

International livestock markets and the impact of animal disease

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The views presented in this article are those of the authors and not necessarily those of the Food and Agriculture Organization.

Summary

Escalating and pervasive outbreaks of animal diseases are posing considerable challenges to livestock producers, industries, and policy-makers around the globe in a context of steadily rising demand for locally produced and imported livestock products. This paper reviews the factors and trends underpinning the growth in meat trade over the past decade and assesses the impact of animal diseases on international markets. The factors shaping the transmission of the impact of animal disease to global markets and back into domestic markets are identified and the potential global market impact of further animal disease outbreaks evaluated.

Keywords

Animal disease – Avian influenza – Bovine spongiform encephalopathy – Foot and mouth disease – Livestock – Meat trade.

Introduction

The global meat market has witnessed a profound transformation over the past 15 years, with rising incomes, changing consumption and demographic patterns prompting growth in consumption and trade that exceeds those of most other agricultural commodities (Fig. 1). Global meat consumption has increased by nearly three-quarters since 1990, in line with global economic growth. Consumers in both developed and developing countries are requiring a broader diversity and quality of meat cuts, more ease in preparation, and enhanced assurances about product safety.

Declines in feed prices in real terms and increases in productivity, achieved through specialisation, enhanced management and improved processing technologies, over the past decade, have led to progressively higher meat production and lower prices, particularly those of the poultry and pigmeat sectors (Fig. 2a). This is despite the concomitant increase in demand and the challenges posed by changing consumer requirements. This process was facilitated by increased cross-border movement of finance, knowledge and technology that permitted nearly three-

quarters of this growth in global meat production to be concentrated in developing countries (Fig. 2b).

Among the major factors that have influenced the global livestock sector over the past few decades, the following are of particular relevance. Many of these factors are expected to continue to shape markets over the next decade.

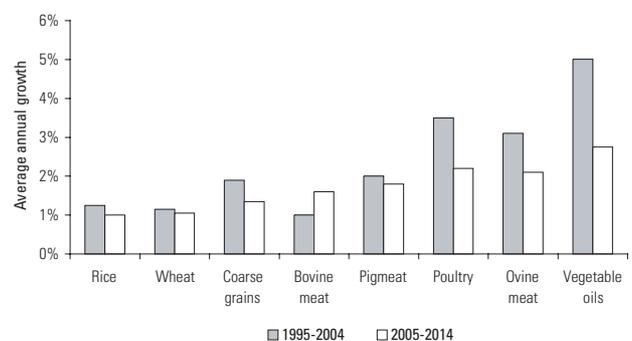
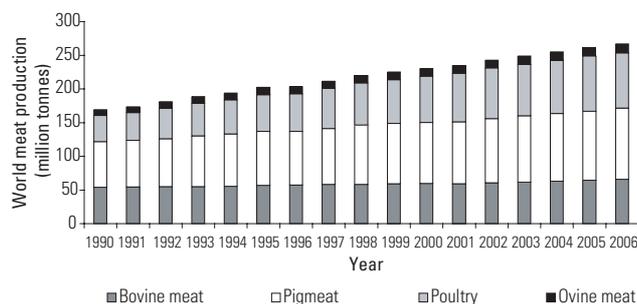


Fig. 1
The growth in the consumption and trade of meat compared with that of other agricultural commodities

a) growth driven by gains in poultry/pork sectors



b) growth in developed and developing countries

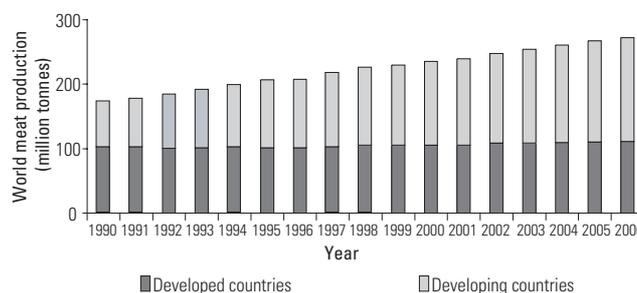


Fig. 2
World meat production, an historical perspective, 1990-2006

Structural changes in livestock industries, including improved genetics, upgraded animal housing, and enhanced management

In part these changes are a result of growing cross-border technology and investment flows into meat industries around the globe, particularly in strong growth markets or low-cost production regions. This trend is likely to continue in the future, leading to changing cost structures in industries in developing countries.

Changes in policy environment

Implementation of World Trade Organization (WTO) provisions for meat products over the past decade has led to a reduction in the use of export subsidies and expanding access to various markets. In particular, the transformation of tariff-rate quotas into *ad valorem* tariffs in many of the strongly growing Asia meat markets has had a significant and positive impact on trade. Policy developments that have stimulated trade flows have led to the increasing participation of developing countries in international markets as exporters. The gains are expected to continue, albeit at a slower pace, in the context of any agreement of the ongoing Doha Development Round.

Increased instability in global meat markets as a result of animal disease outbreaks and escalating human health concerns

Meat markets have become more unstable as a result of human health concerns related to bovine spongiform encephalopathy (BSE), avian influenza (AI), antibiotics in feed and a host of other non-trade issues. As animal densities increase and production and slaughtering systems change, disease outbreaks are becoming increasingly prevalent and widespread. In particular, the magnitude and the impact of these disease outbreaks have accelerated over the past five years with the imposition of

disease-related import restrictions, which had an immediate and visible impact on world meat trade.

The role of trade in the global meat economy

The evolution of meat trade since the 1990s has been, for the most part, resilient and dynamic, supported by developments in transportation, cold chain, and meat processing and packaging technology, which have all combined to push up trade nearly threefold since 1990 to an estimated 20 million tonnes in 2005. Meat trade as a share of production over this period rose from 5% to 8%. While gains in the volume of meat trade have exceeded most other agricultural products, the total value of global livestock and meat trade since 1990 has grown much more slowly than absolute trade volumes. This value was estimated at US\$ 72 billion (source: FAOSTAT – <http://faostat.fao.org>) in 2004, which is up less than half from the 1990 level. The slower growth in the value versus the volume of trade is an indicator of the declining prices of meat and the changing meat product composition of livestock markets that have stimulated both trade and meat consumption around the globe. These price declines have been facilitated by technology and the ability of meat processors to produce a diverse combination of product cuts that are priced to sell to consumers in different markets characterised by a wide range of preferences and tastes.

Much of the growth in meat trade has been driven by growing demand for poultry cuts, due to both health and economic factors, such as lower relative prices. Poultry's share of the volume of global meat trade rose from 22% in 1990 to over 40% by 2005 (Fig. 3). Pork and beef trade has also grown, albeit more slowly, with increasing market access provisions under the WTO, as well as a plethora of bilateral and regional trade agreements.

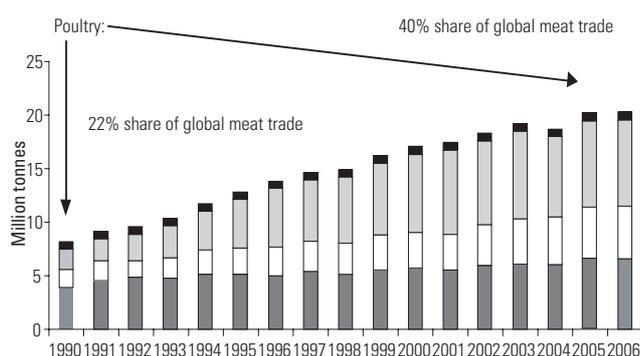


Fig. 3
Meat trade gains since 1990

Much of the growth in the meat trade has been driven by growing demand for poultry meat

Disease-related trade restrictions increasingly shape animal product markets

Over the past five years, the resilience of international meat markets has frequently been tested by the increasing and pervasive impacts of animal disease outbreaks. While many animal diseases, particularly foot and mouth disease (FMD) and most types of AI, are endemic in many parts of the developing world, only since 2001 has the severity of outbreaks of FMD (in Europe and Latin America) and more recently AI outbreaks in Asia (which have moved westward into Europe) had a significant impact on international meat markets.

Market disturbances induced by animal disease outbreaks have affected consumption and meat trading patterns, altered relative meat prices, and imposed ripple effects transcending the direct impact on livestock industries by imposing higher costs on the input industries and the broader economy. Worldwide import bans on meat from disease-infected areas, combined with heightened border inspections and testing, have limited trade gains over recent years, from the 7% annual gains witnessed during the late 1990s to only 2% annually over the past few years.

As a result of these outbreaks, meat producers, processors, traders and policy-makers are facing unprecedented challenges. Despite a context of relatively robust economic growth and growing demand for meat products, animal diseases are resulting in production losses and food safety-induced consumption shifts which limit potential industry gains. Trade disruptions resulting from import bans reinforce market segmentation, resulting in diverging meat prices within and between countries, and among products. Furthermore, the increasing complexity of global markets,

the uncertain nature of consumer demand, and the often prolonged and capricious imposition of market access conditions make it difficult to assess the duration and magnitude of a short-term market shock. Animal health and food safety issues, as well as those related to product quality, are expected to increase in complexity over the next decade, influencing consumption patterns and market access by competitive suppliers to global meat markets.

The impacts of animal diseases on international meat trade: an historical review

Prior to 2000, isolated disease outbreaks had short-lived and less dramatic impacts on global markets. These included the United Kingdom (UK) BSE crisis which since the mid-1990s, while causing temporary shifts in world beef demand to other meat products due to human health concerns, has had only a limited direct impact on beef shipments as the UK was not a significant exporter outside the European Union (EU). Similarly, in 1997, the EU classical swine fever outbreak significantly affected intra-EU trade, as the Netherlands was a major exporter of pork and live pigs within the EU, but global pork trade was largely unaffected since the Netherlands, as well as Germany, Belgium, France, Italy and Spain, were not major exporters of pork outside the EU. By contrast, the global pigmeat market was affected by the outbreak of foot and mouth disease in Taipei China when its pork exports, valued in 1996 at US\$ 1.6 billion, fell to US\$ 234 million in 1997. The broader impact of the disease was the major realignment of pigmeat destined for the Japanese market. The drop in product movement from Taipei China resulted in expanding pork shipments into the Japanese market from the United States of America (USA), Denmark, Canada and the Republic of Korea. However, the Republic of Korea's outbreak of foot and mouth disease in 2000 ended its recent growth in trade with Japan, valued at US\$ 300 million, allowing other major exporters to increase their share of the Japanese market.

These relatively isolated animal disease outbreaks do not appear to have resulted in long-term market disruptions. This is partly because reduced exportable supplies from one producing country have typically been compensated by rapid increases in supplies elsewhere. From an international trade perspective, the increasingly pervasive outbreaks of transboundary animal diseases over the past five years and the consequential imposition of disease-related export restrictions have had much more immediate and visible impacts on world meat trade.

Foot and mouth disease in the United Kingdom and Latin America

In 2001 the severity and visibility of the FMD pandemic that affected major meat markets led to countries around the globe closing their borders to at least one-quarter of world beef trade and nearly 40% of global pork exports. These were imposed firstly to meat products originating in the countries of the EU and, later on, to those from Argentina, Uruguay, and parts of Brazil.

Global meat trade, disrupted by temporary market closures and food-safety-induced shifts in consumer preferences, grew only fractionally, registering the slowest gains in 13 years. Beef trade, in particular, destabilised by FMD outbreaks and escalating reports of BSE cases outside the UK, fell by 3% while demand and prices for meats other than beef, particularly poultry, rose. Trade losses for Argentina and Uruguay are estimated at US\$ 400 million and US\$ 150 million respectively. While the value of lost trade opportunities for the UK meat industries is estimated at only US\$ 300 million, this amount pales compared to the total cost of the disease outbreak to the economy, estimated at US\$ 9.2 billion (Table 1).

While trade, with the exception of some markets for Argentinean beef, has recovered, the magnitude of the consequential losses, in particular in the UK, highlights the serious adverse impact that animal disease can have for the

wider economy and the process of economic growth in both developed and developing countries.

The avian influenza epidemic

In 2004 and 2005, the impact of animal disease on global meat markets was acute, leading to price shocks, shifting consumption patterns and the first decline in global meat trade since the mid-1980s. In particular, poultry markets were affected with export shortages due to AI in Asia and higher prices leading to an unprecedented 8% decline in global poultry trade. Limitations on fresh/chilled/frozen products from disease-affected Asian exporters (in particular Thailand and the People's Republic of China) caused a decline in Asian exports from 1.8 million tonnes in 2003 to less than 1 million tonnes in 2004, a loss of approximately US\$ 1 billion of export earnings for the region. These AI outbreaks followed on the heels of an H7N7 AI outbreak in the Netherlands in 2003 that, although quickly contained, cost the government nearly €150 million. The Dutch Agricultural Research Institute estimates that total costs for the Dutch farm sector, including related industries, were 500 million. While the impact of the outbreak reduced EU poultry production slightly in 2003, there was only a limited impact on global markets, with most of the impact on intra-European regional trade flows.

Table 1
Cost of recent animal disease outbreaks (US\$ million) (FAO study [1])

Cost	BSE	CSF	Uruguay 2000 and 2001	Foot and mouth disease			
	United Kingdom 1996/1997	Netherlands 1997/1998		United Kingdom 2001	Republic of Korea 2000	Japan 2000	Taipei China 1997
Direct costs							
Compensation	2,433	1,183	n.a.	2,223	377	0.5	188
Control measures	n.a.	138	20	1,335	66	14.5	66
Sub-total	2,433	1,321	20	3,558	433	15	254
Indirect costs							
Agricultural sector	n.a.	423	n.a.	489	n.a.	n.a.	2,202
Related industries	n.a.	596	60	267	n.a.	n.a.	3,212
Other	n.a.	n.a.	n.a.	4,890	n.a.	n.a.	949
Sub-total	1,395	1,019	60	5,646	n.a.	n.a.	6,363
Total costs	3,828	2,340	80	9,204	433	15	6,617
Impact on GDP	-0.4% ^(a)	-0.75%	n.a.	-0.2% ^(b)	n.a.	n.a.	-0.64%
Cost to public sector	63.5%	43.5%	25.0%	38.6%	n.a.	n.a.	3.8%
Cost to private sector	36.5%	56.5%	75.0%	61.4%	n.a.	n.a.	96.2%

a) -0.1% to -0.2% if the cost of compensation, which accounts for 64% of total costs, is excluded

b) the impact on United Kingdom (UK) gross domestic product (GDP) is relatively low because the cancellation of tourism and leisure to the countryside (53% of total costs), was largely offset by increased consumer spending in other sectors of the UK economy (4)

BSE: bovine spongiform encephalopathy

CSF: classical swine fever

n.a.: not available

It is clear that meat markets affected by animal disease outbreaks are characterised by considerable instability as governments are forced to adopt policies to protect their livestock sectors, including import bans, tighter sanitary border control measures, and stronger domestic regulations. Prices tend to become more volatile as importers scramble to procure meat products from disease-free zones. In 2001, beef trade dropped; however, some of the pressure on international beef prices was mitigated by a shift in trading patterns with non-disease affected markets increasing shipments and stronger import demand for other meats. In 2004, however, the pervasive impact of AI outbreaks led to a more than 30% increase in international poultry prices. The overall price impact on poultry prices has been additionally aggravated by shortages of other meats, particularly beef from North America; a region that, while traditionally supplying one-quarter of world beef trade, faced bans over the same period (2004-2005) from many countries due to BSE-concerns. Recent market developments since late 2005, however, have dramatically changed price developments in international meat markets. In particular, AI outbreaks in approximately 40 previously unaffected countries, many of which are the major poultry consuming and importing countries of Europe, the Middle East, and Africa, have prompted a decline in the FAO poultry price index by 22 points (Fig. 4). Dramatic consumer responses as consumers shifted their consumption patterns to include alternative protein sources are affecting market developments in global meat markets in 2006.

Policy challenges related to animal disease outbreaks

Key to the challenges being confronted by industries is the policy dimensions surrounding the issue of controlling animal diseases. Until recently animal diseases have been relatively localised in terms of their cost and impact on international livestock markets. Increasingly, as livestock production and trade have grown and markets have become more integrated, it is clear that national commodity strategies addressing animal disease issues need to be reinforced by international policies and guidelines that facilitate livestock trade while providing guidance on animal disease prevention and control.

Policy-makers need to have a good understanding of the overall market impact of animal diseases, both globally and locally, to be able to attribute costs to various sectors of the economies, covering producers, traders, feed and service industries, as well as the general economy etc., and to understand the socio-economic/equity implications of policy interventions which potentially reshape the structure of livestock industries. Animal disease outbreaks need to be recognised as problems that affect economies as

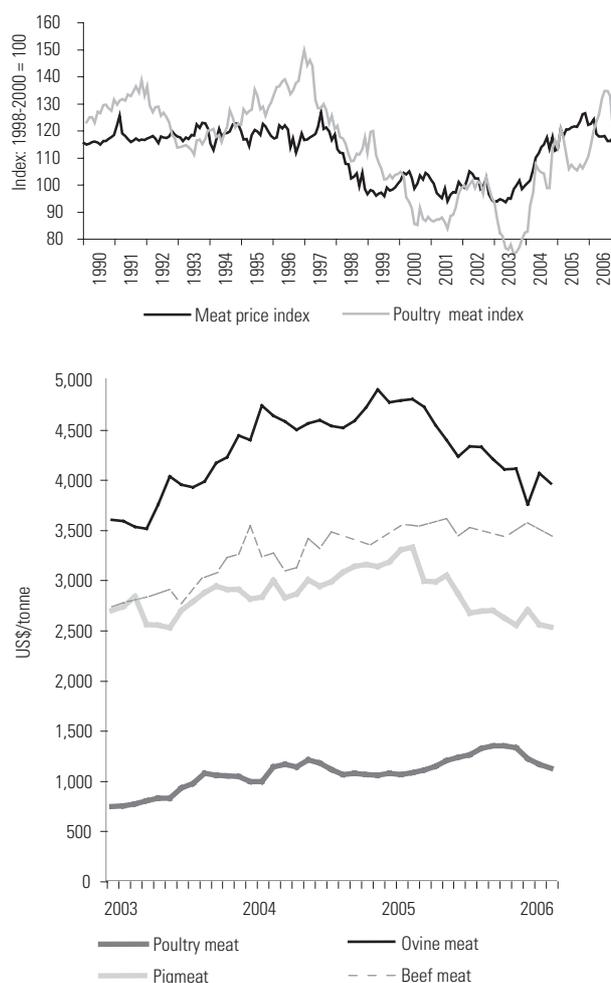


Fig. 4
Increased meat price volatility as a result of animal disease outbreaks

a whole, with policy intervention developed within a context of comprehensive cost information and tailored to deal with their socio-economic consequences. The development of tools to understand and analyse these linkages requires a solid understanding of how local livestock markets are linked to other sectors of the economy and to international markets. The next sections identify some of the factors determining those linkages and attempt to analyse the impact of further animal disease outbreaks on both local and international markets.

What puts global markets at risk from localised disease outbreaks?

The livestock sector is rapidly globalising as meat demand increases, structures of production change, and trade

increases not only in absolute volume but also as a share of global production. In addition, the segmentation of meat markets that previously characterised trading patterns is gradually being eroded by disease eradication, policies on zoning and technologies that allow exporters to ship products in a form that minimises the risk of disease transmission, e.g. cooked product or beef aged to reduced FMD risk. Consequently, the impacts of localised animal disease outbreaks are quickly transposed into the global marketplace as a result of diverging trading patterns, changing consumption patterns (including shifts between different meats), and price shocks. Some of the key factors influencing the overall duration and impact of animal diseases are discussed below

Disease type and consumer response to potential human health issues

The potential risks of animal to human disease transmission posed by zoonotic diseases, including the H5N1 AI virus and BSE which is linked to variant Creutzfeldt-Jakob disease, have had a more durable impact on global meat markets than those resulting from other animal diseases

such as FMD or non-H5N1 AI outbreaks. A case in point is the prolonged ban on North American beef after the discovery of three BSE-infected cows in 2003. The USA and Canada normally account for more than one-quarter of global beef exports (around 1.6 million tonnes, valued at approximately US\$ 4 billion). Two-year bans by major Asian importing countries contributed to nearly 20% gains in international beef prices over the same period. History seems to reveal that changing consumption and trade patterns related to zoonotic animal diseases tend to recover within two years. However, consumer and government responses to the human health implications of animal diseases make any type of market assessment of the overall impacts extremely complicated because of the difficulties of estimating consumption impacts in different markets.

Disease outbreak location/ duration and global market concentration

Despite the increasing shift in the percentage of global trade being provided by developing countries and growing export gains from non-traditional middle-income exporters, the degree of market concentration in the global

Table IIa
Largest meat exporters: share of global trade (percentage)

Poultry	United States of America	Brazil	European Union (EU-15)	People's Republic of China including Hong Kong	Thailand	Total market share of the five largest exporters	Developed countries	Developing countries
1980-1990	29	21	31	1	5	87	67	33
1990-2000	41	12	17	9	5	84	66	34
2000-2004	36	22	13	7	6	84	56	44
2004	34	36	11	3	3	87	52	48
Bovine meat	Australia	United States of America	European Union (EU-15)	New Zealand	Brazil	Total market share of the five largest exporters	Developed countries	Developing countries
1980-1990	24	7	32	11	9	83	66	34
1990-2000	21	15	19	8	5	68	76	24
2000-2004	21	15	8	8	15	67	66	34
Pigmeat	European Union (EU-15)	Canada	United States of America	People's Republic of China	Brazil	Total market share of the five largest exporters	Developed countries	Developing countries
1980-1990	40	18	6	17	1	82	74	26
1990-2000	35	15	13	8	3	74	77	23
2000-2004	27	20	18	8	11	84	75	25
Total meat	United States of America	Brazil	European Union (EU-15)	Australia	Canada	Total market share of the five largest exporters	Developed countries	Developing countries
1980-1990	11	8	30	14	5	68	70	30
1990-2000	23	7	20	10	5	65	73	27
2000-2004	24	16	14	14	7	75	64	36

meat market is high, with five major exporters accounting for nearly three-quarters of global meat exports (Table II). This high degree of concentration in global meat markets, in the context of any market shocks, including those resulting from animal disease outbreaks, can translate into large swings in international prices. Of particular note is the rapid escalation of meat exports from Brazil, which has risen from less than 10% of global meat trade in 2000 to an estimated 35% by 2005.

Links to international markets

The extent to which a country or region is impacted by a disease is dependent on their linkages to international livestock markets and the meat product trade.

A heavy export dependency by some countries can lead to significant market disruptions, both internationally and domestically. Such examples include the Canadian cattle industry which exported 12% of their live animals and nearly 50% of total beef production prior to the identification of a BSE-infected animal in May 2003. After two years, at a cost of over US\$ 4 billion, exports of meat are finally recovering but live animal exports are still languishing. In 2003 alone, the value of Canadian beef and

cattle exports declined by over US\$ 1.3 billion. In Asia, the Thai poultry industry, prior to the AI outbreaks in late 2003 was the fourth largest poultry exporter after the USA, Brazil, and the EU. With approximately 40% of Thailand's estimated production of 1.5 million tonnes destined for export markets, market closures resulted in a 40% decline in export earnings in 2004, from US\$ 1.1 billion to US\$ 674 million. Such trade losses, the cost of animal disease surveillance and control, and livelihood losses to poultry producing households are estimated to have resulted in a 1.5% gross domestic product (GDP) loss for the country (2).

The net trade position of a major trading country and the trade share of production/consumption will also determine how localised the impact of an animal disease will be, as well as how global trading patterns are likely to be shaped. Animal disease outbreaks in countries that are both large importers and exporters of the same products, such as the USA for beef or the EU for poultry, have a very different impact on global markets than outbreaks in countries that are only exporters. For example, the discovery of BSE-infected cattle in Canada and the USA resulted in different impacts in the two markets due to differing characteristics of the two respective beef markets. While the USA is one of the world's largest beef exporters, exports account for only 10% of production and it is a net beef and live cattle

Table IIb
Largest meat importers: share of global trade (percentage)

Poultry	Russia	Hong Kong	Japan	People's Republic of China	European Union (EU-15)	Total market share of the five largest importers	Developed countries	Developing countries
1980-1990	n.a	12	23	2	17	54	44	56
1990-2000	20	14	13	10	6	64	48	52
2000-2004	16	11	10	8	8	54	49	51
Bovine meat	United States of America	Japan	Russia	European Union (EU-15)	Mexico	Total market share of the five largest importers	Developed countries	Developing countries
1980-1990	38	12	n.a.	16	1	66	69	31
1990-2000	22	16	12	8	4	63	69	31
2000-2004	24	13	10	8	6	61	65	35
Pigmeat	Japan	Russia	United States of America	People's Republic of China including Hong Kong	Mexico	Total market share of the five largest importers	Developed countries	Developing countries
1980-1990	26	n.a.	39	8	2	75	78	22
1990-2000	29	20	14	6	5	75	75	25
2000-2004	26	11	12	7	8	64	67	33
Total meat	Japan	United States of America	European Union (EU-15)	Mexico	People's Republic of China including Hong Kong	Total market share of the five largest importers	Developed countries	Developing countries
1980-1990	18	28	21	1	5	73	66	34
1990-2000	17	11	8	4	7	48	62	38
2000-2004	14	11	8	6	7	46	58	42

importer. The value of US beef exports, as a result of the discovery of two BSE-cows led to a drop of export earnings of US\$ 2.6 billion in 2004 while the absence of US beef in global markets contributed to higher international prices. However, domestic prices remained relatively high as imports adjusted. This contrasts with the domestic impact in Canada where a more dramatic dependence on international export markets, as indicated above, immediately translated into cattle prices dropping by approximately 50% and reduction of cattle and calf receipts for 2003 by 33% from the previous year's level (3). Since Canada is not a net beef importing country, imports could not adjust sufficiently to maintain stable prices.

In the case of countries which are neither importers nor exporters, the impact of an animal disease outbreak will be linked to the structure of the industry and the contribution of the livestock sector to GDP. The extent of the losses beyond the production sector depends on linkages with other sectors within the agricultural supply chain. In most cases, animal disease outbreaks in these cases will only have a limited impact on international markets, with the glaring exception being the potential consumption shocks generated by the H5N1 AI which is aggravated by the human-to-human health concerns.

Industry structure and the degree to which the industry is linked to other sectors of the economy

Livestock industries in many developed, and increasingly developing countries, have a high degree of vertical linkages with upstream and downstream industries as well as horizontal linkages between industries in different countries through foreign investment. Livestock industries can be significant users of raw materials from upstream industries and are a major provider of raw materials for downstream industries. Any shock to highly concentrated industries that undertake further processing and move packaged products to numerous outlets around the country will have knock-on effects throughout the supply chain. Consequently, the broader impact of animal diseases needs to be examined to identify the market impacts on other sectors of the economy.

Further outbreaks of avian influenza: what are the market implications?

Identifying the scenario

After the AI outbreaks of 2004 and 2005 and BSE-concerns about North American beef over the same period,

meat markets are expected to recover in 2006, with consumption rising and increased production in disease-free countries mitigating the pressure for upward price movements. However, considerable uncertainty clouds any potential market impact of further outbreaks of AI, particularly in Europe where its close proximity to recent outbreaks raises concerns about the risk of disease transmission. In the current situation, a key issue for the global poultry sector is the vulnerability of poultry markets to any major market shocks, in particular any potential outbreak in the EU, a significant player in world poultry markets. This has led the Food and Agriculture Organization (FAO) to evaluate the impact that any extensive outbreak of avian influenza that spreads over the major EU producing countries (five countries account for two-thirds of EU poultry production: France, the UK, Spain, Germany and Italy) would have on global poultry markets as countries around the globe ban imports from the EU (a summary of this evaluation, including the difficulties of undertaking such a study, is discussed below).

Reviewing any complicating factors

Any straightforward assessment of the potential global impact of AI in Europe is, however, complicated by the recent outbreaks of FMD in Brazil – the world's largest meat exporter of both 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.

A factor complicating the analysis is the net trade position of a country. Whereas Brazil has limited imports, the EU is both a major importer and exporter of poultry meat. The EU ships approximately 1 million tonnes of fresh/chilled/frozen poultry products, valued at over US\$ 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 500,000 tonnes of frozen fillets and other chicken products. These imports would be expected to drop as internal EU prices decline relative to rising world prices. Similarly, the EU is increasingly a net beef importer. With a large percentage of imports sourced from FMD-affected Brazil, any shortfalls would prompt a rise in domestic beef prices as bans are imposed on Brazilian beef products.

Working through the possible market impacts of a scenario analysis

With the EU accounting for approximately 13% of global poultry production and exports, and Brazil supplying nearly one-third of global beef shipments, international poultry and beef prices would be expected to move up sharply. Meanwhile, internal prices in these two disease-affected markets would decline as would production prospects and feed prices as meat products intended for exports, approximately 10% of production for EU poultry and 25% of Brazilian beef, move back into local markets. Differing production structures for the two livestock species, in particular the ability of producers to hold cattle back from slaughter, could, however, imply different supply availabilities on local markets.

Measuring the impacts of a potential market shock

Assessing the overall impact of an animal disease on both global meat markets and other sectors, such as the feed industry, ideally necessitates the use of a framework that links markets, both spatially and cross-commodity. In the absence of such a framework, it is somewhat difficult to disentangle the impacts that specific disease outbreaks have because of the complexities in determining trade developments that would have occurred in the absence of disease outbreaks. To evaluate the short-term global impact of a potential outbreak of AI in the EU, FAO's short-term commodity model (STM) was used. The STM is a dynamic, multi-commodity, partial-equilibrium, global trade model, which provides one-year-ahead projections for demand, imports, exports, stocks and prices, given predetermined supply for 18 basic foodstuffs, covering 50 countries /regions. Four meat categories, sub-divided into FMD-affected and FMD-free markets, are included in the model alongside a comprehensive coverage of the feed sector. Changes in real income, population and exchange rates are the principal exogenous variables driving global agricultural commodity markets.

Conditioning the impact assessment are the various assumptions underpinning the analysis. The scenario in the FAO study 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. While AI 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 risks of

avian influenza transmission through poultry consumption. Consequently poultry consumption over the period of the shock is assumed to remain relatively stable.

This scenario evaluates the impact of two major shocks to global meat markets that are imposed exogenously:

a) EU poultry exports drop to 0 from 1 million tonnes while imports adjust based on demand

b) Brazilian exports of beef decline by 200,000 tonnes (down 10% from their projected exports of 1.8 million tonnes). (This assumption is a moderate case scenario which reflects Mato Grosso do Sul's and Parana's [the FMD-affected states] position as suppliers of nearly half of Brazil's beef exports. In actual fact, due to the FMD outbreak in October 2005, Brazilian beef exports in 2005 grew at only 16%, half of the trade gains registered over the past five years and less than FAO's estimated gains of nearly 22%.)

Market implications

Any extensive AI outbreak in the EU, combined with reduced exportable beef supplies from Brazil, would have immediate implications on global meat and feed markets. Preliminary results of the FAO analysis indicate that the potential short-term impact would be higher meat prices for all meats on world markets (ranging from 9% and 11% for poultry and beef respectively and 6% 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, spillover effects would be evident in the feed industry as lower meat production pushes down grain and protein feed consumption, resulting in price drops of 2% and 5%, respectively (Table III).

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. In fact, poultry consumption in the EU was already affected in 2005 despite the absence of an actual outbreak in the EU. Sales of poultry dropped in many European countries with poultry prices, production, and feed use reported down. In addition, trade flows within Europe have been affected with markets such as the Netherlands, heavily dependent on intra-European trade, reporting poultry price declines of up to 25% and falling animal feed exports.

With potential outbreaks and consumer responses uncertain, the above scenario is only one possible impact assessment. Consumption responses are very difficult to anticipate as is the ability of other major exporting

Table III
The projected implications for global meat
and feed markets of any extensive outbreak of avian influenza

Type of change	Percentage change		
	World	European Union (EU-25)	Brazil
Bovine meat			
Production	-0.19	0.00	-1.51
Consumption	-0.19	-0.05	+2.69
Exports	+4.45	0.00	-17.05
Imports	+4.28	-0.59	0.00
Price	+11.41	+0.80	-2.57
Poultry			
Production	-1.93	-14.35	0.00
Consumption	-1.92	-0.55	-3.20
Exports	+0.46	-100.00	+7.15
Imports	+0.46	-6.25	0.00
Price	+9.02	-7.08	+7.16
Pigmeat			
Production	0.00	0.00	0.00
Consumption	+0.01	+0.23	+0.41
Exports	+1.61	-3.30	-1.48
Imports	+1.58	+0.23	0.00
Price	+6.83	+0.26	+0.75
Wheat feed			
Consumption	-0.68	-1.19	-0.90
Price	-1.91	-1.91	-0.58
Corn feed			
Consumption	-0.37	-2.54	-0.37
Price	-2.08	-0.63	-0.63
Protein feed			
Consumption	-0.21	-2.04	+2.17
Price	-4.55	0.00	0.00

countries, particularly the USA and Brazil who supply nearly 70% of global poultry trade, to step up production and exports of poultry meat in the short-term. The ability of these countries to respond to market shocks and higher prices would obviously mitigate upward price shocks. This, of course, assumes that there are no supply constraints in these countries and they themselves do not experience any AI outbreaks.

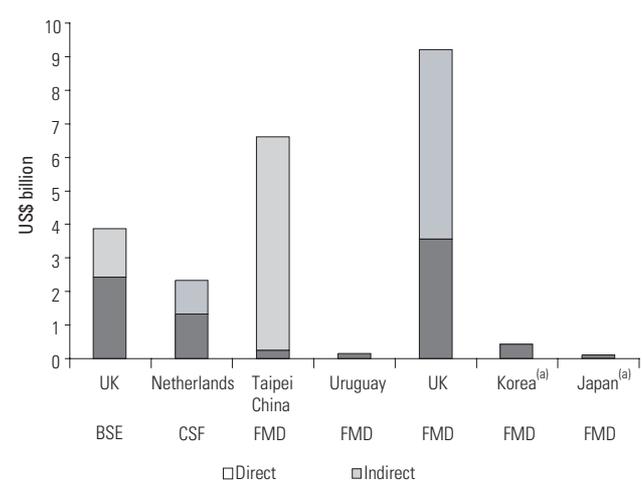
Conclusions

International meat markets have been increasingly affected by animal disease outbreaks which have caused trade diversion and shifting market shares between exporters of the same and different types of meat products. History as an indicator has, however, shown us that global meat

markets are very resilient to these shocks, with markets typically recovering within a few years. The short-term costs to economies, however, are considerable and even short-term market impacts have long-term implications for trading patterns, policy formulation and industry and sector development. Increasing recognition is being paid to the fact that the continual emergence and re-emergence of disease outbreaks are increasingly resulting in frequent short-term market disruptions which impose significant costs to producers, industries, and economies around the globe. Economic models are a useful tool that take into account the factors affecting the market fundamentals and may provide useful indications of the potential impact on livestock prices and trading patterns.

The broader implications of the proliferation of animal diseases, including an assessment of the localised costs of the animal disease outbreaks, cannot, however, be measured by an econometric model. Increasing attention is being placed on the costs, both direct and indirect, of animal diseases for producers, industries and consumers, as well as to the broader economy. A previous review undertaken by FAO (1) demonstrates the enormous financial and economic losses that can accrue to both developed and developing nations following the outbreak of a transboundary animal disease (Fig. 5). In many cases, the costs of animal diseases to the livelihoods of households and industries linked to the livestock sector are underestimated.

One of the long-term consequences of the costs imposed by animal diseases is that longer-term investment in the



a) indirect costs not available
 BSE: bovine spongiform encephalopathy
 CSF: classical swine fever
 FMD: foot and mouth disease
 UK: United Kingdom

Fig. 5
The cost of animal disease outbreaks

sector will be shaped by the increased market volatility engendered by disease outbreaks. Whereas in developed countries, governments have the ability to compensate a given sector, the invisible impact of such diseases in developing countries on small producers have implications for livelihoods and food security. Increasingly, and very

acutely in the case of AI which has implications for human health, policy-makers are faced with the difficult question of how the livestock sector should be structured and what needs to be done to limit the damaging impact of animal disease outbreaks. ■

Impact des maladies animales sur les échanges internationaux d'animaux d'élevage et de leurs produits

N. Morgan & A. Prakash

Résumé

Partout dans le monde, la gravité et l'extension croissantes des foyers épizootiques posent d'immenses difficultés aux éleveurs, au secteur agroalimentaire et aux responsables politiques, dans un contexte d'augmentation constante de la demande en produits d'origine animale issus des productions locales ou des marchés internationaux. Après avoir expliqué les facteurs et les tendances qui soutiennent la croissance du marché de la viande depuis une dizaine d'années, les auteurs évaluent l'impact des maladies animales sur les échanges internationaux. Les facteurs déterminant que l'impact d'une épizootie puisse se répercuter sur les marchés mondiaux, puis affecter de nouveau le marché intérieur d'un pays, sont ainsi identifiés ; l'impact potentiel de nouveaux foyers épizootiques sur le marché mondial est également évalué.

Mots-clés

Animal d'élevage – Commerce de la viande – Encéphalopathie spongiforme bovine – Fièvre aphteuse – Influenza aviaire – Maladie animale. ■

Influencia de las enfermedades animales en los mercados agropecuarios internacionales

N. Morgan & A. Prakash

Resumen

En todo el planeta, la proliferación de brotes zoonosarios cada vez más agresivos plantea considerables problemas al sector de la producción y la industria agropecuarias, así como a los organismos de planificación, en un contexto en el que viene aumentando, sin prisa pero sin pausa, la demanda de productos ganaderos, ya sean importados o de origen local. Tras describir los factores y tendencias que han impulsado el crecimiento del comercio de carne en el último decenio, los autores evalúan la influencia de la situación zoonosaria en los mercados internacionales. También examinan los factores que hacen que las repercusiones de las enfermedades animales se transmitan a los mercados mundiales para después incidir de vuelta en los mercados nacionales. Asimismo, evalúan las posibles consecuencias de nuevos brotes zoonosarios para los mercados mundiales.

Palabras clave

Comercio de carne – Enfermedad animal – Encefalopatía esponjiforme bovina – Fiebre aftosa – Ganado – Influenza aviar.



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