



MARKET IMPACTS OF HPAI OUTBREAKS: A RAPID APPRAISAL PROCESS - TURKEY

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Paper presented at

Symposium on

The Market and Trade Dimensions of Avian Influenza

**Rome, Italy,
14 November 2006**

in conjunction with
the 21st Session of the Inter-Governmental Group on Meat and Dairy Products

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Acknowledgements

I would like to thank the following persons for helping me with my work:

- My colleagues Cevat Sipahi, Yavuz Cevger, Yılmaz Aral and Savaş Sariözkan
- Nancy Morgan, Ellen Geerlings, John Curry and Jonathan Rushton of FAO Headquarters in Rome
- Yüce Canoler and Aslı Ilgen of Besd-bir
- Gizem Alav of Healthy Chicken Meat Platform
- I. Hakkı Erdoğan of Turkish Feed Association
- Hüseyin Sungur of Egg Producers' Union
- Hüseyin Büyüksahin of Egg Producers' Association
- Burhan Hacıslamoğlu of Veterinary Drug Suppliers' Association

Summary

Turkey has a well-developed commercial poultry sector as well as widespread backyard industry in rural areas. Turkey declared Highly Pathogenic Avian Influenza outbreaks first on 7 October 2005 and then on 25 December of the same year. The first outbreak was quickly eradicated. However, the impact of the latter which resulted in human deaths caused panics among consumers the impact of which lingered until Mid-February 2006. Due to the panic, poultry meat market collapsed, and sales dropped 1-4% below pre-AI level, with prices dropping to a level much lower than the cost of production in the early days of January 2006. Besides stocking the surplus production in cold storage, reducing production capacities, most of the firms had to 1) destroy chicks up to 15-day-old; 2) delay age of slaughter (from 42 days to 54-55 days); and, 3) sell the breeding eggs as table eggs.

The government had to depopulate all the birds in each of 230 outbreaks and surveillance zones (2.5 millions). Then, 13.5 millions spent hens, generally sold in the rural market, were culled through the last outbreak in 31st of March 2006. The culling, compensation and the expenditures on the disease control and prevention cost the government around 32 millions YTL (US\$23 millions).

While some sector participants, including backyard producers were compensated, the rehabilitation programmes were not based on any type of analysis which evaluated the differential impact of disease interventions. Furthermore, no further assessment has been made of the scale and duration of market shocks that 1) result from consumer fears about eating poultry products and 2) recognise market losses for producer and other market participants. Yet reports suggest that these shocks may be considerable and it is important that policy makers receive guidance in understanding and managing the shocks to the extent possible.

This study aimed at carrying out a rapid market assessment to examine the impact of market shocks caused by the HPAI outbreak and immediate control measures, and indications of long term change in the structure of poultry markets. It is intended that the study proposed here will provide a case study detailing the market events around the HPAI outbreak(s) in Turkey in 2006, and the methodological framework developed during this study be used to derive similar information from other countries facing AI outbreaks.

The study concludes that in spite of the short duration of consumer panics resulting from disease outbreaks and human mortalities in Turkey, there was a severe affected the poultry sector and its related industries (both upstream and downstream industries). Such events demonstrated that longer AI outbreaks causing human death would cause devastating effects not only the sector itself, but also all national economy.

Differential market assessment illustrated that:

- The integrated firms have been negatively affected during the outbreak periods. The AI induced losses due to decreases in production level and market prices of broilers are estimated to be 27,6millions YTL and 101,9millions YTL respectively.
- The industry have been recovering, but several medium scale semi-integrated and integrated firms has gone to bankrupt. Further bankrupts are expected in the near future. However, survivors, particularly those invested in brand development are likely to be better off in the future. Previously, consumption of commercial poultry meat and eggs by the rural families were negligible. However, as a result of ban on spent hen sales in local market, and depopulation of backyard poultry, the industry has been increasing their sales volumes in the rural markets.
- Both hormone and AI crises increased collaborations among integrated firms. The "Healthy Chicken Meat Platform" established by the largest 19 integrated broiler firms conducted very successful campaigns to re-gain consumers' confidence in a short period of time.

- The contracted broiler and turkey producers lost on average 1 cycle of production due to the AI. Most of them are operating now. However, their future is very dependent upon the future of the integrated firms. Negative impacts on integrated firms are directly transferred to the contracted producers. The nation-wide losses at the contracted broiler farms were estimated to be 77,6millions YTL of which 51,3millions YTL was due to decrease in the production and 26,6millions YTL was due to the decrease in management fees. The production losses in the contracted farms are likely to be significantly higher than those in the integrated firms. However, the government did not have any compensation programme for the contracted broiler and turkey producers.
- The integrated firms are able to negotiate with MARA relative to the problems/losses they faced due to the AI outbreaks, consequently influencing government decisions on compensation payments. However, they did not represent the problems faced by contracted farms faced due to the AI outbreaks. Since the contracted farmers are not organised under producers associations and unions, they cannot express their problems sufficiently. The government tends to neglect them when supporting the industry.
- Most of the table-egg producers have not re-stocked after culling of 13,5 million spent hens (31% of the national layer population) due to the unclear picture in the market. In particular, some of the farmers are in very bad financial crisis. They cannot restart operations due to the lack of finance, and they tend to rent their business. Those capable of re-entering the market are producing eggs, expanding their sales in the rural areas and enjoying high egg prices recently.
- The psychology, nutrition and income of rural families have been severely affected due to delayed restocking (due to the ban of the spent hens in rural market, most villagers can not find hens to purchase). They did not perceive as sufficient the compensation paid by the government since they not only lost income from poultry, but they become dependent on purchased poultry products in the market (indirect income loss). It is recommended that the government consider all these losses when considering compensation.
- During the crisis, the consumers, significantly lowered their protein intake and paid higher price for substitute protein sources (red meat and fish). However, most of resumed poultry consumption by June 2006.
- The government spent 31,7 millions YTL for combating the disease and compensating the sector participants. As a result of AI induced losses in production the sector and its related sectors, tax revenue losses were also occurred. Calculation of the economic/socio-economic cost of the AI nationwide is difficult to estimate. But it has far reaching indirect impact from tourism to environment.
- The government gained valuable experience on how to manage contagious zoonotic animal diseases. Both the government and industry realised that media communication/management is the most important area in the management of contagious animal diseases. The government is regarded as successful in combating and controlling the disease in spite of the fact that the methods of depopulating the birds, organisation efficiency in deployment of resources, and communications with the public have been under criticisms.
- Initially, the government focused on combating and controlling possible future outbreaks, neglecting rehabilitation programmes/initiatives for those suffering from the outbreaks. The decision to and how to compensate was not based on the scientific socio-economic impact analyses of different segments of the industry. The rapid market analyses and differential impact analyses outlined in this research depicted that the impacts of the disease appeared to be more distracting in the sector and its negative impacts are far reaching. The findings suggest more elaborative compensation programmes for the future outbreaks.

1 Introduction

1.1 Background and objective of the study

Highly Pathogenic Avian Influenza has affected Turkey, with the first outbreak starting in October 2005. In Turkey as in other countries, the consumption impact of this and subsequent outbreaks has resulted in significant market shocks for both commercial and backyard poultry operations. The market impact followed a sequential pattern prior to, during and immediately after an outbreak: demand falters, prices drop, and supplies decline as producers reduce output (birds are culled, mortality rates increase, or producers respond to reduced consumption and lower prices), and industry returns declined. Markets subsequently recover but the ability of producers to re-enter the market in a timely fashion may be compromised by various factors with implications for the long term structure of the sector.

No assessment has yet been made of the scale and duration of market shocks that result from consumer fears about eating poultry products and producer concerns about loss of markets, yet reports suggest that these shocks may be considerable and it is important that policy makers receive guidance in managing the shocks to the extent possible.

Considering the above stated points, this study aimed at carrying out a rapid market assessment to examine the impact of market shocks caused by the HPAI outbreak and immediate control measures, and indications of long term change in the structure of poultry markets. It is intended that the study proposed here will provide a case study detailing the market events around the HPAI outbreak(s) in Turkey in 2006, and the methodological framework developed during this study be used to derive similar information from other countries facing AI outbreaks.

The study involved the following activities:

1. Description of Turkish poultry sector (production, consumption, trade, the structure of the industry, locations and size of operations, and the major market chains) just before the AI outbreaks.
2. Historical backgrounds of the HPAI outbreaks in Turkey and government responses to combat and control the disease.
3. A detailed quantitative analysis of the impacts of HPAI outbreaks in Turkey on:
 - Demand, prices and supply of commonly consumed poultry products (broiler and turkey meats and table egg) during and immediately after the outbreaks in major consumer outlets.
 - Different segments of the poultry marketing chain (integrated firms, contracted broiler and turkey producers, table egg producers and consumers)
 - Related industries (feeding mills and veterinary service suppliers)
4. Suggestions for actions by government or other agencies that might improve market stability before, during, and after an outbreak

1.2 Overview of the poultry sector in Turkey

1.2.1 Poultry meat

Poultry is one of the leading sectors in Turkish agricultural sector. Annual turnover of the poultry sector was around US\$3-3.5billions, employing approximately 500,000 people in the immediate and related sectors. It is estimated that the livelihood of over 2 million people depends on their income from the poultry sector (including producers, farmers, small-scale retailers, feed and drug producers/sellers, marketing, transportation companies and workers).

In the early 1970s, the sector was dominated by backyard producers. However, during the 1980s, and 1990s, the sector rapidly developed with the establishment of modern layer farms and integrated broiler firms (and turkey firms after 1995).

The production, consumption and trade poultry meat in Turkey over the years are presented in Table 1.

Table 1: Poultry meat production and consumption and trade in Turkey

Years	Broiler meat production (Tonnes)	Turkey meat production (Tonnes)	Village poultry production (Tonnes)	Total poultry meat production (Tonnes)	Change in production (%)	Per capita consumption (Kg/year)	Poultry meat exports (tonnes)	Poultry meat imports (tonnes)
1990	162.569	0	54.190	216.759		3,83	575	203
1991	179.073	0	59.691	238.764	10,15	4,15	278	589
1992	216.214	0	72.071	288.285	20,74	4,92	2.115	2.727
1993	276.501	0	92.167	368.668	27,88	6,15	1.014	77
1994	233.510	0	77.837	311.347	-15,55	4,91	12.228	1
1995	313.154	2.646	101.739	417.539	34,11	6,65	4.913	38
1996	415.155	3.223	135.162	553.540	32,57	8,62	9.520	65
1997	493.271	2.678	120.640	616.589	11,39	9,53	11.012	291
1998	497.720	9.577	114.853	622.150	0,90	9,43	12.481	31
1999	557.666	18.270	80.142	656.078	5,45	9,83	9.886	12
2000	662.096	23.265	67.021	752.382	14,68	11,09	10.439	1.446
2001	592.567	38.991	41.813	673.371	-10,50	9,59	24.417	211
2002	620.581	24.582	60.043	705.206	4,73	9,98	19.642	38
2003	768.012	34.078	51.255	853.345	21,01	11,88	25.055	62
2004	941.000	50.000	54.555	1.045.555	22,52	14,33	29.161	20
2005	957.416	53.530	52.850	1.063.795	1,76	14,11	44.774	252

Source: BESD-BİR (2006a) (*) Turkey meat is included in the 4th column between 1990-1994.

As can be seen from the table, poultry meat production dramatically increased since 1990. It jumped almost five-fold, from 216,759 tonnes/year to 1,062,000 tons/year (390% increases) in 15 years witnessing an average growth rate of 14%. Production only declined in 1994 and 2001 in response to an economic depression affecting the national economy.

Turkey currently ranks 14th in the world in poultry production. The daily slaughtering capacity of the commercial poultry meat sector is 5,000 tons (in double shift), reaching 1,500,000 tons per year. In 2004 the capacity utilization ratio was estimated at 70% in the slaughterhouses and breeding houses (Besd-bir, 2006b)

The majority of the poultry meat and table egg production is supplied by modern enterprises. Commercial broiler and turkey accounted for 93% of the total production. While most of the villagers in rural areas (35% of the total population) keep backyard poultry (around 20 millions birds or 3% of the total poultry population (Alav, 2006a) they are primarily produced for family consumption, and their products are very narrowly marketed in the main consumer outlets. Per capita consumption of poultry meat also rapidly increased from 3.8kg in 1990 to 14.1 kg in 2005 (271% increase) with an average growth rate of 17.5% exceeding that of per capita red meat consumption (12.9kg). Turkish consumers mainly prefer broiler and turkey meats in urban areas. Consumption of other poultry meats is negligible, with consumption of spent hens and backyard poultry estimated at only 1kg/person (Alav, 2006a).

In 2005, approximately US\$6 million of poultry products were exported, 44,794 tonnes of poultry meat and 5.2 millions chicks/hens. This compares to more than US\$8 million worth of product

imports. While trade constitutes only a small share of domestic production, Turkey has the potential to export. Before the outbreak, the EU was considering importing broiler meat from Turkey. After the evaluation by the European officials, 6 of the integrated firms (31% of capacity), got an approval, and 5 other firms were still being under evaluation for approval (together they represent 56% of production capacity).

1.2.2 Table eggs

Table 2: The production and consumption and trade of table eggs in Turkey

Years	Commercial table egg production (Million)	Export of table eggs (*) (Million)	Import of table egg (Million)	Per capita consumption (eggs/person)
1990	7.699	42	209	139
1991	7.668	15	143	135
1992	8.215	9	17	140
1993	10.006	13	42	168
1994	9.845	453	3	154
1995	10.269	143	38	164
1996	9.782	202	26	152
1997	7.136	395	4	105
1998	12.160	564	5	177
1999	9.917	333	10	144
2000	7.245	46	26	107
2001	8.194	203	6	116
2002	7.809	13	0	111
2003	9.816	76	0	137
2004	8.443	124	0	115
2005	9.021			122

Source: BESD-BİR (2006a) (*) Eggs for breeding purpose included in Column 3 between 1990-1996.

As can be seen in table 2, the egg industry has not witnessed the strong growth in the poultry sector, Table egg production fluctuated between 7-12 billions across the years. It reached its peak level (12 billions) in 1998, and decline to 9 billions in 2005.

Turkey ranks 10th in the world egg production and per capita consumption was declined from its peak level of 177 eggs in 1998 to 122 eggs in 2005, mainly due to health concerns (cholesterol issue etc.). In 2004, 124 millions of table eggs and 52 millions of breeding eggs were exported; 16.8 millions of breeding eggs were imported in Turkey.

1.3 Market Chain Analysis

Both the poultry meat and layer egg sector are highly concentrated in certain areas in Turkey The main locations of the firms/farms are illustrated in the map in Figure 1 and Table 3.

Figure 1: Map of poultry unit density in Turkey (Source: MARA, 2006)

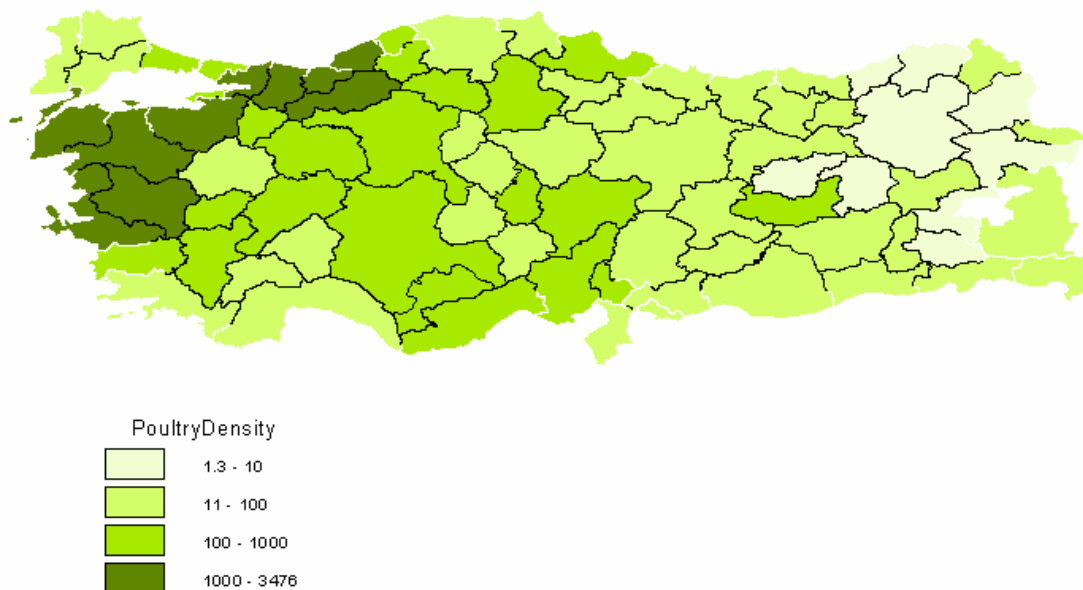


Table 3: Main locations of broiler and table egg enterprises in Turkey

Layer			Broiler		
Provinces	Number of flocks	% in Total	Provinces	Number of flocks	% in Total
AFYON	636	22,7	BOLU	2804	22,2
KONYA	351	12,5	BALIKESIR	1676	13,2
BALIKESIR	260	9,3	SAKARYA	1532	12,1
BURSA	177	6,3	MERSİN	970	7,7
KAYSERI	170	6,1	MANISA	744	5,9
Total	2805	100,0	Total	12652	
% in Total		56,8			61,1

As can be seen from Table 3, the commercial poultry sector is mainly concentrated in a few provinces with 5 provinces (out of 81 provinces) accounted for 57% of broiler farms and 61% of layers in Turkey. The broiler meat industry is dominated by 31 vertically integrated firms (see Table 4 for their market shares). Their organisational structure is illustrated in Figure 2.

Most of the integrated firms have their own breeder units, hatcheries, feed mills and slaughterhouses (some of them do not have the latter). The majority of the firms are in sector 1.¹ They provide their contract farms with day old chick, feeds, veterinary products and even credits if

¹

FAO (2005) defines the sectors as follows:

Sector 1: Industrial integrated system is a big scale commercial with the range of chicken number of 20.000 to 500.000 birds. This particular industry takes on a high level bio-security and products are sold commercially in urban areas or exported.

Sector 2: Commercial poultry production system with moderate to high bio-security or in Indonesia is referred to as small scale commercial with the range of chicken numbers of 1.000 to 10.000 birds. In general, this type of business is financially integrated to the big poultry companies. This particular business implements moderate to high bio-security. Products are sold commercially in urban and rural areas.

Sector3: Commercial poultry production system with low bio-security. This particular business adopts low bio-security and products are sold commercially in urban and rural areas.

Sector 4: Minimal bio-security of backyard farming. As an additional income activity, this type of farm centred in rural areas and products are consumed locally.

farmer wish. These inputs are transported to the contracted farm with the company owned vehicles. The firms have their veterinarians as well. Flocks are controlled weekly by the veterinarians with respect to the general condition and health status of birds, and the all internationally acceptable bio-security measures taken. Also, flocks are controlled by official veterinarians as regards the use of veterinary medicinal drugs, vaccinations, bio-security measures, hygienic conditions, etc. After the AI outbreaks, the firms increased the vet visits to improve the bio-security measures (e.g. prevention from rodents and wild birds, manipulation of death birds, animal faeces, use of separate cloths and disinfectant, quality of production records, general appearance of flocks). Rapid AI test on randomly selected birds are now applied in each farm before their birds are transferred to the slaughterhouses.

The integrated broiler meat firms are organised under the name of "BESD-BIR (The Poultry Meat Producers & Breeders Association). The association has 41 member firms which accounted for about 90% of the total commercial poultry production in Turkey.

The size of the broiler operation is quite large-scale in Turkey. As can be seen from Table-4, the largest 5 and 10 integrated firms accounted for 48% and 68% of the national broiler production respectively. On average, each integrated firm has 1,000 contracted broiler farms. There are 12,652 broiler flocks in Turkey. The average size of contracted broiler farms is about 20,000 heads per farm.

Figure 2: Organisational structure of integrated broiler firms in Turkey

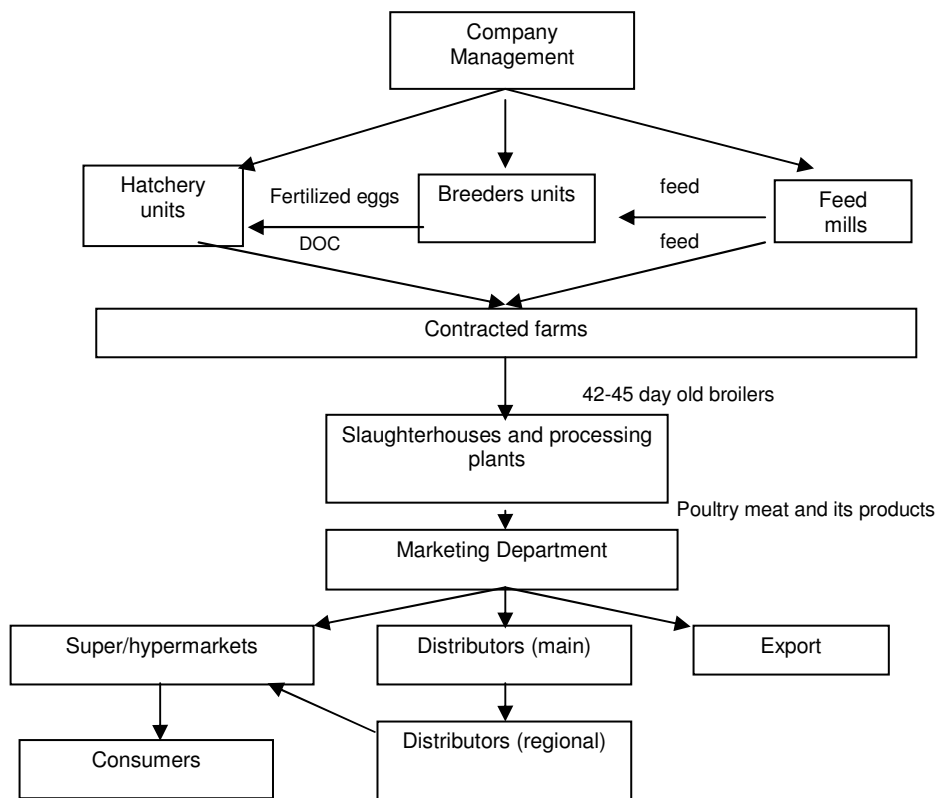


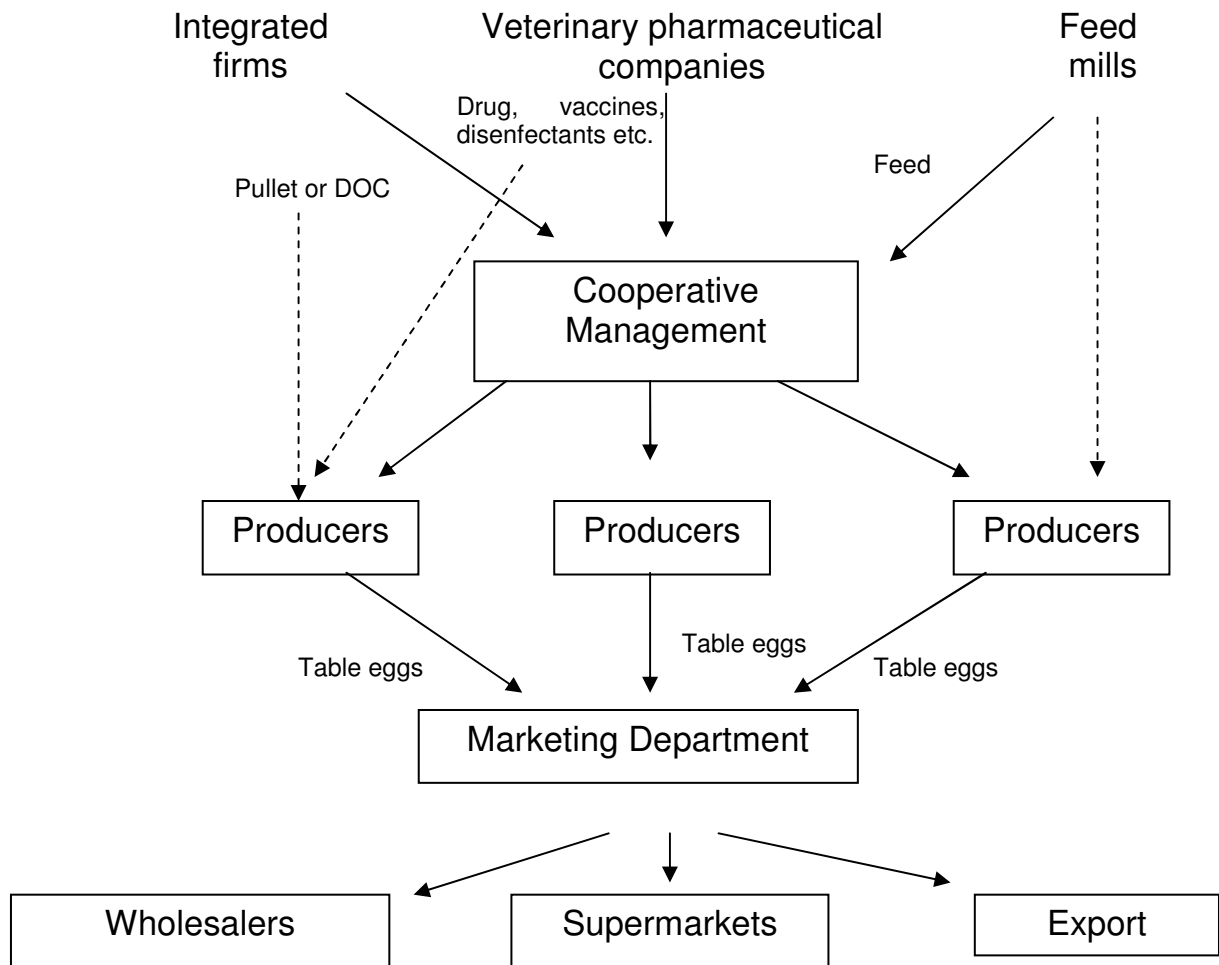
Table 4: Production and market shares of the 31 largest broiler firms in 2005

	Name of the firm	Production (Tonnes)	Market share (%)
1	C.P.	104.000	10,86
2	BEYPİLİÇ	96.000	9,95
3	BANVİT	95.000	9,92
4	ERPİLİÇ	85.000	8,88
5	ŞENPİLİÇ	83.500	8,72
6	ŞEKER PİLİÇ	53.000	5,54
7	KESKİNOĞLU	47.000	4,91
8	PAK PİLİÇ	39.000	4,07
9	KÖY-TÜR EGE	27.000	2,82
10	ÖMÜR	23.000	2,40
11	ABALIOĞLU	22.000	2,30
12	EMRE PİLİÇ	20.500	2,14
13	ESKAR (ÇELİKLER)	19.500	2,04
14	GEDİK	19.000	1,98
15	BU PİLİÇ	18.000	1,88
16	ASPİLİÇ	17.000	1,78
17	GÜNCANLAR (İZMİT)	17.000	1,78
18	KARAGÜP	17.000	1,78
19	AKPİLİÇ	15.000	1,57
20	FAT PİLİÇ	13.000	1,36
21	BAK PİLİÇ	12.850	1,34
22	GÜNCANLAR (BOLU)	12.400	1,30
23	YUMTA	10.810	1,13
24	AKYEM (BEYZA)	10.500	1,10
25	GARİP TAVUKÇULUK		1,04
26	BOZLAR	8.250	0,86
27	MİZAN TAVUKÇULUK		0,68
28	BOZOK (AYTAÇ)	6.000	0,63
29	KAR TAVUK	5.000	0,52
30	ÖZNESİL	4.890	0,51
31	AYPI	3.000	0,31
32	CANPI		0,22
33	TAD PİLİÇ	1.818	0,19
31	Other firms	51.398	3,49
	T O P L A M	957.416	100,00

Turkey production has been growing fast in recent years. The structure of the sector is similar to that of broiler sector. The integrated broiler firms produce majority of turkey meats.

The structure of the table egg sector differs from that of the broiler industry (See Figure 3). In particular, most of the table eggs are produced by individual medium scale enterprises, where, horizontal integration (co-operatives or marketing companies) is generally observed. They generally obtain their day-old-chicks or pullets from the breeders (integrated firms), feeds from feeding mills (large scale farms often make their own feed), and veterinary product from the veterinary pharmaceutical companies. Very few vertically integrated layer firms have been appeared in recent years, not benefiting from integration as did broiler firms.

Figure 3: Organisational structure of the layer industry in Turkey



There are 1530 egg producing enterprises in Turkey. The average flock of layers generally averages between 20,000 to 100,000 (see Table-5) with the proportion of layer farms greater than 50,000 layer hens 65% (Table 5).

The breeds/strains used for egg production are; Lohman (60%), Hy-Line (15%), Isa Brown (10%), white Bovaks (10%) and other (5%). There is no national firm producing grand parent stocks in Turkey. Grand parents are mainly imported from the EU countries (mainly from the United Kingdom)

Table 5: Size of layer farms in Turkey

Size of enterprise	Percentage of total number of enterprises (%)
<10.000	5
10.000-20.000	10
20.000-50.000	20
50.000-100.000	50
>100.000	15

The majority of table egg producing companies have been organised under the Turkish Table Egg Producers' Association since 1985. It started its operation in Istanbul with 900 members, but moved to Ankara in 2006. At present it has about 800 members. Beside the association, the producers established the Egg producers' Union² in 2006. The union at present has 351 members.

1.4 History of the AI outbreak in Turkey

In Turkey, the first outbreak was declared on 7 October 2005 in an open free range turkey farms in Manyas district of Balıkesir (Western Turkey) where all of the 2500 turkeys as well as 4000 village poultry were culled. Contacts of domestic animals with migratory birds were declared to be the reason for the outbreak. This first outbreak was successfully controlled without spread to other areas. The second outbreak started on 25 December 2005 in Aralık district of Iğdır Provinces (Eastern Turkey) and spread to 53 out of 81 provinces of Turkey during the peak season of migratory birds in Turkey. 28 provinces reported no outbreak, whereas 19 had one confirmed outbreak, and another 14 had 2 confirmed outbreaks. Only three provinces had more than 10 confirmed outbreaks and one of these, Samsun, had around one quarter (59) of the national total of confirmed outbreaks. (See the map below)

The last outbreak was recorded on 31 March 2006. Until this date there were 230 confirmed cases (30 in wild birds, 199 in backyard producers and 1 in sector-3 commercial farm) 6,510 birds died from the disease, 2,5million backyard poultry were culled in the outbreak and surveillance areas during the first and second outbreaks. Then, In order to support layers, control over-production of table eggs and avoid sells of spent hens in the rural markets, 13.5 millions layer hens older than 60 weeks of age were culled through the last outbreak on 31 March 2006.

The details of the latest statistics related to the AI outbreaks are presented in Table 6.

Figure 4 Confirmed cases of HPAI H5N1 in Turkey by provinces

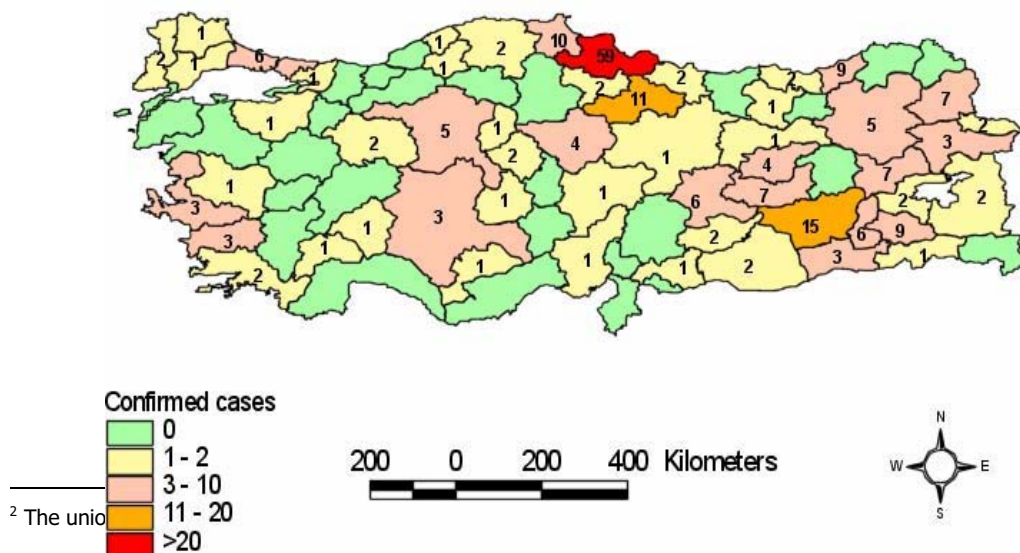


Table 6: Overall summary of avian influenza in Turkey (at 20 September 2006)

<i>Totals to date</i>	
Total No of confirmed cases	230
Total No of provinces with confirmed cases	53
Total No of confirmed cases in backyard poultry	199
Total No of confirmed cases in small scale village commercial poultry	1
Total No of confirmed cases in large scale commercial company	0
Total No of confirmed cases in wild birds	30
Total No of birds dead from disease	6,510
Total No of birds culled in quarantine zone	903,019
Total No of birds culled outside quarantine zone	1,619,853
Total No of birds culled	2,522,872

Source: GDPC of MARA (2006)

1.4.1 Government measures to combat and prevent AI

Turkey is a member of the World Organisation for Animal Health (OIE), and information regarding outbreak areas has been regularly reported to the OIE throughout the outbreak period. The Veterinary Service of Turkey has a transparent and reliable reporting system and shares all information with the EU and international organisations.

The General Directorate of Protection and Control (GDPC) of the Ministry of Agriculture and Rural Affairs (MARA), the competent authority responsible for animal disease control published a report that included its activities related to Avian Influenza control in Turkey since the end of September 2006. The followings are the summary of GDPC's activities to combat and prevent AI (GDPC of MARA, 2006).

1.4.1.1 Measures taken during the outbreaks

- General measures taken in the outbreak areas according to current legislation and the AI Contingency Plan. In accordance with the AI Contingency Plan, the National Disease Crisis Centre and Local Disease Crisis Centres were activated and protection and surveillance zones were established. Cooperation with the Ministry of Internal Affairs, the Ministry of Health, the Ministry of Environment and Forestry and other relevant units were formed, and a Government Announcement was prepared in order to be broadcasted in news bulletins of the Turkish media. All relevant information is published on the web page of the GDPC, which is open to access of public (www.kkgm.gov.tr).
- The movements of live poultry and poultry products, also including equine animals, were strictly controlled until the outbreak zones are lifted.
- Check points were established in the vicinity of outbreaks in order to control illegal movements.
- Hunting of wild birds throughout or part of the country was banned.
- Intensive clinical surveys were conducted in the periphery of all outbreak areas. During the second outbreak, due to the culling of all poultry within the protection zones, serological surveys were not able to be conducted in protection zones, certain outbreak areas, and surveillance zones.
- Personnel were deployed immediately to outbreak areas and areas at risk. Outbreak areas were strengthened with the provision of protective clothing, disinfectants and application equipment supplies, giving priority to the indicated areas and to all Provincial and District Agriculture Directorates.
- Susceptible animals within the protection zone and also the surveillance zone (2,522,872 birds) were culled and compensation was paid. Furthermore, in order to prevent the sales of spent hens in local markets, 13.664.745 spent hens were culled on-site.

- In order to enable the implementation of culling activities through humane methods, a meeting was held in January 2006 with the participation of Provincial Governors, Provincial Directors of Agriculture, and Provincial Directors of Health. An instruction on AI culling activities was disseminated to the 81 Provincial Directorates of Agriculture. The Directors of Animal Health of the Provincial Directorates of MARA were trained on animal welfare by the Turkish Veterinary Service (GDPC). Representatives of the GDPC participated in national and local TV and radio broadcasts in order to inform the public. Animal welfare issues were included in the AI booklets.
- Numerous posters, leaflets and other printed material have been disseminated to relevant units, public awareness has been raised and trainings are being performed.
- Bio-security measures have been increased, and a leaflet has been prepared particularly for this purpose. Regular meetings have been held with the sector for the purpose of evaluation and information.

1.4.1.2 Measures taken after the outbreaks

Turkey overcame the disease and still continues to take necessary measures. Measures taken for ensuring preparedness for the re-occurrence of the disease are listed below.

- Raising public awareness, training and strengthening of passive surveillance: Studies for training and the dissemination of leaflets and brochures are being continued uninterruptedly. For the coordination of these studies among all relevant units, a working group including representatives from main organisations, namely the GDPC, Ministry of Agriculture, Ministry of Health, Ministry of Education, FAO, WHO, UNICEF, and World Bank has been established in August 2006. This working group is assigned with the drawing up of a set of messages to be used in campaigns in autumn 2006. These messages concentrate on three main transmission steps: Wild bird to poultry, poultry to poultry and poultry to human.
- The keeping of poultry indoors: Instructions have been disseminated throughout the country in order to keep backyard poultry indoors, and the prevention of their contact with migratory birds and waterfowl.
- Support for the increasing of bio-security measures: The firms were encouraged to invest to strengthen bio-security measures by providing low interest loans.
- Ban on the sales of live poultry in local markets: the sales of live poultry in local markets were banned permanently.
- The improvement of laboratory capacity and capability: Activities for increasing laboratory capacity will be carried out under the Avian Influenza and Human Pandemic Preparedness and Response (AIHP) Project financed by the World Bank and the Avian Influenza Preparedness and Response Project financed by the EU. These activities involve:
- Updating of relevant legislation: The stocks and requirements of all institutions within the MARA have been evaluated, and related legislation and the contingency plan for AI have been revised.
- Surveillance: Surveillance studies (both active and passive in wild birds, backyard production and commercial farms) are in continuation. Clinical, serological and virological surveillance are being carried out for diseases. In order to assist these studies, under the FAO project titled "Emergency Assistance for the control and prevention of Avian Influenza OSRO:GLO:SO4: MUL Baby 02" 2 epidemiologists have been working in cooperation with the GDPC staff at central level.
- Vaccination: At present, vaccination is not being implemented against Avian Influenza in Turkey. A decision has been taken at Ministerial level for the stocking of a certain amount of vaccine to be used in emergency cases. So far the government and integrated firms are reluctant to apply vaccination policy for two main reasons; firstly due to the international trade concerns, secondly difficulties of applications of vaccines in backyard poultry (difficult to monitor the chickens for the second vaccination and for the non-vaccinated young birds)
- Compartmentalisation: Informative studies on compartmentalisation have been launched in June 2006. Discussions have been held with representatives of the broiler industry in August 2006 about the benefits of compartmentalisation in order to resume international trade. Presentations have been given and literature has been provided, explaining the

concepts of compartmentalisation and the measures required to achieve this. The industry is assessing the requirements, benefits and costs.

The last confirmed case of HPAI was reported on 31 March 2006, over six months ago. Stamping out was carried out in the periphery of all outbreaks and surveillance is ongoing, with negative results. On the basis of this evidence, Turkey declared itself free from highly pathogenic avian influenza with effect from 15 August 2006, in accordance with the conditions outlined in the OIE *Terrestrial Animal Health Code* (Articles 2.7.12.3. and 2.7.12.4).

At present several internationally supported (World Bank, EU and FAO) integrated AI projects have been applied to better prepare and control possible new epidemics in Turkey.

1.4.1.3 Government supports to the industry

As a compensation for the culled birds, the government paid 20YTL for turkey, 10YTL for geese and duck, and 5YTL for chicken, pigeon and other game birds. The total compensation paid for the cull of 2,522,872 susceptible domestic birds within the protection zone and the surveillance zones were 12.877.850YTL (US\$9.198.464).

Furthermore, in order to prevent the sales of spent hens in local markets, 13.664.745 spent hens over 60-week old were culled on-site, and a total compensation of 14,759,262YTL was paid, based on a payment of 1.1YTL per animal. Also 1,511,665 spent hens were slaughtered in previously determined 16 slaughterhouses, and animal owners and slaughterhouse owners were paid 0,3 and 0,1 YTL per bird respectively as a premium for combat with Avian Influenza. Considering other miscellaneous expenditures for disease control and prevention (purchase of materials and fuels) the total expenditures of the governments was estimated to be 31,7millionYTL (See Table 7 for the details).

Table 7 Financial cost to Turkish Government of AI prevention and control

Cost components	YTL
Compensation payments for stamping out at outbreak areas	12.877.850
Compensation for culling spent hens	14.759.262
Slaughtering fees for spent hens to the slaughterhouse owners 0.1 YTL per bird)	111.983
Compensation payments for culling spent hens after 30 April 2006 (0.3 YTL per bird)	345.531
Other expenditures (material purchase, fuel etc.)	3.607.204
Total	31.701.831 (US\$22,6millions)

Besides the compensation payments, the government postponed the tax and electricity bills of the industry for 6 months and 1 year respectively, and provided low interest loan for the bio-security investments.

Decisions on the level and type of the government supports were not based on the impact assessments on the different segments of the industry. The participants of the sector claim that the level of compensation was much lower than the economic losses they experienced (personal communications with the sector's participants).

Besides market impact analyses of the AI in Turkey this reports presents differential impact of the AI on different segments of the sector in the following section.

2 Market Impact of AI Outbreaks in Turkey

2.1 Data sources

In order to examine the impact of AI in prices and sales of broiler meat and table egg, and differential impacts on the integrated firms, contracted broiler farms, layers, consumers and related industries (feed mills and veterinary product suppliers), the required data were obtained from different sources. The table below summarizes the data sources.

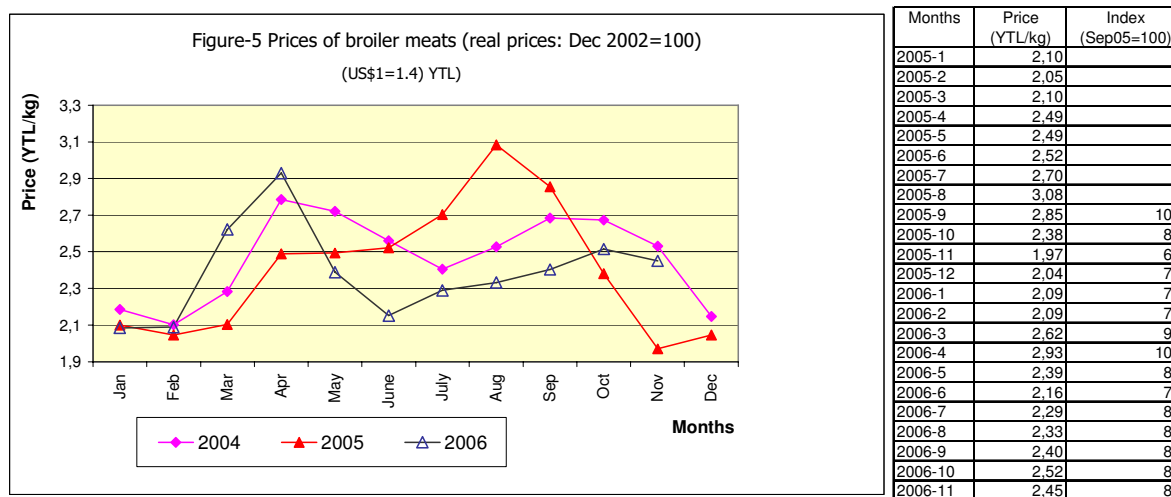
Type of information	Data source
Broiler meat and table egg prices	TURKSTAT
Broiler meat sales volumes	Ankara Chambers of commerce,
Beef prices	TURKSTAT
Differential impacts of market participants (integrated firms, contracted broiler farms, layers, consumers)	Preliminary results of the project Yalcin et al. (2006) Socio-economic Impacts of the Avian Influenza outbreaks the poultry sector, backyard poultry producers and consumers in Turkey. MARA (2006) Preparation of Sector Analyses for Certain Agricultural Products: Poultry Meat Sector.
Impact of AI on backyard producers	Geerlings (2006)
Other related industries (feed mills and veterinary product suppliers)	The Feed Producers' Association, The Veterinary Drug Suppliers' Association

2.2 Impacts of avian influenza outbreaks on poultry meat

2.2.1 Impact of avian influenza outbreaks on the price and sales volumes of broiler meat

It is difficult to assess the impact of the AI outbreaks in broiler prices in Turkey, since there was a hormone crisis (resulted from the claim of a popular football commentator on the TV that the industry use hormone as a feed additive in the broiler feeds) which started in October 2004 and affected the poultry meat markets until June 2005. Therefore, comparison of the monthly prices in 2005 and 2006 would be misleading as a gauge to assess the impact of the AI crisis in Turkey.

The real consumer prices for broiler meat (current prices for broiler meat published by TURKSTAT were corrected according to the inflation rate) over the years are presented in Figure-5.

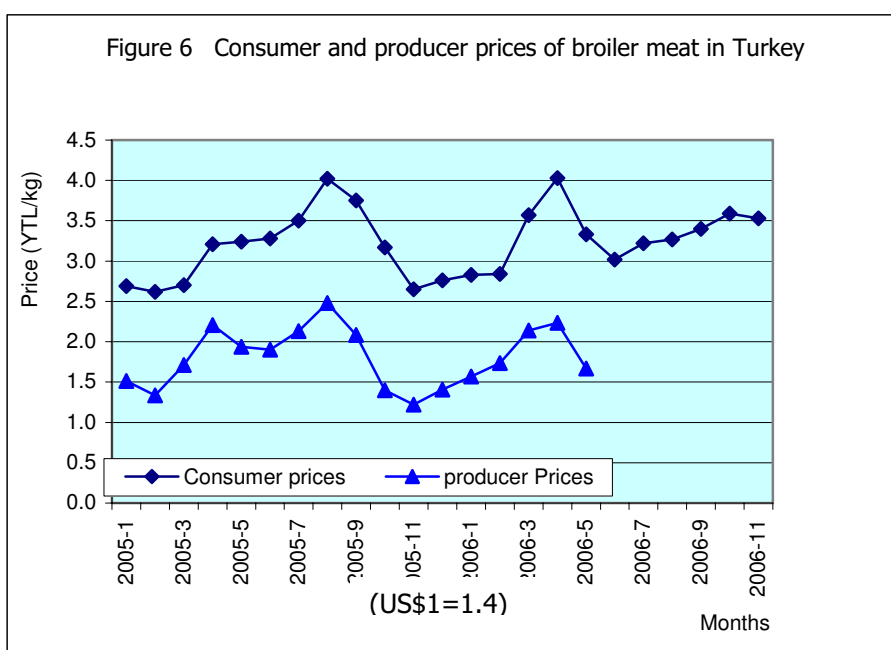


Source: TURKSTAT (2006)

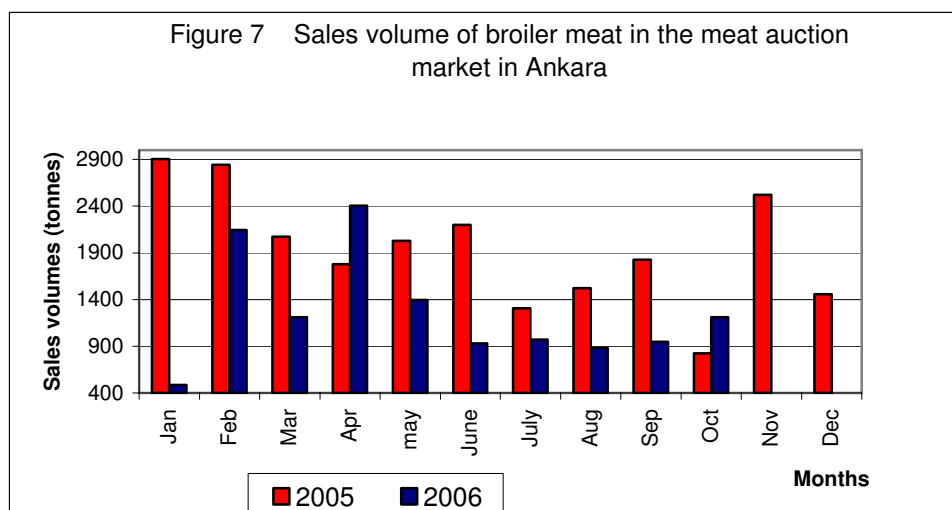
As can be seen in the above graph and table, due to the hormone crisis, the prices significantly declined in October and November 2004. These low prices continued until March 2005. The prices were under the previous year's level until June 2005. It reached the peak level just before the first AI outbreak in October 2005.

However, market prices dramatically declined after the first AI outbreak in October 2005; plummeting by 31% by the end of November 2005, compared to the price in September 2005. No further price decrease was observed during the second outbreak in January and February 2006. However, due to the strong consumer reactions to the disease, sales volumes dropped to 1-4% of the sales volumes of September 2005 (most of the supermarkets stopped selling fresh chicken in early January 2006).

The Graph in Figure 6 depicts that the price adjustment of producers in changing price is symmetric in terms of both timeliness and magnitude.



Sales volumes data were not available representing whole country. However, the sales volume figures in the Ankara auction market, depicted in the graph below (Figure 7) may indicate the market response to the disease.



As can be seen, from the figure, the sales volume of 1829 tonnes/month in September 2005 declined to 823 tonnes/month in October 2005 (% 55 reductions). It has quickly recovered during November and December 2005, as the outbreak was quickly controlled and then eradicated. However, given that the second outbreak resulted in more human cases and deaths, there was a more dramatic impact on the sales. The sales volume of 2900 tonnes/month in January 2005, declined to 486 tonnes/month (73%) in January 2006.

2.2.1.1 Impact on markets in different regions in Turkey

The AI outbreaks seemed to have different market impacts in different regions of Turkey. For instance, In Ankara (capital city of Turkey), broiler meat prices and sales volumes decreased by 32% and 54% respectively, whereas, the price decreased by 12%, and sales volumes increased by 78% in Erzurum (relatively small market in Eastern Turkey). Similarly, prices and sales volumes of table egg in Ankara auction market dropped by 16% and 58% respectively, whereas, the price of egg declined by 5% and the sales volume increased by 83% in Erzurum. These findings imply that consumer perceptions about the risk of AI may not be the same in different regions of Turkey. A detailed consumer surveys on this issue is needed to further explore the findings presented here.

2.2.2 Impact of AI on different segments of the Turkish poultry meat sector

2.2.2.1 Impact on integrated broiler firms

Some of the important preliminary findings of surveys conducted by Yalcin et al. (2006) on 3 integrated firms (their total market share was 25%) are summarised below:

- Number of breeding hens decreased by 15% during AI (1 Oct 2005 – 31 Jan 2006) and 24% after AI (1 Feb 2006 – 30 Apr 2006)
- Production of concentrated feed decreased by 8% during AI, and 15% after AI
- Capacity use of slaughterhouses decreased by 12% during AI, and 33% after AI
- Total sales volumes decreased by 25% during AI, and 18% after AI
- Exports of poultry products decreased by 69% during AI, and 94% after AI
- Broiler meats in the cold storages increased by 121% during AI, and 163% after AI
- Expenditures on bio-security increased by 22% during AI, and 26% after AI
- Expenditures on advertisements increased by 390% during AI, and 297% after AI
- The Costs of cold-storage increased by 258% during AI, and 228% after AI
- Interests paid for loan increased by 80% during AI, and 560% after AI as a result of increased needs for borrowing due to the fact that decrease in incomes from sales and increasing costs of cold-storage, bio-security and advertisements.
- Number of contracted enterprises decreased by 31% during AI, and 18% after AI.
- Capacity use in the contracted farms decreased by 23% during AI, and 8% after AI

- Payments of contracted producer (per kg meat) decreased by 9% during AI, and 11% after AI
- Sales of broiler meat without packaging decreased by 24% during AI, and 54% after AI

2.2.2.2 Impact on contracted broiler and turkey producers

Some of the important preliminary findings of surveys conducted by Yalcin et al. (2006) on 117 contracted broiler and 20 turkey farmers are summarized in Tables 8 and 9.

Table 8 Impact of the AI crisis on contracted broiler producers (117 producers)

	Before the AI (10 months)	After the AI (10 months)	% Change
Number of broilers produced (heads during 10 months)	6.505.911	4.717.922	-27,5
Number of cycle	3,9	2,7	-29,5
Net income per month from broiler production	481.166	307.269	-36,1

Table 9 Impact of the AI crisis on contracted turkey producers (20 producers)

	Before the AI (10 months)	After the AI (10 months)	%change
Number of turkey produced per farm (heads)	19.790	10.920	-44,8
Number of cycle	2,1	1,1	-52,4
Net income per month from turkey production	3246,3	1887,8	-41,8

As can be seen from the tables, compared to the situation pre-AI (ten months before the AI outbreaks), the number of broilers produced declined by 28%, number of cycles by 30%. As a result of this net income per month generated from broiler production dropped by 36% ten months after the first AI outbreaks (between the periods 01 October 2005-31 May 2006). Similarly, compared to the before AI situation, number of turkey produced declined by 45%, number of cycle by 52%, with corresponding income declines of 42% over the same period. These findings demonstrate the negative impacts of the AI outbreaks on the contracted turkey producers are likely to be worse than those on the contracted broiler herds.

2.2.3 Overall impact of AI outbreaks on the poultry meat industry

Below are some industry assessments about the impact of the AI crisis on the broiler industry, derived from personnel communication with Yüce Canoler, the general secretary of Besd-bir, and presentation of Kemal Akman who was head of Besd-bir at that time (Akman, 2006).

The industry declared that after the first AI outbreak in October, initially the sales volumes dropped 10% of the level before the AI, however sales rose again to 80% of the before-AI level until the second wave of the AI crisis in December 2005. During the first outbreak the firms reduced production level by 25%, and a significant amount of production were sent to cold storages. The volume of frozen chicken meat in storage increased to 40,000 tonnes by the end of December 2006 (normal levels in cold storage vary between 10.000-15.000 tonnes depending on the season).

After the deaths of 4 children due to the AI in the second wave of the outbreak, poultry meat market collapsed, and sales dropped to 1-4% of September 2000 sales volumes in early days of January 2006. Besides increasing stocks and reducing production, most of the firms had to destroy chicks up to 15-days-old (19.6millions DOC), delay the age of slaughter (from 42 days to 54-55 days) and sell the breeding eggs as table eggs (42,3 millions eggs between October 2005 and

February 2006). But they generally retained their parent stocks if they were not close to the age at culling.

Sales increased to 15% by the end of January, rose to 25% after the lunch reception with the prime minister and MPs at the parliament in February 2006, and increased a further 25% after the awareness-raising campaigns in the same month (details of the campaigns are given in the following section). However, by mid-March 2006 the production decreased by 50% (as a result of destroying 19.5 millions of DOCs and sales of 27.6 millions of breeding eggs as table eggs) and broiler meat stocks increased to 100,000 tonnes. The unit cost of production (2.4 YTL/kg) exceeded the market price of broiler until October 2006, except in the month of April when the firms made profit (This was due to the re-gaining consumer confidence, and commence of the picnic season. However, increasing demands was hampered by the human deaths due to the Crimean-Congo Hemorrhagic Disease for which picnic areas considered to be as the main risk in Turkey. Attempts of reducing frozen poultry meat in the cold-storages had also been decreasing effects on the broiler prices until September 2006). 5 firms went to bankrupt during this period, 4 of which as result of the AI crisis.

Using the currently available statistics in Turkey, an attempt has been made to extrapolate the total monetary impact of the AI induced production losses to the broiler firms and government tax revenues (Table 10).

Table 10 Total monetary impact of AI-induced production losses to broiler firms

	2003	2004	2005	2006
Total production (tonnes)	764.727	940.889	957.416	945.779
Annual growth rate (%)		18,7	1,8	-1,2
If the production would grow at the average annual growth rate of 14%			1.072.614	1.216.344
Losses due to the reduction in growth rate			115.197	270.564
Losses due to the 2006 AI Crisis				143.730
Cost of broiler meat (kg/YTL)				2,4
Profit margin (%8)				0,192
Production Losses incurred in the integrated firms (YTL)				27.596.160

If the average annual growth rate were not hampered by the hormone and AI crises in 2005 and AI crisis in 2006, the annual production would have reached 1.072.614 tonnes in 2005 and 1.216.344 tonnes in 2006. In other words, these crises decreased the production by 115.197 tonnes in 2005 and 270.564 tonnes in 2006. The production losses due to AI in 2006 were calculated to be 143.730 (1.216.344-1.072.614). Taking account of the cost of production and profit margins of the firms, the values of losses to the industry were estimated to be 27,6millions YTL. The nation-wide losses in the integrated firms due to the decrease in broiler prices were estimated to be 101,8 millions YTL (See Table 11).

Table 11 AI-related losses of integrated firms (nationwide) due to decrease in broiler prices

Average price between Jan2005-Sept2005	3,20
Average price between oct2005-Feb2006	2,90
Reduction in price	0,30
Total broiler production during the AI Crisis (October 2005-February 200606) (kg)	339.644.000
Total losses (YTL)	101.893.200

It should be noted that the changes in costs e.g. increasing cost for idle production, cold-storage and advertisements were not taken into account in the above calculations.

Turkey production is expected to be decreased from 54,000 tonnes in 2005 to around 40,000 tonnes (26%) in 2006. The AI imposed production losses are likely to be relatively higher in turkey meat sector, compared to those of broiler meat.

The nationwide impacts of the AI outbreaks on the contracted broilers farms were estimated by using the information presented in Table 12.

As can be seen in the table, the nation-wide losses at the contracted broiler farms were estimated to be 77,6millions YTL, of which 51,3millions YTL was due to decrease in the production and 26,6millions YTL was due to the decrease in management fees.

According to the above calculations, the production losses in the contracted farms are likely to be significantly higher than those in the integrated firms. However, the government did not have any compensation programme for the contracted broiler herds.

Table 12 Nationwide impact of AI outbreaks on contracted broilers farms

	Before AI	After AI	Differences	Source of information
Management fee (MF) of the producers (YTL/kg)	0,22	0,19	0,03	Survey
Profit margin % of MF	0,60	0,60		Pers. Com.
Average live-weight	2,20	2,20		MARA (2006)
Number of broiler houses	12.652,00	12.652,00		KKGM
Total number of broilers in Turkey in 2004	664.647.609	664.647.609		Besd-bir (2006c)
Average size of per broiler house	13.470	13.470		
Average number of production cycle in 10 months	3,90	2,70	1,20	Survey
Profit/average broiler house	15.256	9.121	6.134	
Nation-wide losses at the contracted broiler farms	193.013.666	115.403.276	77.610.390	
Nation-wide losses due to decrease in production(YTL)			51.290.345	
Nation-wide losses due to decrease in MF (YTL)			26.320.045	

2.2.4 Response to the poultry meat industry to restore consumers' confidence

Just after the "hormone crisis" in Turkey, the 19 poultry meat integrated firms which account for 85% of chicken meat produced in Turkey established "Healthy Chicken Meat Platform". The platform played significant role in restoring consumers' confidence during the AI crisis as well. Alav (2006b) extensively elaborated the activities of the platform during the AI crises in Turkey. The followings are the summary of her presentation:

Crisis management by the Platform: October 2005 crisis

- Declared strict bio-safety rules, red alarm in the integrated facilities
- Organised press conferences in coordination with the Ministry of Agriculture (sector, Ministry officials, scientists)
- Organised awareness-raising campaign which included intensive visits with the media, special reports and interviews, participation in live broadcasts and, plant tours. They broadcast 180 spots on national radios (October 18th-23rd), 4740 spots on local radios

(November 1st-6th), disseminated 50,000 posters at points of sale, and gave 14 announcements (7x25-45) ads to the national newspapers.

- Transparency: They responded to all kinds of questions/requests from the media and consumers, and declared that facilities of the integrated firms open at all times to the media, academy and NGOs.

Crisis management by the Platform: January 2006 crisis

- Due to human deaths in the second crisis a more comprehensive effort was needed. Besides intensive crisis communication which included the tools in the October crisis, a poultry lunch reception at the parliament with the attendance of prime minister was organised. Furthermore, the platform organised an "awareness-raising campaign" with the contribution of prominent journalist Uğur Dündar, who is a popular and trusted investigative journalist. US\$2 million was spent of activities including 893 spots on national TVs, 540 spots on national and 12.144 spots on local radios, 335 poster announcements on billboards, 50,000 small posters at points of sale, 1 million leaflets were handed out and 20 announcements were posted in 10 national newspapers.
- After the deaths of 4 children due to the AI in January 2006, poultry meat market collapsed, and sales dropped to 1-4%. Nevertheless, the campaign featuring Uğur Dündar boosted sales immediately in one week in February 2006. The public opinion conducted in Turkey in February 2006 stated that amongst the respondents, 86% liked the spot, 92% found the spot "comprehensible", 88% "memorable", 87% "informative and enlightening", 83% "convincing". %75 of the respondents stated that Uğur Dündar bolstered their confidence.

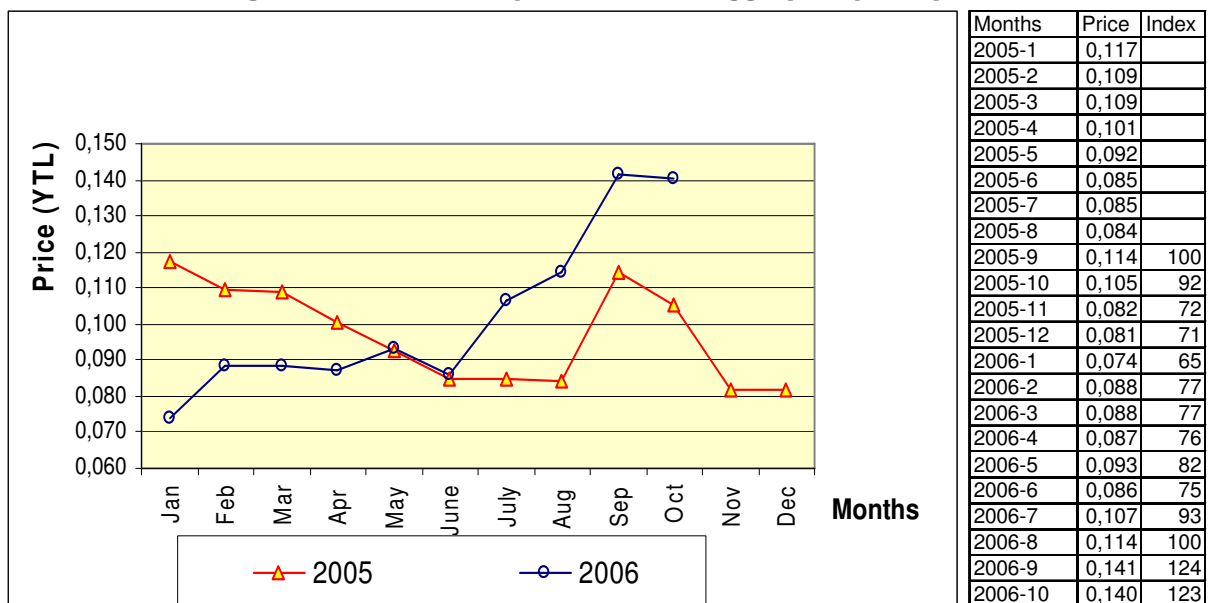
Broiler meat prices during 2006 have been lower than those of previous year until October 2006. Several medium scale semi-integrated and integrated firms went to bankrupt during these periods. In spite of the fact that, most of the firms will declare losses in the 2006 accounting year. However, in general the industry has quickly recovered. The firms invested in brand development are likely to be better off in the future.

2.3 Impact of AI on the price of table eggs

2.3.1 Impact of AI on table egg prices

Comparisons of consumer prices for table egg between 2005 and 2006 are depicted in the following table and graph.

Figure 8 Consumer prices of table eggs (real prices)



During the AI outbreaks, the table egg prices price steadily declined by the end of January 2006, more dramatic decline (35%) has been observed in the egg prices by the end of January 2006, compared to those of broiler (27%). The egg prices started rising again after February 2006. The prices exceed their 2005 levels after May 2006. There was a sudden jump in the prices between June and September 2006 because of rising shipments of egg exports to Iraq.

2.3.2 Impact of AI on layer farms

Some of the important preliminary findings of surveys conducted by Yalcin et al. (2006) on 12 table egg producers are summarized in Table 13.

As can be seen from the table, compared to the before AI situation, number of layer hens declined by 31% during AI and 13% after the AI. Total debt increased by 134% during AI and 166% after the AI.

Average income from the poultry business decreased by 175% during AI and 14% after the AI.

In spite of the fact that information on 12 layer farms is not sufficient to speak about the AI impacts on all layer farms nation-wide, such limited information shows dramatic impacts of the AI on the net incomes during the outbreaks.

Table 13 Impact of AI outbreaks on table egg producers (12 farmers)

	Before AI	During AI	After AI	% Change During AI	% Change During AI
Number of layer hens	69.545	48.145	60.875	-31	-13
Average age at culling (weeks)	78	69	82	-11	6
Total debts	61.667	144.000	163.750	134	166
Average net income from the poultry business	2.293	-1.711	1.968	-175	-14

2.3.3 Overall impact of AI on the table egg industry

The following is a review of the impact of the AI crisis on the broiler industry generated through personnel communication with Huseyin Buyuksahin, the general secretary of Egg Producers' association.

According to the assessment of Egg Producers' Association, the table egg sales in the first and second wave of the AI crises decreased to 40% and 15% of the sales level before AI. This collapsed the producers' prices and they dropped as low as 0,04YTL (almost half of the unit cost of the production). Because the government banned the sales of spent hens in the market without initiating compensation payments, these hens had to be kept at farms for 3 months and egg stocks increased to one billion by February 2006. In February 2006, the government culled one-third of the commercial layers hen population of Turkey (13.5 millions layers over 60 weeks old).

Before AI, the producers were able to sell the spent hens for up to 1YTL each, while the price obtained by the middlemen for each spent hen was about 1.5YTL. After the ban of spent hen sales, the price of the spent hens dropped to as low as 0.1YTL.

After June, the prices of table eggs dramatically increased due to mass exports to Iraq (approximately 3-4 millions of daily egg production of 20-23 millions during August 2006) In particular the large-scale farms have become better off after the AI outbreaks.

As 2006 production records were not available, the nationwide impact of the AI on the layer farms could not be assessed.

2.3.4 Response of the table egg industry

Unlike the poultry meat sector, the table egg industry is not well organised. Therefore, collective actions to increase consumers' confidence have not been organised as desired. However, as the consumers regain confidence to start eating broiler meat; this boosted the demand for table egg as well.

The sales of backyard poultry and their eggs were almost stopped in the local market due to the ban of such sales. This boosted the demand of villagers in rural areas for broiler meat and table egg.

2.4 Impact on rural families (village/backyard producers)

In spite of the fact that the contribution of backyard poultry to the national production of poultry meat and egg is negligible, it is very important for the livelihood, nutrition and psychology of rural families (35% of the population). Cull of all birds in the outbreak zones (2.5 million birds), and ban of selling spent hens in the local markets have negatively affected the livelihood, nutrition and psychology of rural families.

This area was beyond the objective of this study. However, Geerlings (2006) conducted research on this issue. Some of the findings of Geerlings (2006) on how and the extent of the impact on the backyard poultry producers in Samsun and Elazığ provinces of depopulating backyard poultry due to AI outbreaks are illustrated in Table 14.

Table 14 Impact of AI outbreaks on village producers in Samsun and Elazığ provinces

Impact	Ranking according to # of times mentioned as worst impact*
Loss of animal protein consumption	9 (14)
Loss of companion animals	0 (3)
Psychological stress	3 (8)
Loss of direct income**	1 (8)
Loss of indirect income**	1 (5)

Modified from Geerlings (2006) * The numbers in brackets in the third column represent the times that people mentioned this impact to be in the top 3 of worst impacts. ** Loss of direct income means that people miss income because they cannot sell poultry products anymore. Loss of indirect income means that people now have to spend money on buying poultry eggs and meat, products that they had free access to before the culling.

As can be seen from the table, villagers think that the main area of loss is nutrition (loss of animal protein consumption). In order of importance, it is followed by psychological stress, loss of direct income and loss of indirect income.

During the interviews, majority of the backyard producers stated that the rate for compensation per bird would represent the market value of their birds, and they were paid on time. However, they claimed that their losses were much higher than the market values due to the indirect losses (loss of productions, dependency on purchased chicken meat and egg, and nutritional impact of the disease)

2.5 Impact on consumers

A web-based survey was conducted to have an idea on how consumers behaved towards the AI crisis in Turkey. Some important findings are presented below.

• Number of respondent	189
% male	73
% Married	62
% University graduate	89
% of respondents stopped or reduced consumption of poultry products	68
% of respondents having sufficient info about the AI	68

% of respondents considering the official information unreliable	24
% of respondents considering the info. at newspapers unreliable	40
% of respondents started consuming the products by March 2006	38
% of respondents started consuming the products by June 2006	80
% Increase in the branded products in broiler meat	12
% Increase in the branded products in table egg	25

In spite of the fact that the survey may not represent the entire country, it reflects some of the important changes in consumers' attitudes. It shows that majority of the consumers stopped consuming poultry products, but restarted. Demands for branded products have significantly increased. 24 of the respondents considered the official information unreliable.

Research conducted (De Balogh and Sarkar, 2006) in a sample of 24,693 respondents in 29 European countries (25 EU members + Bulgaria and Romania + Croatia and Turkey) in March – April 2006 reported that:

- 46% of respondents thought that the EU public authorities informed the public of everything known about AI,
- Majority of EU25 citizens have reduced their consumption of poultry meat only on a temporary basis (77%) and 13% stopped them forever.

2.6 Impact on related industries

2.6.1 Impact on feed industry

Table 15 summarises the impact of AI outbreaks on the production of poultry feeds.

Table 15 Change in the production of Turkey's 50 largest poultry feed mills

Months	Production (tonnes) 2005	Production (tonnes) 2006	%Change
January	380.767	350.872	-7,9
February	384.627	359.846	-6,4
March	445.860	397.995	-10,7
April	407.363	379.252	-6,9
May	398.273	424.788	6,7
June	361.889	395.483	9,3
July	365.538	405.710	11,0
August	370.722	401.887	8,4
September	368.651	397.778	7,9

As can be seen from the table, the concentrated feed production declined by 6-11% between January and April 2006, compared to those of previous year. However, the prices recovered after May 2006. The industry reported that the main loss of the industry was due to the delay of paying the feed bills of the poultry industry (Personal communication with Hakkı Erdoğan, secretary general of Turkish Feed Association)

2.6.2 Impact on veterinary products suppliers

Survey results of the impacts of the outbreaks on the sales of the veterinary products suppliers to the poultry industry are shown in Table 16.

Table 16 Sales of veterinary products to the poultry industry ('000 YTL)

	Before the AI Crisis (01.10.2004-31.01.2005)	During the AI Crisis (01.10.2005-31.01.2006)	After the AI crisis (31.01.2006-31.05.2006)	% Change during AI	% Change after AI
Disinfectants	2255	2700	2600	20	15
Vaccines	5415	4060	4440	-25	-18
Drugs	3390	1900	2550	-44	-25
Vitamins	1500	675	1000	-55	-33
Feed additives	25000	17500	20000	-30	-20
Total	37560	26835	30590	-29	-19

As can be seen from the table, the sales of the veterinary products to the poultry industry dropped by 29% during the AI outbreaks and 19 % after the outbreaks. The sales of all products (vaccines, drugs, vitamins and feed additives) except disinfectants were negatively affected by the outbreaks. The sales of the latter however increased by 20% during the AI outbreaks and 15% after the outbreaks.

2.6.3 Impact on the beef industry

The monthly beef prices in Turkey during 2005 and 2006 are illustrated in Table 17.

Table 17 Monthly beef prices in Turkey

	2005	2006	% Change
January	11,3	12,9	12,4
February	11,4	13,2	13,3
March	11,4	13,2	13,5
April	11,4	13,2	13,9
May	11,4	13,2	13,9
June	11,4	13,3	14,2
July	11,4	13,3	14,4
August	11,4	13,4	14,5
September	11,5	13,6	15,5
October	11,7	13,7	14,6
November	12,1	13,9	12,9
December	12,1		

As can be seen from the table, the monthly beef prices increased after the AI outbreaks, The monthly prices in 2006 were 12 to 15% higher than those of 2005.

3 Conclusions and Recommendations

In spite of the short duration of AI outbreaks in Turkey and immediate consumer panics which lasted only two months, the analyses presented in this report depict the extent of the losses by the poultry sector and its related industries (both upstream and downstream industries). The implications are that longer AI outbreaks which causing human death would cause devastating effects not only on the sector itself, but also on the national economy.

Differential market assessment illustrated that;

- The integrated firms have been negatively affected during the outbreak periods. The AI induced losses due to decreases in production level and market prices of broilers are estimated to be 27,6millions YTL and 101,9millions YTL respectively. The firms lost both its exports (although negligible) and strong export potentials during 2006. There were however no need for imported chicken meats.
- The industry has been recovering, but several medium scale semi-integrated and integrated firms has gone to bankrupt. Further bankrupts are expected in the near future. However, survivors, particularly those invested in brand development are likely to be better off in the future. Previously, consumption of commercial poultry meat and eggs by the rural families were negligible. However, as a result of ban on spent hen sales in local market, and depopulation of backyard poultry, the industry has been increasing their sales volumes in the rural markets.
- The industry has in previous years extremely competitive behaviour was observed in the sector. However, after the hormone crisis, collaboration among integrated firms improved. The "Healthy Chicken Meat Platform" conducted a very successful campaign to re-gain consumers' confidence.
- The contracted broiler and turkey producers lost on average 1 cycle of production due to the AI. Most of them are operating now. However, their future is very dependent upon the future of the integrated firms. Negative impacts on integrated firms are directly transferred to the contracted producers. The nation-wide losses at the contracted broiler farms were estimated to be 77,6millions YTL of which 51,3millions YTL was due to decrease in the production and 26,6millions YTL was due to the decrease in management fees. the production losses in the contracted farms are likely to be significantly higher that those in the integrated firms. The negative impacts of the AI outbreaks on the contracted turkey producers are likely to be worse that those on the contracted broiler herds. However, the government did not have any compensation programme for the contracted broiler and turkey producers.
- The integrated firms are able to negotiate with MARA relative to the problems/losses they faced due to the AI outbreaks, consequently influencing government decisions on compensation payments. However, they did not represent the problems faced by contracted farms faced due to the AI outbreaks. Since the contracted farmers are not organised under producers associations and unions, they cannot express their problems sufficiently. The government tends to neglect them when supporting the industry.
- Most of the table-egg producers have not re-stocked after culling of 13,5 million spent hens, due to the unclear picture in the market with some of the farmers in a very bad financial crisis. They cannot start operations due to the lack of capital, and they tend to rent their business. Some of those producing eggs are expanding their sales in the rural areas and enjoying high egg prices recently. In order to establish more efficient communication, their association and union should be a close communication with Besd-bir and the "Healthy Chicken Meat Platform".
- The psychology, nutrition and income of rural families have been severely affected. They have not re-stocked yet. Therefore, the problems are still continuing. They are not happy with the compensation the government paid since they not only lost income from poultry, but they become dependent on purchased poultry products in the market (indirect income loss). They would expect that the government consider this issue when they offer

compensation. Detailed socio-economic assessments are needed to quantify the impact of the AI on the village producers.

- During the crisis, the consumers significantly lowered the protein intake, and paid higher price for substitute protein sources (red meat and fish). However, most of them started eating poultry by June 2006. Since then they have been enjoying purchasing better quality and safer poultry products. Several consumers surveys related to the AI crisis in Turkey are being carried out in Turkey. Results of these surveys should be carefully examined to get lessons for the management of future disease outbreaks.
- The government spent 31,7 millions YTL for combating the disease and compensating the sector participants. As a result of AI induced losses in production the sector and its related sectors, tax revenue losses were also occurred. Calculation of the economic/socio-economic cost of the AI nationwide is difficult to estimate. But it has far reaching indirect impact from tourism to environment.
- The government learned valuable lessons on how to manage contagious zoonotic animal diseases. They and the industry recognised that media communication/management is the most important area in the management of contagious animal diseases. The government is regarded as successful in combating and controlling the disease in spite of the fact that the methods of depopulating the birds, organisation efficiency in deployment of resources, and communications with the public have been under criticism. (More detailed information on that can be found in the report of World Bank, 2006 and Geerlings, 2006).

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