ECONOMIC AND SOCIAL IMPACTS OF AVIAN INFLUENZA

Anni McLeod, Nancy Morgan, Adam Prakash, Jan Hinrichs, FAO (AGAL and ESCB).

FAO Emergency Centre for Transboundary Animal Diseases Operations (ECTAD)

Estimates of global HPAI loss from the outbreaks since 2003 run into billions[1]. The cost of the 1997 outbreak in Hong Kong, it is suggested, may have been US$100s of millions including knock on effects, but the very strict control measures applied may have prevented large scale human infection. In spite of this, the global poultry sector is dynamic and resilient. Global production and trade have shown the potential to recover quickly from severe outbreaks that until recently were confined mainly to East and South East Asia. Why, then, is this disease the focus of so much attention, when other major transboundary animal diseases (classical swine fever, even foot and mouth disease) and other important diseases of poultry (Newcastle disease) cause much less interest.?

Four factors contribute to HPAI's potential economic and social impact, and this paper will briefly examine each in turn.

1. It is a zoonotic disease, and can cause death in humans.
2. Local effects of the 2003-4 outbreaks were very severe, caused considerable losses of production, and loss of livelihoods of vulnerable people,
3. Several countries that experienced large outbreaks in 2003-4, and have now seen the disease move to an endemic status. They face a prolonged financial drain for control costs.
4. The movement of migratory birds has caused outbreaks to emerge in several countries and regions simultaneously, with rapid spread across central Asia to Europe and Africa. If widespread outbreaks persisted and were not quickly controlled, they could disrupt the global poultry population and global trade.

Costs of human disease

To date, the number of recorded human illnesses and deaths is very small and all have been traced back to contact with poultry or uncooked poultry products. The direct cost in loss of life and human productivity has not yet been large, although all deaths are regrettable and cause considerable distress to families involved. Considerably more has been spent on the costs of tracing disease and trying to prevent it.

There remains, however, the possibility that HPAI could change to a form able to be transmitted from human to human. In a paper presented last month to the World Bank[2] the audience was reminded that SARS in 2003 "led to an immediate economic loss of perhaps 2% of East Asian GDP, even though only about 800 people ultimately died.." A global pandemic of HPAI would have a more widespread effect. A study in 1999 suggested that an AI pandemic in the US alone might cause economic losses of $100 to $200 billion dollars at 2004 values.

Severe localised effects of 2003-4 outbreaks

The impact of a single outbreak of HPAI on national GDP depends on the speed with which it is controlled, the extent to which it spreads, the contribution of poultry to GDP and the structure of the poultry sector.

The outbreaks of 2003 and 2004 in Asia took veterinary services by surprise. As a result (apart from a single outbreak in Malaysia) they took time to control, spread widely or recurred, and resulted in the death or destruction of many birds. Direct losses were highest in Vietnam (44 million birds, amounting to approximately 17.5% of the poultry population,) and Thailand (29 million birds, 14.5% of the poultry population).

---

[1] Commission of the European Communities: "Impact Assessment Avian Influenza (COM(2005)171)".

[2] Milan Brambhatt, World Bank, September 2005. "Avian Influenza: Social and Economic Impacts".

In the six most severely affected countries, the contribution of the poultry sector to GDP ranges from approximately 0.5% in Thailand to 1.3% in China and 1.5% in Cambodia. In Vietnam, before the final extent of spread was known, the costs of the 2003-4 outbreaks were predicted top be between 0.3%-1.8% of GDP[3]. Based on GDP estimates for 2004, this would have been the equivalent of US$76m-450m. Early estimates in Thailand suggested that as much as 1.5% of GDP growth over a year was lost.

Of the worst infected countries, only China and Thailand are notable poultry meat exporters. As a result of HPAI, Thailand lost its position as the world's 5th largest exporter of poultry meat. By switching to processed poultry meat, the country has regained most of its export value, but it is at risk of permanently losing the export market for fresh poultry meat. These changes cannot be solely attributed to HPAI, since fierce international competition (e.g. from Latin America) makes the global poultry market very dynamic, but HPAI outbreaks accelerated the changes and worked to Thailand's disadvantage.

Poultry systems in five South East Asian countries affected by HPAI in 2003-5

Country	Industrial	Large commercial	Small commercial	Backyard
Cambodia		<1% poultry	<1% poultry	99.9% farms, 90% poultry
Indonesia	3.5% poultry, export & national consumption	21.2% poultry	11.8% poultry	63.4% poultry
Lao PDR		Small	10% poultry	90% poultry
Thailand	70% production, export important	20% production	10% production, 98+% producers	
Viet Nam	Small	20-25% production, few producers	10-15% production, few producers	65% production, possibly 70% of poultry

Source: Rushton et al (forthcoming)

Preliminary estimates in 2004 of impacts on South East Asian economies suggested that a single large outbreak could result in a reduction of up to 1.5% of GDP growth. This would occur if effects went beyond the poultry sector alone. Thailand and Malaysia (which had one outbreak, rapidly controlled) both experienced losses to tourism. Bali island in Indonesia, which gains much of its income from tourism, is also vulnerable. In the other infected countries the impact on tourism was negligible.

Something that all Asian countries affected by AI have in common is involvement of many small scale operators (farmers, traders and local market stallholders) in poultry production and marketing. Impact of the 2003-4 outbreaks varied along the market chain, and with the type of chain. Industrial chains have suffered mainly from export loss. Large commercial producers specializing in poultry serving domestic markets suffered from temporary loss of consumer confidence and preference for other types of protein. Small commercial and backyard producers lost the least in absolute terms but the most relative to their assets and income.

In Vietnam, relatively the largest losses were felt by small scale commercial chicken producers with limited numbers of other livestock. Many had borrowed money to fund poultry production and found themselves in debt when their birds died or were culled. A compensation rate of 50% of market value was recommended by the Department of Agriculture but in reality a rate closer to 30% was paid, not all farmers registered, and it took weeks or months for compensation to be issued. On the instructions of the government, bank loans were extended to assist these farmers who had borrowed from banks.

[3] World Bank (2004): "The impact of the avian influenza epidemic on the Vietnamese economy: an estimate by the World Bank in Vietnam".

Backyard farmers also experienced losses. One case study in a Vietnamese village[4] paints a typical picture for a backyard producer. The loss of birds, loss of 2.3 months of production and loss of consumption were estimated to have cost US$ 69-108 for households involved in the outbreak – a large sum when compared to an income per person of $2 per day or less. Farmers and traders who were already engaged in pig operations were able to increase the size of their pig enterprises to take advantage of rising pork prices. Those who had previously focused on chickens were at disadvantage. The effect of price swings on poor consumers is undocumented but may have been considerable, since the supply of chickens was reduced for several weeks while the price of alternative meats went up.

Population and household income in five countries affected by HPAI in 2003-4				
Country	Population 2004. (million)	% population < US$ 2 /person/day	% Rural	% labour in agriculture
Cambodia	13.4	77.7	82	75
China	1,321	46.7	60	64
Indonesia	238.5	52.4	52	45
Lao PDR	6.1	73.2	70	80
Thailand	64.9	32.5	75	49
Viet Nam	82.7	33.4	72	63
Sources: CIA website, 2004; FAOSTAT, 2004; UNDP website, 2004; World Bank Development Indicators, WB, March 2005				

In Cambodia, by contrast, there appears to have been a minor impact of HPAI in terms of direct deaths and control measures of stamping out, but a larger effect on prices of poultry products. The farmers who did suffer losses received no compensation as the government had a policy not to provide it. Significant reductions in price in poultry products were seen during the first 2 months of 2004[5], followed by a complete recovery in prices. Combining the fall in prices with the fall in quantities sold and comparing this with the recovery rates in the markets, it appears that the broiler and the egg market were most severely affected. Broiler traders could take up to 3 years to recoup their losses and egg traders nearly a year[6]

In Laos, although the total reported losses were only 3% of the national flock, the impacts were highly localised, with nearly 80% of the reported loss in commercial farms in Vientiane province[6] Since the majority of poultry farming in Laos is on a small scale, this means that like Vietnam, the small commercial producers suffered badly.

In Indonesia, 15 out of 30 provinces were affected in 2003 and early 2004 with 16.2 million poultry dead or stamped out in control efforts[7], excluding those lost from backyard farms for which no accurate estimates are available. The value of birds lost was between US$16.2 to 32.4 million. In

[4] Delquigny et al.(2004) Evolution and Impact of Avian Influenza Epidemic and Description of the Avian Production in Vietnam. Final Report for FAO's TCP/RAS/3010 "Emergency Regional Support for Post Avian Influenza Rehabilitation". FAO, Rome, Italy. 119 pages.

[5] VSF (Veterinaires Sans Frontieres) 2004. Review of the poultry production and assessment of the socio-economic impact of the highly pathogenic avian influenza epidemic in Cambodia. Final Report for FAO's TCP/RAS/3010 "Emergency Regional Support for Post Avian Influenza Rehabilitation". FAO, Rome, Italy. 89 pages.

[6] Rushton et al (2005) Impact of avian influenza outbreaks in the poultry sectors of five South East Asian countries (Cambodia, Indonesia, Lao PDR, Thailand, Viet Nam) outbreak costs, responses and potential long term control, based on data from Webb (2004) Emergency Assistance for the Control of Highly Pathogenic Avian Influenza in Lao PDR Report for FAO's TCP/RAS/3010 and Vannasouk, T. 2004. Review of Livestock Marketing in Lao PDR. Report for FAO's TCP/RAS/3010 "Emergency Regional Support for Post Avian Influenza Rehabilitation". FAO, Rome, Italy. 10 pages.

[7] CASERED (2004) "Socio-Economic Impact Assessment of the Avian Influenza Crisis in Poultry Production Systems in Indonesia, with particular Focus on Independent Smallholders" Report for FAO's TCP/RAS/3010.

addition to farm level impacts, there were drops of 45 to 60% in the demand for day old chicks and feed inputs during the outbreak and a reduction of just over a third in the employment in the poultry industry.

Endemic disease

Economic analysis to date has focussed on the impacts of outbreaks rather than the long term effects of endemic avian influenza, with smaller but repeated outbreaks over a number of years. There has been only limited work on the social and economic impacts of long term control strategies. Here we present estimates based on data from Viet Nam, Indonesia, Thailand and The Philippines to suggest the scale of costs for different elements of prevention.

Farmers contracted to large producers tend to suffer less in individual outbreaks, as they are supported by the contracting company to stay in production. In the future, however, poultry sectors are likely to restructure much more rapidly than they might otherwise have done in response to measures to improve biosecurity against AI. One consequence of restructuring will be that there are fewer small commercial producers and, eventually, fewer backyard producers.

The future poultry sector in East and South East Asia will contain

- More concentrated markets, with fewer, larger producers. Some may form "compartments". As yet it is not clear how small scale contract farmers could participate in a compartment – certainly, the transactions costs of sustaining and certifying their biosecurity will be higher than for fewer, larger units.
- Poultry production zones. Malaysia and Viet Nam already include this concept in their planning. Zoning limits poultry production to specified areas. Infrastructure can be concentrated in these areas so that production becomes more cost-efficient, and biosecure units can be built to house and possibly slaughter and process birds so that sanitary inspection can easily be applied. The cost of these developments, however, will include loss of livelihoods for small scale producers who are unable to meet the conditions needed to participate. There are also potential environmental externalities of concentrating livestock production in small geographical spaces.
- Compartments for exporting countries, arranged in such a way that a minor outbreak outside of an exporting compartment will hardly affect export. At present this is only receiving serious consideration in Thailand, but the technical and institutional challenges of applying this relatively new notion are proving to be great.
- Live poultry markets ("wet" markets) with upgraded infrastructure and better biosecurity, moved outside of cities. Eventually, a smaller number of wet markets with fewer traders holding licenses. In Hong Kong, which has been successful in upgrading the biosecurity of wet markets, the number of traders holding licences is decreasing. Centralised slaughtering in large slaughterhouses. A larger number of supermarket outlets in cities.
- Fewer small producers and fewer traders, with more stringent inspection of their premises. Backyard producers will continue although in small numbers but small commercial producers will be required to register for production licences and small traders for trading licences, contingent upon meeting certain conditions.
- Requirements to fence and house all poultry including ducks. Confined duck production, with no more ranging, herded flocks.
- In some countries still at risk, compulsory strategic vaccination in some countries (China, Indonesia and Vietnam of infected countries currently practice vaccination; Pakistan uses it as a preventive measure).

Costs of long term control measures (US$)

The estimates provided in the table overleaf suggest the full cost of each element of AI control, whether it is paid by the government, the private sector or the international community. They are preliminary estimates for activities that are in progress, and they will be updated as more information becomes available

It is worth noting that, were this not a zoonotic disease, the strategies for control in the livestock population might be very different and the costs to some countries much less. Only exporting countries would try to eradicate the disease and they might choose to use progressive zoning or compartmentalisation. Mass vaccination would hardly be applied at all. There would be little need for high levels of biosecurity on backyard farms farm, and farmers could have the option to vaccinate at their own cost, as they do for Newcastle disease.

To illustrate this point, we can use the estimates for a ten year strategy applied in Vietnam which includes heightened surveillance, improved biosecurity of markets, preventive vaccination and improved biosecurity on all types of farm from sector 1 to 4. When all measures are applied, the cost of the investment over a ten year period is between 4 and 6 times the benefit, depending on the assumptions made about the incidence of disease. However, the cost of upgrading biosecurity on smallholder farms is expected to be over $500 million for investment costs alone and twice that for recurrent costs. Many smallholders cannot afford to pay these costs.

The costs of prolonged vaccination in Vietnam are likely to amount to over $39 million. If it were not for the need to protect human health, vaccination could be used more selectively and eventually funded by the private sector.

Long term costs of HPAI control in East and South East Asia

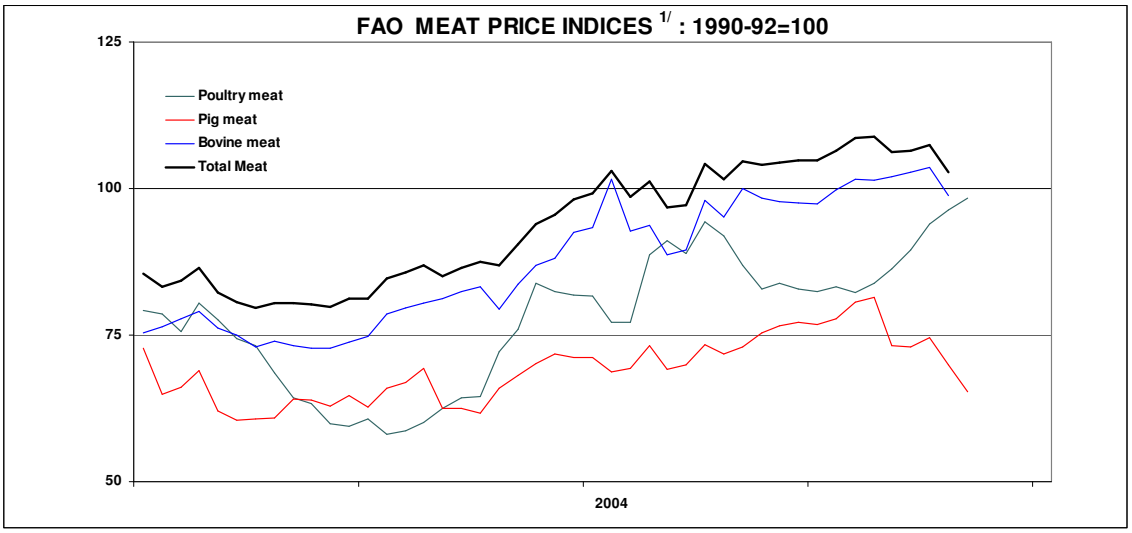
	Investment	Recurrent
Planning	An often overlooked cost. Planning and strategic studies by consultants can cost **$300 thousand**	
Compartments	Not yet implemented by any country for poultry. Costs will include defining the compartments, delays in trade, and improved biosecurity systems and will be shared by the government and the private sector beneficiaries. It may be necessary to subsidise smallholder biosecurity near exporting compartments..	Traceability (a relatively small increased cost per bird for an international company)
Production zones	Practised in Malaysia and to some extent China. Being considered in Vietnam. Investment needed to relocate farms, provide infrastructure (roads, farm sanitation). In Viet Nam this might result in **loss of income for ½ to 1 million small commercial producers** over 15 years.	Infrastructure maintenance. Higher production inputs offset by economies of scale
Early warning	Staff training, laboratory upgrades and information system upgrade from the field to the centre. For Vietnam the total cost would be approximately **$2.4 million**. This includes setting up community animal health worker networks. In Indonesia,. a similar activity carried out country wide would cost **$5.8 million** or more. In Thailand a single, highly detailed "x-ray" survey has been carried out house to house. A similar survey might cost around $2.5 million.	Field observation, sample taking and testing, reporting. In Vietnam, the cost would be around $4.1 million a year, or **$41 million** over ten years.
Vaccination	Staff training, upgrade of cold chains. In Viet Nam for a national campaign this would cost approximately **$2.7 million.**	Vaccine, transport and labour. In Viet Nam, a mass vaccination campaign covering chickens and ducks in the most affected provinces, would cost around $9.7. million a year. For a seven year campaign including 2 years of mass vaccination and 5 years of strategic vaccination the cost would be about **$39 million**, including pre and post vaccination sero-surveillance. This assumes a cost of 2.8c per dose delivered to a chicken and 3.5c for a duck. In Indonesia, vaccination of commercial poultry is compulsory but funded and managed by producers.

Farm biosecurity	This cost has generally been ignored in estimates and is not included in requests for external assistance because it is assumed that poultry owners should make the necessary investments. Yet it is by far the largest investment costs in AI control. In Viet Nam, Cambodia or Laos, enclosing the birds and building a bamboo night shed on a sector 4 farm might cost $50 to $75 per farm. If only half the backyard producers in Viet Nam did this, the total cost would be **$562 million**. It is not economically viable to make the investment for a very small flock. Adding netting and better fencing to a sector 3 chicken farm might cost $50 to $75, but enclosing a flock of herded ducks could cost twice as much.	Commercial farms, the recurrent costs of increased biosecurity relate to traceability (recording costs) and hygiene. The cost per bird is relatively small but the inconvenience to workers may be large. For example, CP in Thailand requires **workers to stay within the farm compound for the whole of a chicken production cycle**. For sector 3 duck farms and sector 4 farms, biosecurity requires a significant change in management, since **feed** needs to be provided to enclosed birds. Even with modest assumptions about increased inputs, the total cost in Vietnam over 10 years could amount to **$1.1 billion**
Market biosecurity	This might include rebuilding large wet markets to relocate them outside cities. the cost to rebuild Marikina market in The Philippines was $1.3 million. The total cost of upgrading markets in Vietnam would be between **$5 and $10 million**. Experience elsewhere suggests this is a good investment for a municipality as markets have the potential to generate reliable income. However, if not handles carefully it can result in **some stallholders being squeezed out** and losing their livelihood.	Operational costs of providing hygienic facilities, ensuring compliance with regulations, and regular testing. In Marikina the cost is approximately **$129,000 a year**, expected eventually to double. It is more than covered by income.

International Meat Trade: potential market impacts of further outbreaks

AI-inducted shortage in poultry supplies push up international prices in 2004 and 2005

Avian flu outbreaks in Asia and other countries as they progressively move westward are prompting the imposition of import bans on poultry products from disease-affected countries. The global market impact of these bans over the past year and a half include a progressive shortage of poultry meat supplies, escalating world poultry prices, a sharp drop in global poultry trade, and trade diversion as countries scramble to procure product from disease free countries. The overall price impact on poultry prices in 2004 and 2005 has been additionally aggravated by shortages of other meats, particularly beef from North America, a region which, while traditionally supplying one-quarter of world beef trade, is now banned by many countries due to BSE-concerns.



Restrictions on exports from Asian countries affected by AI outbreaks in 2004 and halfway into 2005 contributed to a nearly 20 percent increase in international poultry prices over the period. These upward world price movements contrast dramatically with declining prices in disease-affected countries as exportable supplies moved back into domestic markets. Demand declined as consumers responded to food safety and human health concerns. In fact, consumption gains in Asia, which exceeded world averages over the past decade, slowed as consumers in 2004 switched to other protein sources which, along with a culling of flocks, prompted a decline in Asian production.

On international markets, export shortages due to avian influenza and higher prices led to an unprecedented 8 percent decline in global poultry trade. Limitations on fresh/chilled product movement from Asian exporters, in particular Thailand and China, caused a decline in Asian exports- which in 2003 exceeded 1.8 million tonnes- to less than 1 million tonnes in 2004/5, or approximately 12 percent of global shipments.

Poultry markets vulnerable to another shock: what could happen?

As outbreaks of avian flu continue to move westward, the global market is preparing itself for more market shocks. While most markets are concerned about the threat that wild bird migrations pose to local industries, the close proximity of recent outbreaks in the European region to EU member states has raised considerable concerns about the industry impact of potential outbreaks. This concern, particularly given the significant position of the EU in world markets, has led FAO to evaluate the impact that any extensive outbreak of avian flu that spreads over the major EU producing countries[8] would have on global poultry markets as countries around the globe ban imports from the EU. With the EU-25 accounting for approximately 13 percent of global poultry production and exports, international poultry prices would be expected to move up sharply. Meanwhile, internal EU prices

[8] Five countries account for two-thirds of EU-25 poultry production: France, the UK, Spain, Germany and Italy.

would decline as production prospects in the EU as product intended for exports, approximately 10 percent of production, swamps local markets. The EU ships approximately 1 million tonnes of fresh/chilled/frozen poultry products, valued at over $1 billion, to more than 150 markets around the world with three quarters of these shipments destined for Russia (23%), Middle Eastern markets (27%) and developing countries in Africa (26%). Meanwhile, they also import approximately 700,000 tonnes of import frozen fillets and other chicken products. These imports would be expected to drop as internal EU prices decline relative to rising world prices.

Assessing the overall impact of an animal disease impact on both global meat markets and other sectors such as the feed industry, necessitates the use of a framework which links markets, both spatially and cross-commodity. To evaluate the short term global impact of a potential outbreak of Avian Influenza in the European Community (EU-25), FAO's short term commodity model was used to measure the impact of exogenously imposed export shocks to baseline projections which do not include the impact of these scenarios.

Any straightforward assessment of the potential global impact of avian influenza in Europe is, however, complicated by the recent outbreaks of FMD in Brazil--the world's largest meat exporter-both of beef and poultry—which will also influence world meat markets over the short term. The market impact of poultry shortages in international markets, in particular relative price movements, would be heightened by reduced exportable beef supplies from Brazil which was expected to account for more than one-quarter of the global beef shipments in 2005. The combination of these two events would be expected to put considerable upward pressure on all meat prices, similar to the situation in 2004 when the absence of North American beef due to BSE-concerns led to hikes in all meat prices. In addition, the position of the EU-25 as a net beef importer, with a large percentage of imports sourced from Brazil, would prompt a rise in domestic beef prices as bans are imposed on Brazilian beef products.

Conditioning the impact assessment are the various assumptions underpinning the analysis. This scenario assumes that AI outbreaks in the EU are spread out over the major producing areas thus inducing import bans on poultry products from the entire region. Producers in the EU, in response to lower prices, are expected to lower production levels commensurate to trade losses. While avian influenza is expected to result in changes in poultry consumption as consumers shift to alternative protein sources, it is assumed that this is only of a short duration as risk communication strategies ensure that consumers are aware of the minimal risk of bird flu transmission through poultry consumption. Consequently poultry consumption over the period of the shock remains relatively stable.

This scenario evaluates the impact of two major shocks to global meat markets which are imposed exogenously: 1) the EU poultry exports drop to 0 from 1 million tonnes, and, at the same time; 2) Brazilian exports of beef decline by 800,000 tonnes (down 45 percent from their projected exports of 1.8 million tonnes)

Market implications

Any extensive AI outbreak in the EU would have immediate implication on global poultry markets. Preliminary results of this analysis indicate that the potential short term impact would be higher meat prices for all meats on world markets (ranging from 7-8 percent for poultry and beef and 3 percent for pigmeat), lower global meat consumption, and a shift in trading patterns with some markets moving to fill the gap left by Europe (for chicken) and Brazil (for beef). In addition, spill over effects would be evident in the feed industry as lower meat production pushes down grain and protein meat consumption and prices down 1-2 percent respectively.

Particularly vulnerable to any reduced access to poultry imports are those countries heavily dependent on EU imports for price stability. In Africa, currently also at risk from AI outbreaks due to migratory bird patterns, poultry imports account for 20 percent of estimated regional poultry consumption of 4.2 million tonnes. Import bans on EU poultry, which supply nearly 50 percent of African imports, in the context of a major EU outbreak could potentially have major price implications for African consumers in selected import dependent countries.

The results of this short term analysis have been shaped on the basis of rather extreme assumptions including the total loss of the EU export market in the context of AI outbreaks and expectations that European consumers and others will not reduce their consumption of poultry products. With potential outbreaks and consumer responses uncertain, the above scenario is a worse case scenario. In particular, the ability of other major exporting countries, particularly the United States and Brazil who supply nearly 70 percent of global poultry trade, to step up production and exports of poultry meat the short term in response to higher prices would mitigate upward price shocks. This assumes that these are no supply constraints in these countries and they themselves do not experience any AI outbreaks.