dated 25/07/05</p> <p>Decision, No. 48/2005/QD-BNN, on forms for slaughter control, stamps for veterinary hygiene control, dated 25/07/05</p> <p>Decision, No. 64/2005/QD-BNN, on list of diseases of declaration diseases; dangerous animal diseases; diseases must be compulsorily vaccinated, dated 13/10/2005</p> <p>Decision No. 39/2005/QĐ-BYT of Ministry of Health, on promulgation of the regulations on general hygiene conditions for food production establishments, dated 28/11/05</p> <p>Decision No.41/2005/QĐ-BYT of Ministry of Health, on stipulations on food safety hygiene conditions for trading establishment of food services, dated 08/12/05</p> <p>Decision No. 3065/QD-BNN-NN of MARD on promulgation of regulation on conditions for poultry production, incubation, transport, slaughter, trade of poultry and poultry products, dated 07/11/05</p> <p>Ordinance on Food Hygiene and Safety No.12/2003/PL-UNTVQH11, dated 26/07/03</p> <p>Regulations on the procedures for quarantine, slaughter control, and veterinary hygiene inspection of animals and animal products, issued in conjunction with ministerial Decision 389 NN-TY/QD, dated 15/04/94</p> <p>Regulations on the veterinary hygiene requirements and inspection of animal product processing and trading establishments, issued under Ministerial Decision 67/1999/QD/BNN-Ty, dated 20/04/99</p> <p>Governmental Decree 73/CP, on functions, duties, powers, and organization of the Ministry of Agriculture and Foodstuff, dated 01/11/95</p> <p>Decision 348/TTg of the Prime Minister, on functions and duties of the Department of Animal Health under the direct management of the MARD, dated 28/5/96</p> <p>Ministerial Decision 747 NN-TCCB/QD, on functions, duties, powers, organizational structure of the Department of Animal Health, dated 30/12/93</p>	<p>Directive of MARD, No.47/2004/CT-BNN of MARD, on further enhancing activities on bird flu prevention and control, dated 05/10/04</p> <p>Directive No.34/2005/ CT-TTg of Prime Minister, on comprehensive and efficient implementation of urgent action plan on prevention and control of bird flu, dated 15/10/05</p> <p>Decision No.15/2005/NQ-CP of Government, on some urgent solutions for preventing of Avian Influenza (H5N1) and Human influenza pandemics, dated 04/11/05</p> <p>Circular No 69/2005-TT-BNN-NN of MARD, on guidelines of implementation some urgent solutions preventing avian influenza outbreaks, dated 07/11/05</p> <p>Guidelines on Prevention and Control Measures against Highly Pathogenic Avian Influenza applicable by poultry traders and transporters, and small poultry householders (issued under Decision 3400 QD/BNN-TY of MARD, dated 05/12/05)</p> <p>Guidelines on prevention and control measures for avian influenza on intensive poultry farms (issued under Decision 3400 QD/BNN-TY of MARD, dated 05/12/05)</p> <p>Procedures for culling and destruction of infected poultry, and for disinfection and decontamination of infected areas, issued under Decision 3400 QD/BNN-TY of MARD 05/12/05)</p>

Country	General measures regarding animal disease	Specific measures regarding HPAI
Vietnam (<i>cont.</i>)	<p>Ministerial Decision 875/NN-TCCB, on the specific functions, powers, and organizational structure of Department of Animal Health, dated 24/5/96</p> <p>Rule on quarantine, slaughter control and veterinary hygiene inspection of animals and animal products, under Decree 93/CP</p> <p>Decision 02 TY/TCCB/QD of the Director of Department of Animal Health on the organization, responsibilities and powers of the Assistant units of the Director, dated 06/01/94</p> <p>Ministerial Decision 1605 NN-TCCB/QD, on the setting up the Vinh Regional Veterinary Centre, dated 12/12/94</p> <p>Regulation, promulgated under Ministerial Decision 694 NN-TY/QD, on the functions, duties, powers and organizational structure of provincial and Municipal Sub-department of Animal Health and of the field of Animal Health Services System, dated 11/12/93</p> <p>Decision 99 NN-TY/QD on the veterinary hygiene of animal slaughterhouses and slaughter points, dated 20/02/95</p> <p>Directive 403/TTg of the Prime Minister on strengthening animals slaughter control and veterinary hygiene Inspection of food of animal origin, dated 11/07/95</p> <p>Regulations, issued under Ministerial Decision 67/1999/QD/BNN-TY, on veterinary hygiene requirements and inspection of animal product processing and trading establishments, dated 20/04/99</p>	

Annex 3

Examples of good practice in building local animal health systems

Numerous examples (AVSF, 2006; Alders *et al.*, 2000; Azhar *et al.*, 2010; Baumann, 2007; Community Animal Health Network, undated; Catley *et al.*, 2004; FAO, 2010a; IDL Group, 2003; Mondry, 2008; Nopakesorn and Taechasubamorn, 2009; Peeling and Holden, 2004; Roland-Holst *et al.*, 2008; Rosenthal and McLeod, 2008; Sonaiya, 2008) can be cited to suggest the features of a well-designed and sustainable local animal health system. The good practices listed here are mostly drawn from CAHW projects, of which there are many examples, but the principles would apply to local animal health systems involving para-veterinary professionals of any kind.

- The local animal health system receives support and recognition from the government, which encourages coordination with veterinarians (public and private), the private sector, farmers' organizations, NGOs and donors.
- It is based on a genuine need for animal health services in the community, a realistic appreciation of what para-professionals can charge for and some kind of business plan to help them put their services on a sustainable footing.
- Some support may be provided with equipment but all consumables need to be provided at cost to ensure sustainability of the system.
- It starts with concrete activities that bring immediate added value to farmers and animal health providers - which may vary and may include income, prestige, strengthening social relationship, food security, etc.
- The role of para-veterinary professionals is defined through a participatory process that leads to policy, regulation or agreements defining the types of services that may be offered.
- It enables animal health providers to build long-standing trust relationships within their community by assisting farmers to improve their food security through better husbandry and animal health care practices.
- Para-veterinary professionals do not rely entirely for their livelihood on providing animal health services, but retain other options to make an income. In an ideal situation, these would be linked to livestock and would illustrate good animal husbandry practices.
- Some animal health providers assume a role as trainers of farmer groups in routine procedures, such as preventive treatments.
- Para-veterinary professionals are facilitated to ensure linkages between farmers and private and state veterinary services by means of regular meetings or other activities, funded from the public budget.
- There is a recognition of potential conflicts of loyalty in reporting disease and the types of control measures that communities may be willing to implement that gives some space for communities to make decisions about what to do.

- Networks are used to create a critical mass of para-veterinary professionals throughout the country and to foster their links with farmer associations.
- Adequate training, refresher courses and follow-up are provided so that skills remain up to date and valued.
- There is a stable supply of good quality drugs and vaccines to communities through private or state veterinary services. Drugs supplied by state veterinary services can be a transition phase in a specific region where private veterinarians are not present.

Long-term external funding is essential for the public good. The initial cost of setting up a local animal health system may seem high and beyond the mandate of state veterinary services. Governments may wish to explore the possibility of calling for the participation of donors and the technical assistance of FAO and NGOs. Once the system is operational, running costs for surveillance, reporting and compensation could be partially ensured by the international community in the name of animal health as a global public good (Sproul *et al.*, 2009b).

References

- 6th International Ministerial Conference on Avian & Pandemic Influenza.** 2006. *Conference results* (available at <http://www.imcapi2008.gov.eg/Contents/ResultForm.aspx?Tab=5>. Accessed April 2009).
- ACI.** 2006. Poultry Sector Rehabilitation Project – Phase I. The Impact of Avian Influenza on Poultry Sector Restructuring and its Socio-economic Effects. Prepared for FAO by Agrifood Consulting International April 2006. Rome, FAO.
- Agronomes et vétérinaires sans frontières en collaboration avec l'ICAT.** 2006. Evaluation des impacts du projet PAEF sur les activités du projet concernant les services vétérinaires fournis par les AVE, la mise en place des PTA. Hanoi, AVSF.
- Ahuja, V.** 2004. The economic rationale of public and private sector roles in the provision of animal health services. *Revue scientifique et technique, Office international des Epizooties*, 2004 - 23 (1), 33-45.
- Ahuja V., Dhawan M., Punjabi M. & Marse L.** 2008. Poultry based livelihoods of rural poor: Case of Kuroiler in West Bengal. South Asia Pro Poor Livestock Policy Programme (also available at <http://saplpp.org/informationhub/doc012-poultry-livelihoods-rural-poor-kuroiler-west-bengal-study-report>).
- Ahuja, V., Dhawan M., Punjabi M., Marse L. & Pan S.** 2009. Dead Birds or Shattered Hopes, A Study on the Impact of Bird Flu on Poor People's Poultry related Livelihoods in West Bengal. South Asia. Rome, Pro-Poor Livestock Policy Initiative, FAO (also available at <http://saplpp.org/informationhub/doc019-dead-birds-or-shattered-hopes>).
- Alders, R.G., Fringe, R. & Mata, B.V.** 2000. *Experiences in the control of Newcastle disease in Mozambique*. Paper presented at the Second IAEA/FAO Research Coordination Meeting on Improvement of Health and Management of Family Poultry Production in Africa, 4-8 September, 2000, Morogoro, Tanzania.
- Alders, R.G.** 2001. Sustainable control of Newcastle disease in rural areas. In Alders, R.G. and Spradbrow, P.B., eds *SADC Planning Workshop on Newcastle Disease Control in Village Chickens*. Proceedings of an International Workshop, Maputo, Mozambique, 6-9 March, 2000. ACIAR Proceedings N° 103, 80-87.
- Alders, R.G. & Pym, R.A.E.** 2009. Village poultry: still important to millions eight thousand years after domestication. *World's Poultry Science Journal*, 65: 181-190 Cambridge University Press.
- Azhar, M., Lubis, A. S., Siregar E.S., Alders, R. G., Brum, E., McGrane, J., Morgan, I., & Roeder, P.** 2010. Participatory Disease Surveillance and Response in Indonesia: Strengthening Veterinary Services and Empowering Communities to Prevent and Control Highly Pathogenic Avian Influenza. *Avian Dis.* 2010 Mar;54(1 Suppl):749-53.
- Baas, S., Ramasamy, S., Dey DePryck, J., & Battista, F.** 2008. *Disaster Risk Management Systems Analysis* (available at <http://www.fao.org/docrep/010/ai504e/ai504e00.HTM>).
- Baumann, P.** 2007. Managing Risk and Developing Options: HPAI and Livelihood Linkages in the Lao PDR. Rome, FAO, unpublished report.

- Bekele, G. & Akumu, J. 2009. *Impact Assessment of the Community Animal Health System in Mandera West District, Kenya*. Nairobi, USAID (available at http://www.elmt-relpa.org/FCKeditor/UserFiles/File/elmt/200907/VSF_ELMT_CAH_PIA_report.pdf).
- Birol, E. & Asare-Marfo, D. 2008. *Impact of Highly Pathogenic Avian Influenza on Ghanaian Chicken Producers' Incomes*. Working Paper No. 16, HPAI Pro Poor Risk Reduction, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Burgos S., Hinrichs J., Otte J., Pfeiffer D. & Roland-Holst D. 2008a. *Poultry, HPAI and Livelihoods in Viet Nam – A Review*. Working paper No. 2, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Burgos S., Hinrichs J., Otte J., Pfeiffer D., and Roland-Holst D. 2008b. *Poultry, HPAI and Livelihoods in Cambodia – A Review*. Working paper No. 3, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Burgos S., Otte J., Pfeiffer D., Metras R., Kasemsuwan S., Chanachai K., Heft-Neal S. & Roland-Holst, D. 2008c. *Poultry, HPAI and Livelihoods in Thailand – A Review*. Working paper No. 4, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Burgos S., Otte J., & Roland-Holst D. 2008d. *Poultry, HPAI and Livelihoods in Myanmar – A Review*. Working paper No. 8, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Catley, A., Leyland, T., Mariner, J.C., Akabwai, D.M.O., Admassu, B., Asfaw, W., Bekele, G. & Hassan, H.S. 2004. Para-veterinary professionals and the development of quality, self-sustaining community-based services. *Revue scientifique et technique, Office international des Epizooties*, 2004 - 23 (1), 225-252.
- Community Animal Health Network (CAHNET). Undated. Project website (available at <http://www.cahnetfrica.net/>).
- Ear, S. 2009. Cambodia's Victim Zero: Global and National Responses to Highly Pathogenic Avian Influenza. STEPS Working Paper 16, Brighton, STEPS Centre.
- FAO. Undated. *Good Emergency Management Practice (GEMP)* (available at <http://www.fao.org/ag/againfo/programmes/en/empres/GEMP/index.html>, accessed May 2009).
- FAO. 2006. *Symposium summary*. Symposium on: Market and Trade Dimensions of Avian Influenza Prevention and Control. In conjunction with the 21st Session of the FAO Intergovernmental Group on Meat and Dairy Products (available at http://www.fao.org/es/ESC/en/15/138/155/events_157.html).
- FAO. 2009. Proceedings of Emergencies Division Retreat. FAO Internal document.
- FAO. 2010a. Poultry as a tool in human development: Historical perspective, main actors and priorities, by F. Dolberg. FAO Smallholder Poultry Production Paper No. 6. Rome.
- FAO. 2010b. *Small commercial and family poultry production in France: characteristics, and impact of HPAI regulations*, by E. Fermet-Quinet and C. Bussi re. Rome, FAO Smallholder Poultry Production Paper No. 3. Rome.

- FAO. 2010c. *Smallholder poultry production – livelihoods, food security and sociocultural significance*, by K. N. Kryger, K. A. Thomsen, M. A. Whyte and M. Dissing. Rome, FAO Smallholder Poultry Production Paper No. 4.
- FAO. In preparation. *Outbreak communication handbook*.
- FAO, World Bank & OIE. 2008. *Biosecurity for highly pathogenic avian influenza, issues and options*. Rome, FAO & Washington DC, World Bank.
- Forster, P. 2009. *The Political Economy of Avian Influenza in Indonesia*, STEPS Working Paper 17, Brighton, STEPS Centre.
- Geerlings, E. 2006. Rapid assessment of HPAI socio-economic impacts in Turkey. FAO unpublished report.
- Geerlings, E., Albrechtsen, L. & Rushton, J. 2007. in collaboration with Ahmed Z., Abd El-Kader Ahmed F., Eldawy S. A., Saied A., Mohamed H., Khalil M., Ramzi E., Said A., Abd El-Menem N., Mohamed A., Salah A., Hazan A., Abd El-Aziz M., Mohamed M., Mostafa, Omar S., Omar H. & El-Helaly, S. *Highly pathogenic avian influenza: a rapid assessment of the socio-economic impact on vulnerable households in Egypt*. Rome, FAO.
- Gilbert, M., Xiao, X., Pfeiffer, D. and Epprecht, M. 2008. *Ducks, Rice and People - the Key to HPAI Risk in the Mekong Region*. Research Brief No. 8, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Guèye, E.F. 2000. The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. *Outlook on Agriculture* 29 (2): 129-136.
- Hartono, D. 2004. Economic impact of AI on price and supply of poultry product. Paper presented at National Workshop on Post Avian Influenza Recovery, Jakarta, Indonesia.
- Heft-Neal, S., Kahrl, F., Otte, J., Roland-Holst, D. 2009. *Assessment of Smallholder Indigenous Poultry Producer Viability in Thailand*. Working Paper No. 9, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Henning, J., Khin, A., Hla, T. & Meers, J. 2006. Husbandry and trade of indigenous chickens in Myanmar – results of a participatory rural appraisal in the Yangon and the Mandalay divisions. *Tropical Animal Health and Production* 2006 38: 611 – 618.
- Hickler, B. 2007. Bridging the Gap Between HPAI “Awareness” and Practice in Cambodia: Recommendations from an Anthropological Participatory Assessment, FAO Regional Office for Asia and the Pacific.
- Hickler, B. 2008. *Are we listening?* Community perception and Avian Influenza. Video recorded for FAO in collaboration with USAID, JICA and the Cooperation of the Kingdom of Cambodia (available at http://inazio.net/index.php?option=com_content&view=article&id=45:liste).
- Hinrichs, J. 2008. *Cost of HPAI outbreaks in West Bengal*. HPAI Pro Poor Risk Reduction Project. Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Honhold, N. 2009. Personal Communication.
- Hosny, F. A. 2006. *Egypt Poultry sector country review*. Rome, FAO Animal Production and Health Division.

- Hossain, S. T., Sugimoto, H., Ahmed, G.J.U. & Islam, M.R. 2005. Effect of integrated rice-duck farming on rice yield, farm productivity, and rice-provisioning ability of farmers. *Asian Journal of Agriculture and Development* (AJAD). Regional Center for Graduate study and Research in Agriculture, Philippines. 2 (1 & 2): 79-86.
- Iannotti, L., Barron M., & Roy D. 2008. Animal Source Food Consumption and Nutrition Among Young Children in Indonesia: Preliminary Analysis for Assessing the Impact of HPAI on Nutrition. Working Paper No. 10, HPAI Pro Poor Risk Reduction, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- IDL Group. 2003. Community Based Animal Health Workers – Threat or Opportunity? Crewkerne, United Kingdom, The IDL Group.
- Ifft J., Otte J., Roland-Holst D. & Zilberman D. 2009a. *HPAI from a Demand side perspective*. Working Paper No. 6, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Ifft J., Otte J., Roland-Holst D. & Zilberman D. 2009b. *Smallholder Poultry Certification for Pro-Poor HPAI Risk Reduction*. Working Paper No. 11, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- International Institute for Sustainable Development (IIED). 2009. *Global Platform for Disaster Risk Reduction Bulletin - Vol. 141 No. 2*. Second Session of the Global Platform for Disaster Risk Reduction, 15-19 June 2009, Geneva, Switzerland - Final Summary.
- Kasemsuwan S, Poolkhet C, Patanasatienkul & T, Buameetoop N. 2009. Qualitative Risk Assessment of the Risk of Introduction and Transmission of H5N1 HPAI Virus for 1-km Buffer Zones Around Compartmentalised Industrial Poultry Farms in Thailand. Research Brief No. 13, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Kyomugisha, E. L. 2008. *Assessing Poultry livelihoods in Uganda*. FAO unpublished report.
- Loibooki M., Hofer H., Campbell, K. L. I. & East, M. L. 2002. Bushmeat hunting by communities adjacent to the Serengeti national park, Tanzania: The importance of livestock ownership and alternative sources of protein and income. *Environmental Conservation* 29(3): 391-398 (page 3).
- McLeod, A. 2007. Social impacts of structural change in the poultry sector. *Poultry in the 21st century, Avian influenza and beyond*. International Poultry Conference, Bangkok, November 2007. Rome, FAO.
- McLeod, A. 2009. Some thoughts on compensation and alternatives from FAO's experience. PowerPoint presentation given at the Regional Workshop on Funding Mechanism for Outbreak Containment and Compensation, Jakarta, February 24-25, 2009.
- McLeod, A. 2010. Economics of AI management and control in a world with competing agendas. *Avian Dis.* 2010 Mar;54 (1 Suppl): 374-9
- McLeod, A., Thieme, O. & Mack, S. 2008. Structural changes in the poultry sector: will there be smallholder poultry development in 2030? *Proceedings of XXIII World's Poultry Congress*, 30 June-4 July 2008, Brisbane, Australia. *World's Poultry Science Journal* (2009), 65: 191-200 Cambridge University Press.

- Mensah-Bonsu, A. & Roy, D.** 2009. *Investigating the Role of Poultry and the Impact of HPAI on Livelihoods in Ghana*. Research Brief No. 9, HPAI Pro Poor Risk Reduction, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Miers, H.** 2008. *Poverty, Livelihoods and HPAI– A Review*. Working Paper No. 1, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Mondry, R.** 2008. Involving communities in the surveillance and control of HPAI in Lao PDR – the role of the village veterinary workers’ impact of the project implementation. Building Capacity at the Grassroots Level to Control Avian Influenza – Project in Lao People’s Democratic Republic (PDR). FAO unpublished report.
- Ndirangu, L., Birol, E., Roy, D. & Yakhshilikov, Y.** 2009. *The Role of Poultry in Kenyan Livelihoods and the Ex Ante Impact Assessment of HPAI on Livelihood Outcomes*. Research Brief No. 11, HPAI Pro Poor Risk Reduction, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Ngatchou, A. & Teleu Ngandeu, E.** 2006. *Cameroon, Revue du secteur agricole*. Rome, FAO Animal Production and Health Division.
- Nopakesorn, T. P. & Taechasubamorn.** 2009. Facilitator report, Workshop on Community Animal Health Workers (CAHWs) in the Mekong Region: Lessons Learnt and Future Operations, 4-9 February 2009. Bangkok, FAO, unpublished report.
- Obi, T. U., Olubukola, A., & Maina, G. A.** 2008. *Pro-Poor Risk reduction Strategies in Nigeria – Background paper*. Working Paper No. 5, HPAI Pro Poor Risk Reduction Project, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Omiti, J.M. & Okuthe, S. O.** 2008. *An overview of the Poultry Sector and Status of Highly Pathogenic Avian Influenza (HPAI) in Kenya –Background Paper*. Working Paper No. 4, HPAI Pro Poor Risk Reduction Project, Africa/Indonesia Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Otte, J.** 2006. The hen which lays the golden eggs - or why backyard poultry are so popular (available at, http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/feature01_backyardpoultry.pdf, accessed April 2009).
- Otte, J. & Roland-Holst, D.** 2008. E-mail contribution to e-consultation on pro-poor risk-reduction for HPAI control held August-September 2008. Rome, FAO, unpublished.
- Peeling D. & Holden, S.** 2004. The effectiveness of community-based animal health workers, for the poor, for communities and for public safety. In *Veterinary institutions in the developing world: current status and future needs*, de Haan, C., ed. *Revue scientifique et technique*, Office international des Epizooties, 2004 - 23 (1), 253-276.
- Permin, A.** 2009. *Good practices in small-scale poultry production*. Nairobi, FAO ECTAD Regional Unit Eastern Africa.
- Pfeiffer D, Minh P. Q., Martin V., Epprecht M., & Otte J.** 2007. *Temporal and Spatial Patterns of HPAI in Viet Nam*. Research Brief No. 2, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.

- Pro Poor HPAI Risk Reduction Project.** 2010. *Proceedings of Research Meeting on Pro-poor HPAI Risk Reduction: Lessons from Southeast Asia and Africa.* Held in conjunction with the 34th Session of the Animal Production and Health Commissions for Asia and the Pacific (APHCA). Phuket, Thailand. 25-27 October 2010 (available at <http://www.hpai-research.net/Workshops.html>).
- Rafani, M. I., Agustian, A., Nurmanaf, A. R. & Syafaat N.** 2008. Livelihood and Gender Impact of Rapid Changes to Biosecurity Policy in the Jakarta Area and Lessons Learned for Future Approaches in Urban Areas. Indonesian Center for Agro-socioeconomic and Policy Studies (ICASEPS), in collaboration with Food and Agriculture Organization (FAO).
- Randriamanana, A. A., Randrianarisoa, D., Rondro-Harisoa, L. & Rosenthal I.** 2006. *Chronique de notre visite à la communauté d'Antsoha, commune rurale d'Antsoha, District d'Ihosy, Région d'Ihorombé.* Rome, International Fund for Agricultural Development.
- Roland-Holst D., Epprecht M. & Otte J.** 2008. *Adjustment of Smallholder Livestock Producers to External Shocks: The Case of HPAI in Viet Nam.* Research Brief No. 4, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Rosenthal I., Peña M., Huber L., Solano N.** 2005. *Crónica de nuestra visita a la comunidad de Qochaq, distrito de Ayahuanco, provincia de Huanta, departamento de Ayacucho.* Rome, International Fund for Agricultural Development.
- Rosenthal, I. & McLeod, A.** 2008. Pro-poor risk-reduction case studies supporting policy tools: summary of the first e-consultation. Rome, FAO, unpublished.
- Safman, R. M.** 2009. *The political Economy of Avian Influenza in Thailand.* STEPS Working Paper 18, Brighton, STEPS Centre.
- Rushton, J.** 2009. *The economics of animal health and production.* Oxford and Cambridge (Mass), CAB International.
- Schwabenbauer, K.** 2009. Personal communication.
- Sims, L. D.** 2007. Risks associated with poultry production systems. *Poultry in the 21st century, Avian influenza and beyond.* International Poultry Conference, Bangkok, November 2007. Rome, FAO.
- Sims, L. D.** 2009. Lessons learned in control of H5N1 highly pathogenic viruses in Asia. Presented at 7th International Symposium on Avian Influenza, Athens, Georgia, April 2009.
- Sonaiya, F.** 2008. Smallholder family poultry as a tool to initiate rural development. *Poultry in the 21st century, Avian influenza and beyond.* International Poultry Conference, Bangkok, November 2007. Rome, FAO.
- Sproul, T., Zilberman, D., Roland-Holst, D. & Otte J.** 2009a. *A Case for Multilateral Investment in Avian Flu Prevention.* Research Brief No. 17, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- Sproul, T., Zilberman, D., Roland-Holst, D. & Otte J.** 2009b. *Economics of Avian Flu Policy.* Research Brief No. 18, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- The Bellagio Meeting on Social Justice and Influenza.** 2006. *Statement of Principles* (available at <http://www.bioethicsinstitute.org/web/page/906/sectionid/377/pagelevel/4/interior.asp>).

- Thieme O. & Hinrichs J.** 2007. Poultry sector restructuring options and impacts. In *Future of poultry farmers in Viet Nam after HPAI*. FAO/MARD (Viet Nam).
- UN System Influenza Coordination & The World Bank.** 2008. *Responses to Avian Influenza and State of Pandemic Readiness*, Fourth Global Progress Report, October 2008 (available at http://siteresources.worldbank.org/EXTAVIANFLU/Resources/3124440-1172616490974/Fourth_progress_report_second_printing.pdf).
- Vu, T.** 2009. The Political Economy of Avian Influenza Response and Control in Viet Nam. STEPS Working Paper No. 19, Brighton, STEPS Centre.
- Wiegiers E. & Curry J.** 2009. *Understanding Smallholders' Decisions towards Adopting HPAI Prevention and Control Measures*. Research Brief No. 16, HPAI Pro Poor Risk Reduction Project, Mekong Team. Rome, Pro-Poor Livestock Policy Initiative, FAO.
- World Bank.** 2010. Agriculture investment sourcebook: Module 1 - Guinea: Livestock Sector Partnership-Public Sector Herder Organizations and the Private Sector. Washington DC, World Bank.
- World Bank, FAO, IFPRI & OIE.** 2006. Enhancing control of highly pathogenic avian influenza in developing countries through compensation: issues and good practices. Washington DC, World Bank.
- World Bank, FAO, OIE, WHO & AU/IBAR.** 2009. Integrated National Action Programmes for HPAI.
- World Organization for Animal Health (OIE).** 2007. *Standard Operating Procedure (SOP) for OIE Validation and Certification of Diagnostic Assays*. Version 2.0 (available at http://www.oie.int/vcda/eng/en_procedure_dossier_vcda.htm).
- World Organization for Animal Health.** 2009. Terrestrial Animal Health Code 2009, Chapter 4, Application of Compartmentalisation (available at http://www.oie.int/eng/normes/MCODE/en_chapitre_1.4.4.pdf).
- World Trade Organization.** 1998. (available at http://www.wto.org/english/tratop_e/sps_e/spsund_e.htm).
- Yalcin, C.** 2006. The Turkish Situation. Presented at Symposium on Market and Trade Dimensions of Avian Influenza Prevention and Control. Held in conjunction with the 21st Session of the Intergovernmental Group on Meat and Dairy Products, Rome, Italy (available at http://www.fao.org/es/ESC/en/20953/21014/21574/event_109566en.htm).

ONLINE PUBLICATION SERIES

FAO ANIMAL PRODUCTION AND HEALTH WORKING PAPER

1. The use of cash transfers in livestock emergencies and their incorporation into Livestock Emergency Guidelines and Standards (LEGS), 2011 (E)
<http://www.fao.org/docrep/014/i2256e/i2256e00.pdf>
2. Mapping supply and demand for animal-source foods to 2030, 2011 (E)
<http://www.fao.org/docrep/014/i2425e/i2425e00.pdf>
3. Notes on Livestock, Food Security and Gender Equity, 2011 (E)
<http://www.fao.org/docrep/014/i2426e/i2426e00.pdf>
4. Wealth Index mapping in the Horn of Africa, 2011 (E)
<http://www.fao.org/docrep/014/i2427e/i2427e00.pdf>
5. Evolution du secteur avicole en Tunisie, 2011 (F)
<http://www.fao.org/docrep/015/i2549f/i2549f.pdf>
6. Status of animal nutrition research and development activities in Tajikistan, Kyrgyzstan and Azerbaijan, 2012 (E)
<http://www.fao.org/docrep/015/i2582e/i2582e00.pdf>
7. An assessment of the socio-economic impacts of global rinderpest eradication – Methodological issues and applications to rinderpest control programmes in Chad and India, 2012 (E)
<http://www.fao.org/docrep/015/i2584e/i2584e00.pdf>
8. Use of lesser-known plants and plant parts as animal feed resources in tropical regions, 2012 (E)
<http://www.fao.org/docrep/015/i2629e/i2629e00.pdf>
9. Poverty mapping in Uganda – Extrapolating household expenditure data using environmental data and regression techniques, 2012 (E)
<http://www.fao.org/docrep/015/i2705e/i2705e.pdf>
10. How can animal health systems support small-scale poultry producers and traders? - Reflections on experience with HPAI, 2012 (E)

Availability: May 2012

E - English
F - French
** In preparation



Find more publications at
<http://www.fao.org/ag/againfo/resources/en/publications.html>