THE IMPORTANCE OF BIOSECURITY IN REDUCING HPAI RISK ON FARMS AND IN MARKETS

Food and Agriculture Organization of the United Nations
in collaboration with
The World Bank and
The World Organisation for Animal Health (OIE)

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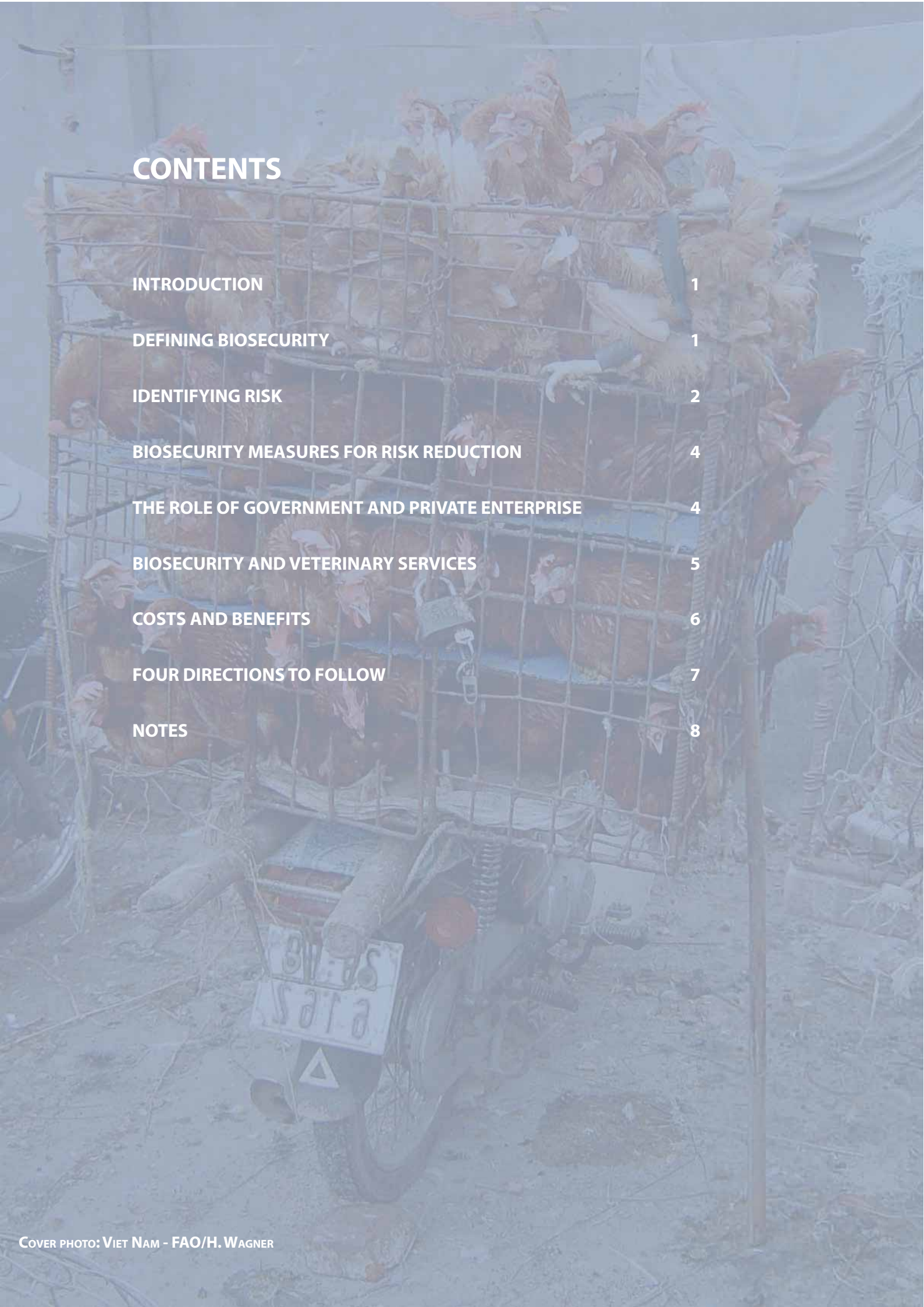

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INTRODUCTION

The current panzootic of highly pathogenic avian infl uenza (HPAI) has demonstrated that in many countries in which the potential for disease transmission is high, HPAI cannot easily be eradicated by stamping out and vaccination only. To make further progress in areas where disease has become entrenched, national authorities and other stakeholders must be encouraged to give higher priority to promoting and implementing measures to reduce the risk of disease transmission. Of these, the major component is biosecurity. The key to sustainable control lies in implementing the highest possible biosecurity measures in the entire production-consumption chain. By protecting poultry through biosecurity we will also be protecting people.

Raising the level of biosecurity in the poultry sector is a long-term approach that requires fi nancial investment and behaviour change. However, the expected returns will be long-term benefits for both producers and consumers in terms of reduced disease incidence not only of HPAI but other diseases and their associated public health and economic impact. Promoting improved biosecurity requires international support and this is appropriate considering the international public good resulting from improved HPAI control.

DEFINING BIOSECURITY

The term "biosecurity" has been used widely in the debate on HPAI control.

It is variously described as an ideal state of affairs in which measures are in place to prevent incursion and spread of disease, or the approach or principles used to achieve this state of affairs.

Depending on the source of the defi nition, the measures included under "biosecurity" can be very broad or more narrowly defi ned, and may be applied on any scale from national policy to the management of an individual production unit.

In this paper, biosecurity refers to those measures that should be taken to minimise the risk of incursion of HPAI into individual production units (*bioexclusion*) and the risk of outward transmission (*biocontainment*) and onward transmission through the market chain.

The value added of applying principles of biosecurity (such as segregation[1] and decontamination) to production unit practices is that other disease will also be controlled.

The same principles can be applied to other units in a production-consumption chain such as live bird markets or slaughterhouses. However the concept of biosecurity in markets where poultry from various sources mix differs from that applied to farms.

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Biosecurity measures are one of a range of disease prevention and control instruments (including vaccination, surveillance, stamping out and compensation), none of which on its own constitutes the 'magic bullet'. At the same time, poultry production premises in themselves are neither 'biosecure' nor 'bio-insecure' – poultry production achieves biosecurity in an incremental fashion (measures to improve biosecurity build on measures already in place) and in decreasing order of importance (the major risks are addressed first). Disease control requires the intelligent use of a combination of available measures adapted to the prevailing production and socioeconomic environment.

IDENTIFYING RISK

The current H5N1 HPAI panzootic cannot be attributed to any one type of production system alone: large and small farms have been affected and played a role in the spread and persistence of the disease. All production systems have their strengths and weaknesses, although some specific production and marketing methods, notably free-range rearing of ducks and poorly regulated live poultry markets, appear to have played a particularly important role in the maintaining the disease in certain regions.

A classification of production systems (or sectors) was developed by FAO[2] in 2004 based primarily on differences in biosecurity.

It is reasonable to assume that if two farms are located in a similar environment and are part of a similar production-consumption chain the one with higher biosecurity represents a lower risk of virus introduction and spread. But this does not imply that Sector 1 production units, because they practise high levels of biosecurity, are completely free of risk.

And if biosecurity fails in a large industrial unit the impact will be much greater than that from a village production environment, because of the difference in the virus load produced and so the potential for spread of infection.

Risk factors

The major sources of risk for HPAI introduction and transmission are well known – the introduction of infected birds into flocks; contact with infected wild birds; movement of contaminated materials particularly containers, vehicles and personal clothing. Direct airborne transmission of virus can occur, but generally over very short distances. Live bird markets have played a major role in spreading disease from unit to unit because they mix birds from many sources.

Once virus has been introduced to an area, one of the factors responsible for maintaining it in poultry populations is high bird density[3].

Ducks are recognised as being responsible for persistence, while terrestrial birds (mainly chickens and turkeys) are responsible for the amplification of virus load. These factors vary among different types of production unit.

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Analysis of risk must be based on a review of existing practices – and these differ from system to system and situation to situation. It is important that risk analysis gives due recognition to local conditions and environments and that biosecurity measures are tailored to these conditions. At the same time, it is true in all situations that the greatest risk of spread of disease lies in the movement of live animals and contaminated materials, so biosecurity measures to reduce risk are heavily dependent on movement management.

Strategies must consider levels of incentives that make it worthwhile for farmers and traders to buy into biosecurity practices. While producers are clearly interested in keeping HPAI out of their flocks, they may be less interested to avoid further spread of the virus when this requires efforts that may be beneficial to society at large but damaging to their livelihoods, such as reporting suspected disease instead of quickly selling the flock. Such concerns highlight the need for strong regulatory controls and effective epidemiological investigation to identify and prohibit such activities.

Commercial production units

Large-scale production units can be physically isolated and can practise effective barrier control. However, if not managed appropriately, large production units face a high risk of disease introduction and onward transmission. The inward movement of people, poultry and commodities is high in large production enterprises with different production components (day-old-chicks, nurseries, pullets, broilers, layers), providing many possible sources of disease introduction. When infected, they may run a higher risk of virus spread through higher levels of virus shedding and movement (of persons, animals, vehicles, equipment, feed, manure, etc.) on and off the production units.

Many of the same risk factors present in large-scale production units (introduction of infected birds to flocks, contact with other domestic or wild birds, fomite transmission, etc.) are also present in small-scale units. A lack of bioexclusion measures is more frequently found in small enterprises, and this may make them more susceptible to infection. The level of risk in small-scale units may also be increased by sociocultural practices or lack of information (for example, the practice of throwing the carcasses of dead birds onto the street for dogs; workers and the owners of poultry farms rearing scavenging birds at home; and the practice of giving live birds as gifts to visitors and the obligation for visitors to accept).

Many of these risk factors can be easily be reduced through simple and inexpensive procedures but lack of knowledge often leads to bad application and unsafe behaviour (for example, working in a dirty area and then moving to a clean area rather than the reverse; failure to quarantine new birds; and generally poor hygiene).

Examples of production units that deserve special consideration in risk management:

- Hatcheries outside integrated systems receive eggs from a large number of sources and young birds are then widely distributed; this high turn-over under often minimal levels of hygiene represents a high risk factor for the spread of the virus.
- Free-ranging duck flocks are a special case, because unlike other large scale units they cannot be enclosed; it is almost impossible to keep them separate from wild birds and in some countries they are moved over large distances, increasing the risk of transmission of HPAI from and to resident poultry.

Backyard flocks

The risk for rural backyard flocks is reduced when they have low bird densities and the birds bought and sold are transported only over short distances and there is little or no disease in the vicinity. However there is risk when transport links connect local movements with long distance chains.

Transport and markets

Live bird markets and the transport systems that carry birds from farms to markets or slaughterhouses each present specific risks of disease spread.

Many markets, whether large or small, urban or roadside, have a low standard of sanitary conditions. Markets that operate day in day out pose a higher risk than those that have closing days when premises can be disinfected. Those where birds of different ages and different species from different locations are mixed at the market, and then returned to their farm of origin or sold on to another farm, create the potential for disease spread over a wide area.

It is often the case that the people trans-

porting live birds have little or no information on the health status of the birds they are carrying. The transportation they use is often dirty and not disinfected before entering farms or villages or markets – indeed there may be no facilities available for cleaning or instructions that it should be done – and birds are transported in cages or baskets that cannot be cleaned easily.

BIOSECURITY MEASURES FOR RISK REDUCTION

Improving existing premises

The first step in implementing biosecurity is to identify those measures that can be applied to individual units, and to understand why they are not already being used and what would make adoption more likely. As a point of principle, there is a set of basic biosecurity and hygiene measures that all poultry production systems, live bird markets and slaughterhouses should put in place. However, in infected countries, more stringent measures are required to reduce the risk of spread, particularly from areas of the country where the disease is present to those where it is not.

Commercial production units

Measures applicable to large-scale units are well known and include the development of an implementation and monitoring plan to enhance biosecurity on the farm, investment in infrastructure, and adoption of practices such as the "all in all out" principle, management of the movement of people, animals, vehicles, etc. , and careful disposal of dead animals, manure and waste. Both segregation and decontamination are feasible and should be implemented.

In a small small-scale enclosed commercial unit segregation and improved hygiene practices are the most practical measures to apply.

Backyard flocks

In scavenging flocks that are not enclosed, it is important that an entire community agrees on uniform biosecurity practices, rather than parts of the community adopting different practices. For example, a village might agree to isolate newly introduced poultry, or to limit movement of traders into the village. At this level, practices aimed at segregation are more likely to be sustainable than those aimed at decontamination.

Markets

Ideally both biocontainment and bioexclusion should be applied to markets, although in practice biocontainment is easier to implement through not taking live birds out of the market and assuring that transport only leaves the market after proper cleaning and disinfection. Local authorities and veterinary services have a crucial role to play in introducing/enforcing new practices to reduce the risk of virus introduction and spread (for example, sourcing of animals, separation of species, cleaning and disinfection, and the installation of proper slaughter facilities).

Relocating premises

In the event that it is impossible to introduce sufficient biosecurity measures at the current location of industrial units, it may be necessary to relocate them. This would be part of a restructuring process and should only be undertaken after careful consideration; a number of studies are being conducted on the economic, social and environmental impacts of sector adjustment (restructuring).

THE ROLE OF GOVERNMENT AND PRIVATE ENTERPRISE

Since HPAI control has a strong element of public good, authorities are responsible for risk management, and risk planning should be based on the link between the level of exposure to risk and the level of measures needed to achieve biosecurity. For biosecurity to be effectively implemented government must understand the risks and have a strong level of political will and commitment.

Governments and international organisations have an important role to play in standard setting, regulation, monitoring and enforcement. They should also be instrumental in bringing stakeholders together and in providing accurate and objective information, and they should finance the costs of regulatory measures applied during emergencies.

For commercial reasons, a strong private sector takes the lead in providing guidance for

farmers and retailers require high standards of suppliers. Conscientious farmers take voluntary action to promote the safety of their fl ocks. Improvements in the hygiene of markets and retail outlets tend to be driven by regulation, consumer pressure and the demands of global market chains. Companies and individuals are likely see a benefi t in practicing bioex clusion on farms, and large production units with good biosecurity could provide technical advice and support to small-scale producers operating in the same geographical area; elsewhere, small-scale operators will rely on advice from government services, NGOs or local animal health workers. Market operators and stall holders will see a long-term benefit from investment in upgrading the level of hygiene in a market.

Investment is likely to be shared, with a large part coming from the private sector. This is justifi ed since good biosecurity can raise productivity and profi t. However, such finan-cing can only come about if those investing perceive a benefi t. It is appropriate for government to invest in biosecurity when it is for public facilities like a rendering plant, or for regulation and communication to encourage safer practices (e. g. not selling sick birds). As far as possible, persuasion during non-emergency periods and market-driven investment are the key. Regulatory measures taken under emergency conditions have a high public cost of enforcement.

Linked to the question of who does what is the issue of where to start enforcing biosecurity regulations – in markets, on large farms or on small farms? Eventually the choice must be based on a risk and impact assessment of the proposed measures.

BIOSECURITY AND VETERINARY SERVICES

To increase biosecurity in the poultry sector for purposes of disease control, national veterinary services can develop generic biosecurity criteria and model biosecurity plans.

Implementation guidelines should specifi cally address the different needs of larger enterprises and smallholders. The veterinary services should publish all relevant information on biosecurity and the important poultry diseases on their websites or communicate otherwise to the relevant stakeholders.

A sound biosecurity plan should include all relevant factors like a description of the potential pathways for the entry and spread of the disease, sanitary measures to be taken to manage the risks and documentation of all actions related to biosecurity.

Credit: Liberia - FAO/S. Sarkar

The World Organisation for Animal Health (OIE) has introduced the concepts of compartmentalisation and zoning for purposes of disease control and international trade. Compartmentalisation is defined as "one or more establishments under a common biosecurity management system containing animals with a distinct health status", whereas zoning applies to animals with a distinct health status where the separation is mostly on the basis of geography. Veterinary services must play an important role in the enforcement and certification of compartmentalisation. The private sector plays a key role in the implementation of biosecurity. Each biosecurity plan should describe the partnership between the relevant industry and the veterinary services, and their respective responsibilities.

The veterinary services are responsible for the auditing and certification of the biosecurity plans by ensuring that the biosecurity measures identified in the plan are soundly implemented.

The veterinary services also have the responsibility to put in place the prerequisites for a good animal identification and traceability system.

Depending on the type of production, identification and registration may be done at the flock, lot or individual bird level or not at all.

COSTS AND BENEFITS

Where the benefits from improved biosecurity measures are private, direct beneficiaries should bear the costs. One example is improved bioexclusion for production units, leading to higher levels of profit due to reduced levels of disease.

Where benefits are public goods (e. g. measures that prevent human exposure and thus reduce the risk of human pandemic influenza), the costs should be borne by public finance.

However, these two categories are not always easy to separate and in any event initiating risk avoidance measures will often require technical and financial support from government.

When investments in biosecurity are privately funded, the benefit to the individual needs to be greater than the full cost.

An increase of biosecurity at farm level should lead to a general increase in the health status of a poultry flock and hence its productivity.

The case for biosecurity is easier to make when it reduces the risk of endemic as well as epidemic diseases.

While investment at the level of individual premises is critical, it must also be placed in the context of national costs and benefits of biosecurity investments (including trade im-

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plications and poverty reduction), and the interests and behaviour of various agents – such as market traders, market owners and public transport drivers.

In a well-regulated system, all farmers will make some investment in biosecurity and all owners of markets, slaughterhouses and transport facilities will invest in hygiene. In large companies supplying international markets or large retail outlets, investment in biosecurity is seen as part of normal business practice.

Smaller commercial enterprises, however, operate with restricted cash flow and tend to face higher costs per unit.

Those who rely on short-term gains may choose to opt out of poultry production rather than invest in biosecurity.

In backyard and scavenging systems, biosecurity measures must be applied more at the village level than on individual premises.

There would be economic incentives for people to participate in community bioexclusion measures, since these would provide a private benefit, and peer pressure would encourage everyone to comply.

As for individual farms, however, there would be less incentive to invest in biocontainment. When economic benefits are clear, awareness-raising may be very effective in encouraging farmers to change practices.

Hygiene in markets can be sufficiently profitable for market owners and stallholders that they will be willing to invest or share investment with the government (e. g. special zones for slaughtering in markets).

In the context of costs and benefits, it is important that implementation of biosecurity measures does not go so far as imposing unenforceable bans which would lead to illegal trade, increasing levels of risk and unpredictability that would be difficult to monitor.

FOUR DIRECTIONS TO FOLLOW

Strengthen commitment

Achieving the levels of biosecurity required to provide appropriate protection against diseases like HPAI depends to a great extent on commitment – political, economic and social.

All stakeholders are called on to make their contribution to this effort. As with any animal health measure, there must be a balance of sufficiently attractive incentives reinforced by strong regulations and enforcement.

Improving biosecurity requires long term and solid effort, but it has the advantage that it can be applied step by step and with lasting benefit.

Refine our knowledge

More work is needed to refine the nuances of analysing risk and applying biosecurity measures in widely varying disease situations and poultry sectors. The tendency has been to see the issue in black and white, losing sight of the all-important grey areas in between; these grey areas touch on sensitive factors such as cultural habits and tradition, local economic conditions and differences between "peacetime" and emergency. Understanding the level of risk must be promoted as a critical component of designing biosecurity measures and this will often require a greatly improved capacity for epidemiological and risk analysis.

Communicate better

Communication is an essential tool in biosecurity. Farmers, market owners and politicians are all key players with veterinary services providing a strong supporting environment and they all need to be motivated to act.

They need clear and accessible information on the biosecurity measures required and their benefits.

Build on good practices

Good practices exist to suit all conditions, but they need to be more widely and consistently adopted. This paper reflects an intensified effort to identify, evaluate and highlight projects and models around the world that demonstrate practices for systems from villages to integrated market chains and to bring them to the attention of farmers, traders, market operators, those who work with them and policy-makers.

NOTES

1. The application of measures to isolate a production unit and limit the entry and exit of animals or materials carrying disease.

2. **Production systems and their main characteristics**

Sector/system 1	Industrial integrated system with high level biosecurity and birds/products marketed commercially (e. g. farms that are part of an integrated broiler production enterprise with clearly de fined and implemented standard operating procedures for biosecurity)
Sector/system 2	Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e. g. farms with birds kept indoors continuously; strictly prevent ing contact with other poultry or wildlife)
Sector/system 3	Commercial poultry production system with low to minimal biosecurity and birds/products usually entering live bird markets (e. g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl)
Sector/system 4	Village or backyard production with minimal biosecurity and birds/products consumed locally

Source: FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia, September 2004

3. Measured in terms of number of birds per square kilometre.

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