

A Report from the Assessment Methodology Unit in Response to Agence
Francaise de Securite Sanitaire des Aliments (AFSSA)

Bee Mortality and Bee Surveillance in Europe

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Summary

Since 2003 there have been reports in Europe and America of serious losses of bees from beehives. In 2006 the term Colony Collapse Disorder (CCD) was first used to describe this phenomenon. CCD is characterised by the rapid loss from a colony of its adult bee population.

The “Mortality, collapse and weakening in bee hives” working group of AFSSA sought information from EFSA with relation to the following topics:

- monitoring of chemical residue levels in honey within the member states
- surveillance programmes monitoring collapse, weakening and mortality in bees active within the EU
- data on levels of honey production in the member states

In order to collate this information, a short questionnaire was distributed through the EFSA Focal Point Network. Furthermore sources of European data on honey production and chemical residue monitoring were analysed.

All member states have a monitoring programme for residues in honey as required under Directive 96/23/EC. In Directive 86/363/EEC there are no pesticide residue MRLs set for honey so residue monitoring in honey focuses on residues of veterinary medicinal products and environmental contaminants. The following veterinary medicinal products and environmental contaminants that have also been used for plant protection have been detected at non compliant levels in honey; streptomycin, pyrethroides, organochlorine compounds and organophosphates. In September 2008 the Regulation 396/2005, which includes temporary MRLs in honey, will be applicable. Therefore, future monitoring programmes will include data on specific active substances in honey.

Five member states reported additional programmes investigating chemical residues. The UK and French surveillance programmes included laboratory testing for pesticide poisoning. The Project “Deutsches Bienenmonitoring” tests for pesticide residues in pollen, the Programa Apícola Nacional includes analysis of honey for pesticides and there is a project in The Netherlands testing for natural plant alkaloids in honey.

Responses were received from the EFSA Focal Point Network from twenty-two member states plus Norway and Switzerland. This identified seventeen bee surveillance programmes in sixteen countries. The surveillance programmes are frequently organised by national associations / federations of beekeepers. Additionally there is collaboration with the international COLOSS Network which aims to explain and prevent large scale losses of honeybee colonies.

The honey production figures provided in the questionnaires were frequently higher than those reported in FAOSTAT, EUROSTAT and national residue monitoring plans. Both the FAOSTAT and EUROSTAT datasets suffered from missing data and were not always clear regarding the data sources used to obtain the figures. When honey production figures extracted from EUROSTAT and FAOSTAT were averaged, Spain was the highest producer followed by Germany, Hungary, France, Romania Greece and Poland. A similar pattern was seen for honey production figures from the national residue monitoring plans. The data supplied in the questionnaires identified Hungary and Germany as the largest producers of honey. Luxembourg produced the smallest amount of honey. Greece reported the largest bee population (1,380,000 beehives). Analysis of the bee population figures provided by twenty-two countries for 2006-2007 estimates the bee population in Europe at greater than 8 million beehives. This estimate is conservative as data from two of the larger producers of honey Spain and Poland was not available.

In order to investigate further the phenomena of colony collapse disorder in Europe the following actions should be considered:

- Description of the study design of the surveillance programmes identified to assess the feasibility of combining data for EU level epidemiological analysis
- Collation of historical data on bee mortality rates and colony losses from the member state surveillance programmes identified in this report
- Review of reports referenced in the questionnaire and existing scientific literature on possible causes of colony collapse disorder and bee mortality

An EU-wide review of bee mortality and bee surveillance would facilitate an objective assessment of all possible causes of CCD. Additionally it would prepare the grounds and orientate research towards identified gaps in scientific knowledge.

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Background as provided by AFSSA

In May 2007 the Director of AFSSA created the working group “Mortality, collapse and weakening in bee hives”. The remit of this working group is four fold:

- Analyze national and international scientific studies (data and results) about colony collapse, weakening and mortality.
- Identify causes and/or risk factors of this phenomenon.
- Assess if the risk factors are relevant to the French situation, knowing French hives and apiary numbers, hive production, hive treatments (anti-parasitic and anti-infectious), changes in hives size etc.
- Raise recommendations about:
 - The need of surveillance plans to objectively and quantitatively monitor the consequences of this phenomenon.
 - The need to set up an epidemiological surveillance network in France.
 - The need for future studies on this subject.

At a meeting of the working group on the 11 March 2008 in Maisons-Alfort, France it was decided to seek information from EFSA with regard to the following topics:

- Monitoring of chemical residue levels in honey within the member states.
- Surveillance programmes monitoring collapse, weakening and mortality in bees active within the EU.
- Data on levels of honey production in the member states.

On the 14 May a preliminary report was sent to the working group for their consideration. Subsequently further information was received from member states and this report represents the collation of all information submitted to EFSA by the 01/07/2008.

Definitions

weakening	lack of strength (or vigour) of a beehive. It is linked to a decrease in the hive population density over a period of time combined, mostly, with a decrease in the hive activity. Bee disorders can be observed, for example, growth or behaviour disorders. Weakening is combined with a loss of honey production
collapse	rapid loss of bees in the hive, leading to its destruction
mortality	death of bee colonies

Introduction

Since 2003 there have been reports in Europe and America of serious losses of bees from beehives. In 2006 the term Colony Collapse Disorder (CCD) was first used to describe this phenomenon. CCD is characterised by the rapid loss from a colony of its adult bee population. No dead adult bees are found inside or in close proximity to the colony (Cox *et al.* 2007). At the final stages of collapse, a queen is only attended by a few newly emerged adult bees.

Collapsed colonies often have considerable capped brood and food reserves. In the United States of America a survey of bee keepers reported an average loss of 38% of colonies during the winter period of 2006-2007 (Vanengelsdorp *et al.* 2007). The cause of CCD has not been determined however many theories have been postulated including starvation, viruses, mites (*Varroa*), electromagnetic radiation or pesticide exposure (Hayes 2007, Cox *et al.* 2007, Kievits 2007).

Objectives

- Gather information on the monitoring of chemical residues levels in honey from member states.
- Identify surveillance programmes for bee mortality, weakening and colony collapse in Europe.
- Collate data on honey production and producers at member state level.

Methods

Chemical Residues in honey

Directive 96/23/EC on measures to monitor certain substances and residues thereof in live animals and animal products provides that Member States have to control compliance with the Maximum Residue Levels (MRLs) for veterinary medicinal products (Regulation (EEC) No 2377/90) and with MRLs for pesticides residues (Directive 86/363/EEC). For honey substances belonging to group B1 (antibacterial substances, including sulfonamides, quinolones), B2(c) (carbamates and pyrethroids), 3a, 3b and 3c (other substances and environmental contaminants- organochlorine compounds including PCBs, organophosphorus compounds and chemical elements) have to be included in the monitoring programmes. These monitoring programmes are targeted to detect illegal treatment. Data for residues in honey was extracted from the 2003 - 2005 results of the national residue monitoring plans (ec.europa.eu/food/food/chemicalsafety/residues/control_en.htm). The number of samples taken is dependant on the honey production data. The recommended frequency of sampling is 10 samples per 300 tonnes of annual production for the first 3000 tonnes of production and 1 sample for each additional 300 tonnes. Reported honey production figures were extracted from the Commission Residues monitoring plans and results Application for 2004-2007.

Questionnaire to Member States

To identify bee surveillance programmes a questionnaire (Appendix) was distributed through the EFSA Focal Point Network. The questionnaire requested information on existing surveillance and monitoring programmes in bees, for any relevant reports in the area of CCD and for data on honey production and the number of beekeepers and beehives for the years of 2006 and 2007.

Honey Production Data

In order to collate information on honey production EUROSTAT (epp.eurostat.ec.europa.eu) and FAOSTAT (faostat.fao.org) were interrogated for data on honey production, honey yield and number of beehives for the time period 2000-2007. Data was selected for the EU27 plus Norway since a completed questionnaire was received from this country.

For FAOSTAT the livestock primary and processed section of ProdSTAT was accessed. The selected parameters were as follows:

subject | Production Quantity | or | Yield | or | Producing Animals |
commodity | Natural honey |

country | Austria | Belgium | Bulgaria | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hungary | Ireland | Italy | Latvia | Lithuania | Luxembourg | Malta | Netherlands | Norway | Poland | Portugal | Romania | Slovakia | Slovenia | Spain | Sweden | United Kingdom |

year | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 |

For EUROSTAT honey production was extracted for the Sugar balance sheet (table name apro_cpb_sugar) with the product equal to honey (b4900) and the balance item equal to usable production (1000 t). The population data was extracted from Number of farms, heads and LSU by size of farm (UAA) and region table (ef_ls_ovaareg) where holding was equal to beehives (j18) and units equal to absolute value and number of holdings.

Results

Chemical Residues in honey

Directive 96/23/EC requires member states to monitor for certain substances in animal products to ensure compliance with MRLs for veterinary medicinal products and pesticide residues. No MRLs for pesticide residues are set in Directive 86/363/EEC for honey and there are no specific requirements concerning the sampling of active substances covered by this Directive. Therefore national residue monitoring plans for honey require monitoring of veterinary medicinal products and environmental contaminants, for the substances B1 (antibacterial substances, including sulphonamides, quinolones), B2(c) (carbamates and pyrethroids), 3a, 3b and 3c (other substances and environmental contaminants-organochlorine compounds including PCBs, organophosphorous compounds and chemical elements). The results of the national residue monitoring plans for the years 2003-2005 are summarised in Table 1. Certain active substances such as certain antibacterials, carbamates, pyrethroids, organophosphorus and organochlorine compounds are used in plant protection products and therefore might cause residues of products to be detected in honey. The following substances streptomycin, fluralinate, B-HCH, DDT, organophosphates and chlorfenvinphos (highlighted in yellow in Table 1) have been detected at non compliant levels in honey and are known to be substances used in plant protection.

Table 1: Substances detected in honey as part of the national residues monitoring plan by member state and year of reporting

Group	Substance	MS	2003		2004		2005	
			Target	Suspect	Target	Suspect	Target	Suspect
Prohibited substances	Chloramphenicol	BE	1					
		ES		2				
Antibacterials	Antibacterial	PL			19	5		
	Chlortetracyclin	GR	4		14	2		
		IT			1	3		
	Doxycyclin	GR	3		5		10	
	Oxytetracyclin	CY					1	
		FI	1				1	
		GR	20		3			
	Streptomycin	BE	1					
		EE			1			
		GR	6		16	3	4	
Sulfachlorpyridazin	GR					1		

Group	Substance	MS	2003		2004		2005	
			Target	Suspect	Target	Suspect	Target	Suspect
	Sulfadiazine	CY					1	
		FI		3				
	Sulfadimidine	DE		1				
	Sulfadoxine	FI	1	3				
	Sulfamerazine	DE					1	1
		GR	19				2	
	Sulfamethazine	AT	1					
		BE		7	1	1	3	2
		DE					1	1
		FI	1	6				
		GR	3		3		3	
	Sulfamethoxazol	CZ				6		
		DE			1			
		GR			1			
	Sulfamides	IT	7	2				
	Sulfamonomethoxin	GR	4		5		1	
		SI			2	2	2	3
	Sulfaphenazol	GR			1			
	Sulfathiazol	AT	3	2	7	9	3	5
		BE		1			1	
		CZ				6		
		DE	2			10	1	
		FI			3	2	1	
		FR	1					
		GR			3		1	
		IT	1		3		3	
	Sulfonamides	BE	6					
		CY			10		1	
		PL			5	3	4	
	Sulphadimidine	CY					3	
		SK					1	
	Tetracyclin	CY					1	
		FI					1	
		FR	20		2		2	
		GR			1	2		
		IT	1				3	
	Tylosin	IT						2
		SK			2		8	
	Carbamates and pyrethroides	Fluvalinate	ES	2				
	Organochlorine compounds	B-HCH	GR	1				
		DDT:sumDDT,DDE,DDD	GR	6				
			SK			2		
	Organophosphates	Organophosphates	IT	1				
		Chlorfenvinphos	ES	4		7		
		Coumaphos	IT			1		
	Mycotoxins	Aflatoxin	ES	1		1		
	Heavy Metals	Heavy metals	CY					
Cadmium			AT	7				
			FR	1				
LeadPb		IT	1					
		AT	2				1	
		CY					2	
		DK	1					

Group	Substance	MS	2003		2004		2005	
			Target	Suspect	Target	Suspect	Target	Suspect
		FR	7		2		1	
		IT	2					
Number of samples			2760	58	4428		3855	

The national residue monitoring plans contain honey production data as the sampling frequency is dependant on the level of honey production. The recommended frequency of sampling is 10 samples per 300 tonnes of annual production for the first 3000 tonnes of production and 1 sample for each additional 300 tonnes. The data was extracted from the Commission Residues monitoring plans and results application. National residues monitoring plans are only available for 2005 onwards in this system. The member states report honey production values for the first or second year prior to the reporting year. Table 2 shows the honey production figures from the national residues monitoring plans for the years 2004-2007. Production figures range between 13 tonnes and 32873 tonnes. The largest producers of honey are Spain, Germany, France, Greece, Poland and Italy respectively.

Table 2: Honey production figures from the national residues monitoring plans for 2004-2007, 1000 tonnes

Member	2004	2005	2006	2007	Average	Rank
Austria	7.7	6.4	6.1		6.7	9
Belgium	1.6	1.6		1.6	1.6	19
Bulgaria			3.4	5.8	4.6	13
Cyprus	0.6	0.5	0.6	0.7	0.6	22
Czech Republic	6.3	7.5	8.3	8.3	7.6	8
Denmark	2	2.5	2.5	2.2	2.3	16
Estonia	0.6	0.5	1		0.7	21
Finland	1.7	1.7	1.7	1.7	1.7	18
France	16.1	16.1	15.5		15.9	3
Germany	25.6	21.5	25.6		24.2	2
Greece	15.6	15.6			15.6	4
Hungary	3.3	5.2	5.4		4.6	12
Ireland	0.3	0.3	0.3	0.1	0.3	24
Italy	11.5	13	14.2		12.9	6
Latvia	0.7	0.9	1.4		1.0	20
Lithuania	0.07	0.1	0.1	0.1	0.1	25
Luxembourg	0.09	0.09	0.09	0.09	0.1	26
Malta	0.01	0.01	0.01	0.02	0.0	27
Netherlands	0.6	0.6	0.6	0.6	0.6	23
Poland	11.1	12.1	15	16.2	13.6	5
Portugal	6.7	5.7	6		6.1	10
Romania			13.8	7.6	10.7	7
Slovakia	3.4	4.3	4.4		4.0	14
Slovenia	2.4	1.7	2.3		2.1	17
Spain		24.4	32.9	29.9	29.1	1
Sweden	2.4	3.4	3.6		3.1	15
United Kingdom	7.1	7		3.6	5.9	11

Questionnaire to Member States

Twenty-one EU member states plus Norway returned completed questionnaires (see Table 3). Portugal provided a report from the Programa Apicola Nacional but did not complete the questionnaire; where possible relevant information from the report has been extracted for this report. Switzerland replied but did not complete the questionnaire. They explained that the Swiss Bee Research Centre is responsible for bee epidemiology but is unable to share data. Seven member states provided additional information in the form of attached files. Generally these were the results from national residue monitoring plans. The Netherlands provided seven reports on bee epidemiology from the *bijen@wur* research programme. Ten member states provided references for reports produced from the surveillance programmes or research programmes these are listed in the References provided by member states section.

Table 3: Replies received from EFSA Focal Point Network

Country	Completed Questionnaire	Provided Additional Info
Austria	Yes	No
Belgium	Yes	Yes
Cyprus	Yes	No
Czech Republic	Yes	Yes
Denmark	Yes	No
Estonia	Yes	No
Finland	Yes	Yes
France	Yes	No
Germany	Yes	No
Greece	Yes	No
Hungary	Yes	Yes
Ireland	Yes	Yes
Italy	Yes	No
Latvia	Yes	No
Lithuania	Yes	No
Luxembourg	Yes	No
Netherlands	Yes	Yes
Norway	Yes	No
Portugal	No	Yes
Romania	Yes	No
Slovakia	Yes	Yes
Sweden	Yes	No
Switzerland	No	No
United Kingdom	Yes	No

From the replies from the Focal Point Network sixteen countries were identified with active bee surveillance programmes (Table 4). Austria reported two surveillance programmes that were active in 2007/2008 but not at national level. In Estonia, France, Finland, Germany, Italy, Luxembourg, Romania and the United Kingdom (UK) there are surveillance programmes that cover all three epidemiological outcomes, weakening, colony collapse and colony mortality. Frequently the bee surveillance programmes are organised by associations/federations of bee keepers. Additionally there is the international network COLOSS for Prevention of honeybee colony losses which a number of countries collaborate with.

Table 4: Bee surveillance programmes relevant to assess colony weakening, colony collapse or mortality

Country	Name of Surveillance Programme	Responsible Institution	Weakening / Collapse / Mortality
Austria		Institut für Zoologie, Universität Graz	
		Beekeeping Association of the Austrian Federal Province of Upper Austria	
Czech Republic	Statistical data	Czech Beekeepers Union	Mortality
Denmark	Questionnaire to local associations	Danmarks Biavlforening	Collapse & Mortality
Estonia	The Estonian National Program of Development of Honey Production and Marketing	The Estonian Beekeepers Association	Weakening & Collapse & Mortality
Finland	member questionnaire, 2008 started bee yard monitoring	Finnish Beekeepers Association	Weakening & Collapse & Mortality
France	“Réseau de surveillance des troubles des abeilles ” (NS 2002-8110 du 2/08/02 modifiée) (<i>Network for surveillance of bee disorders</i>)	Ministère de l’agriculture et de la pêche - AFSSA Sophia-Antipolis (National reference laboratory for pour bee diseases) - GIRPA (Reference laboratory for plant health)	Weakening & Collapse & Mortality
Germany	Project “Deutsches Bienenmonitoring”	Beekeeping Organizations, Farmer Organization, Agricultural Institutes, Ministry of Agriculture, Chemical Companies	Weakening & Collapse & Mortality
Italy	Ligustica.IT & COLOSS project Liebefled Institute	FAI–Federazione Apicoltori Italiani and other associations	Weakening & Collapse & Mortality
Luxembourg	Surveillance sanitaire des abeilles	FUAL (Federation des Unions d’Apiculteurs du G.-D. de Luxembourg)	Weakening & Collapse & Mortality
Netherlands	Monitor Bijensterfte	ICR Beemonitoring	Mortality
Norway		Norges Birøkterlag	Weakening & Collapse
Portugal	Programa Apícola Nacional	Faculdade de Medicina Veterinária & Federação Nacional dos Apicultores de Portugal	Mortality

Country	Name of Surveillance Programme	Responsible Institution	Weakening / Collapse / Mortality
Romania		Institute for Beekeeping Research & Development	Weakening & Collapse & Mortality
Sweden		Swedish Beekeepers Association (SBR)	Mortality
Switzerland	COLOSS Network for Prevention of honeybee colony losses	Swiss Bee Research Centre	
United Kingdom	Bee health programme	Central Science Laboratory National Bee Unit	Weakening & Collapse & Mortality

Twenty-two member states reported the existence of chemical residue monitoring programmes (Table 5). These programmes are as described in Directive 96/23/EC. Finland, Ireland, Belgium, Hungary, The Netherlands and Slovakia provided results from the national residue monitoring programmes, none of these included information on chemicals that are out with the requirements of the directive 96/23/EC. Five member states reported additional investigations to assess chemical residues in bees and honey. The Netherlands reported a programme investigating ‘natural’ residues of plant derived alkaloids in honey. Germany indicated that there was a programme to investigate chemical residues in pollen. The Programa Apícola Nacional in Portugal includes analysis of honey for pesticides. The UK reported a surveillance programme for deaths of wildlife, including beneficial insects, where there is evidence that pesticide poisoning may be involved and in France the Network for surveillance of bee disorders includes laboratory testing for chemical residues.

Table 5: Monitoring programmes for chemical residues in honey

Member State	Name of Surveillance Programme	Responsible Institution
Austria	A900-Tierarzneimittelkontrollprogramm (Monitoring for some Pesticides, antibiotics, lead, cadmium in honey)	Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH
Belgium	plan de contrôle résidus belge (dir. 96/23)	AFSCA
Denmark	Monitoring programme Directive 96/23	Danish Veterinary and Food Administration
Cyprus	National Residual plan	Veterinary services of Cyprus
Czech Republic	National monitoring plan for detection of residues and contaminants in foodstuff of animal origin. (According Commission Directive 96/23)	State Veterinary Administration of the Czech Republic
Estonia	The Estonian National Program of Development of Honey Production and Marketing	Estonian Beekeepers Association, The Veterinary and Food Board of Estonia
Finland	National residue control programme according to the Council Directive 96/23/EC	Finnish Food Safety Authority Evira

France	“Réseau de surveillance des troubles des abeilles”(NS 2002-8110 du 2/08/02 modifiée) (<i>Network for surveillance of bee disorders</i>)	Ministère de l'agriculture et de la pêche
Germany	Project “Deutsches Bienenmonitoring”	Beekeeping Organizations, Farmer Organization, Agricultural Institutes, Ministry of Agriculture, Chemical Companies
Greece	National residues and anti-microbial factors programme	Min. Rural Dev & Food – Centre of Veterinary Institutes
Hungary	Residues monitoring plan	Central Agricultural Office Food & Feed Safety Directorate
Ireland	National Residue Control Plan	Department of Agriculture, Fisheries and Food
Italy	Piano nazionale residui	Italian Ministry of Health
Latvia	National Residue Monitoring Plan according to Directive/EC	Food and Veterinary Service (FVS) and Latvian Beekeepers Association (LBA)
Lithuania	The analysis of different sorts of bee products contaminated by heavy metals and pesticides (period 06 2008 – 09 2008)	Department of Apiculture of the Lithuanian Institute of Agriculture
Luxembourg	EU residues programme	Administration des Services Veterinaires
Netherlands		Voedsel en Warenautoriteit (National Food Authority)
Portugal	Plano Nacional de Controlo de Resíduos	Direcção Geral de Veterinária
	Programa Apícola Nacional	Ministro da Agricultura, do Desenvolvimento Rural e das Pescas & Federação Nacional dos Apicultores de Portugal
Romania	Program of strategic actions in sanitary veterinary field	Institute of Hygiene and Veterinary Public Health
Slovakia	National Plan of Residue Control	State Veterinary and Food Administration of the Slovak Republic
Sweden		National Food Administration
The United Kingdom	National Surveillance Scheme NSS	CSL, on behalf of the Veterinary Medicines Directorate (VMD)
	Wildlife Incident Investigation Scheme (WIIS)	Pesticides Safety Directorate

Bee population and honey production data was provided by twenty three countries. Data was requested for the years 2006 and 2007. The source of the data was generally the government department responsible for agriculture or a national association / federation of beekeepers. Honey production figures were in the range of 88-26,000 tonnes per year, with Luxembourg in 2007 having the lowest honey production and Hungary and Germany the highest (Table 6). The Netherlands did not provide information on honey production, explaining that most of the honey produced is for house sale and therefore is not recorded officially. The questionnaire requested the estimated bee population in the summer, these figures generally correlated with the reported number of beehives. The number of beehives is clearly the most appropriate figure for measuring bee populations in Europe. The range for the number of beehives was

between 5,300 and 1,380,000 beehives. Figure 1 shows the geographical distribution of bee populations (average number of beehives 2006-2007). Of those that submitted data, the countries with the largest bee population were Greece, France, Italy, Romania and Hungary. Considering only the twenty two countries that provided population data, the European bee population can be estimated to be greater than 8 million beehives. Honey yield was in the range of 2-56 kg per beehive. The yield in 2007 in Ireland was the lowest and the yield in 2007 in Finland the highest. The yield of honey is within a biologically plausible range, indicating that the production and numbers of beehive figures reported are accurate. The number of reported beekeepers was in the range 358-82000. Germany reported the greatest number of beekeepers and Luxembourg the smallest. The proportion of professional beekeepers was small. Greece, Cyprus and Romania were unusual with the proportion of professional beekeepers at 22% 17-18% and 15-20% respectively. Overall of the countries who reported numbers of beekeepers the proportion professional beekeepers was approximately 4%. The questionnaire requested mortality rates for 2006 and 2007, where mortality rate was defined as the number of beehives without live bees as a proportion of the total beehive population. All member states with national bee surveillance programmes that completed the questionnaire reported mortality rates. The reported mortality rates were in the range of 7-50%. With the exception of Italy countries reported mortality rates at 26% or lower. Italy reported the highest mortality rate at between 40-50% in 2007. The U.K. reported losses to date for 2008 at 24.2% and predicted that the final figure for 2008 would be higher than previous years. The mortality rates from France were expressed as the number of statements and not as a percentage.

Table 6: Questionnaire data, honey production, beehives, beekeepers, and mortality rate for the years 2006-2007 by country

Country	Source	2006					2007				
		Prod	Beehives	Yld	Bee-keepers	Mortality rate (%)	Prod	Beehives	Yld	Bee-keepers	Mortality rate (%)
Austria	ÖIB - Österreichischer IMKERBUND	4.5-7									
Belgium	CARI	2.513	110000	23	8600						
Cyprus	Beekeeping_Data - Department of Agriculture, Ministry of Agriculture, Natural Resources and Environment	0.63 (0.389)	41478 (21633)	15	707 (120)		0.72 (0.383)	40533 (22500)	18	712 (129)	
Czech Republic	Statistic of Beehives and Beekeepers - Czech Beekeepers Union	9.081 (0.570)	525560 (19155)	17	46647 (83)	10	8.466 (0.6)	520084 (20521)	16	48919 (90)	20
Denmark	Spørgeskemaundersøgelsen 2006/2007 - Danmarks Bivlerforening	2.5 (0.5)	80000 (15000)	31	4100 (150)	15	2 (0.5)	- (15000)		4100 (150)	7
Estonia	The Estonian National Program of Development of Honey Production and Marketing - The Estonian Beekeepers Association	1.4 (0.4)	48000 (12000)	29	7000 (60)	8-10	1.1 (0.385)	48000 (12000)	22	7000 (60)	8-10
Finland	membership survey - Finnish Beekeepers Association	2.3 (1.26)	53000 (28900)	43	3300 (77)	9.3	3.04 (1.78)	54000 (29306)	56	3200 (78)	10.2
France	Ministère de l'agriculture et de la pêche	20	1324565	15	66924	808*	18	1243046	14	65050	142*
Germany	Deutscher Imkerbund	25	700000	36	82000	13	20	710000	28	82000	9
Greece	Min. Rural Dev. & Food, Dir Animal Production	14 (11.2)	1380000	10	23000 (5000)		14 (11.2)	1380000	10	23000 (5000)	
Hungary	Ministry of Agriculture and Rural Development	20-22	923103	24	15764		24-26	897670	29	15320	
Ireland	Estimated figures – Department of Agriculture, Fisheries and Food and the Federation of Irish Beekeepers Associations	0.350 (0.125)	20000 (7000)	6	2200 (70)		0.140 (0.049)	20000 (7000)	2	2200 (70)	
Italy	MIPAAF - Ministero Politiche Agricole, Alimentari e Forestali	15	1083266 (350000)	14	75000 (1.5%)	30-40	12	1100000 (400000)	11	55000 (1.5%)	40-50
Latvia	Latvian Beekeepers Association	2.232	62000	35	3300 (53)		2.1	70000	30	3400 (53)	

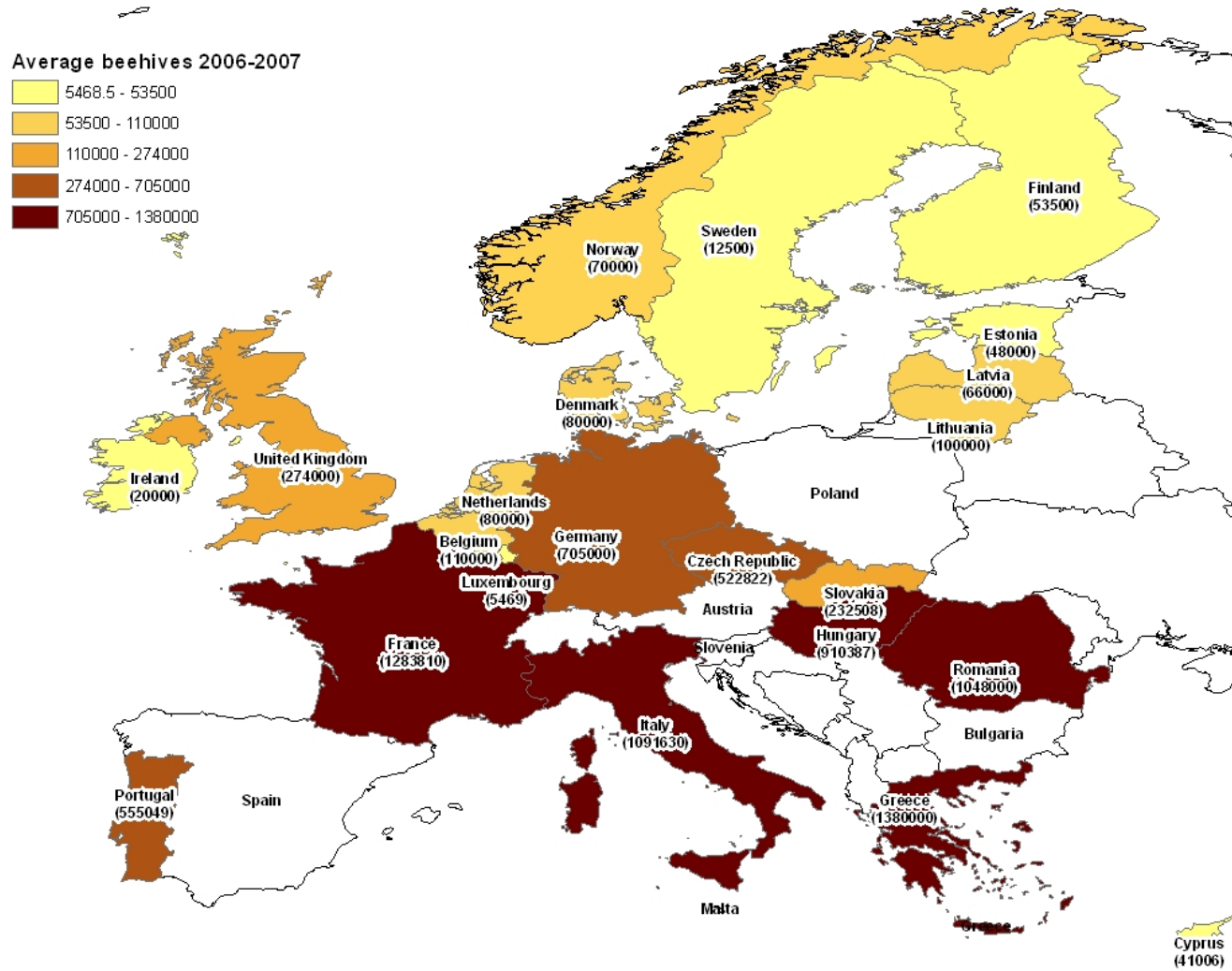
Country	Source	2006					2007				
		Prod	Beehives	Yld	Bee-keepers	Mortality rate (%)	Prod	Beehives	Yld	Bee-keepers	Mortality rate (%)
Lithuania	Statistical data of several institutions - Department of Apiculture of the Lithuanian Institute of Agriculture	4	100000 – 120000	33-40	11000 (20-40)		3	100000-120000	25-30	11000 (20-40)	
Luxembourg	Administration des Services Veterinaires	0.092	5637	16	369 (3)	16	0.088	5300	17	358 (3)	20
Netherlands	bijen@wur- Plant Research International, Wageningen University & Research		80000 (5000)		7500 (20)	26		80000 (5000)		7500 (20)	15
Norway	Norges Birøkerlag	1.8	70000 (10000)	26	3500 (35)	10.6	2	70000 (10000)	29	3500 (35)	
Portugal	Direcção Geral de Veterinária							555049		15267 (4.1%)	
Romania	Program of strategic actions in sanitary veterinary field - National Sanitary Veterinary and Food Safety Authority	19	1100000 (165000)	17	3200 (480)	10	16.5	996000 (199200)	17	2942 (588)	>20
Slovakia	Statistic data of the annual report of the Slovak beekeeping - Ministry of Agriculture of the Slovak Republic	3.862	217338 (7852)	18	12797 (49)		4.628	247678 (57)	19	14854 (57)	
Sweden	Swedish Beekeepers Association	4.100	105000	39	13000	18	3.6	110000	33	12000	12
United Kingdom	ADAS Economic Evaluation (last survey 2001) – ADAS	6.5	274000 (40000)	24	43900 (300)	11.1	4.4	274000 (40000)	16	43900 (300)	11.7

Production (Prod) x 1000 tonnes, Yield (Yld) Kg/bee hive

Figures in brackets are for professional beekeepers

* Mortality data expressed as number of statements

Figure 1: Distribution of bee populations in Europe (white indicates no data received)



Honey Production Data

The FAOSTAT production database contained figures for honey production for the member states up to 2006 (Table 7). The database also provided figures for the number of beehives; however this was an estimated value. The EUROSTAT database contained figures for honey production, plus figures for the number of beehives and holdings for the years 2000, 2003 and 2005 (Table 8). Neither dataset contained information for all member states. In the FAOSTAT database no data were available for Latvia, Malta or The Netherlands. In the EUROSTAT database there were no data for Cyprus and the data for Slovenia was not reported for reasons of confidentiality, plus for some member states the data was not available for all years. With regard to the EUROSTAT data, the figures come from the supply balance sheets and the farm structure survey and the completion of this information for honey is optional. There is no correlation between the figures from EUROSTAT and FAOSTAT suggesting they are obtained from different sources. The analysis of yield of honey from the EUROSTAT data highlights data quality issues, since the yield results in kg per beehive for Luxembourg, Belgium, Austria and Czech Republic are not biologically plausible. Figure 2 shows the average honey production per country when the EUROSTAT and FAOSTAT production figures are combined. It can be seen that the largest producer of honey in Europe is Spain. Respectively the six subsequent largest producers of honey are Germany, Hungary, France, Romania, Greece and Poland.

Table 7: FAOSTAT, honey production, number of beehives and yield 2000-2006 by country

Member states	2000			2001			2002			2003			2004			2005			2006		
	Prod	Beehives	Yld	Prod	Beehives	Yld	Prod	Beehives	Yld	Prod	Beehives	Yld	Prod	Beehives	Yld	Prod	Beehives	Yld	Prod	Beehives	Yld
Austria	8.70 Q	310000 Cf	28	8.00 Q	310000 Cf	26	7.70 Q	345000 Cf	22	7.50 Q	291000 Cf	26	6.90 Q	283000 Cf	24	6.20 Q	275000 Cf	23	6.00 Q	275000 Fp	22
Belgium	1.46 Q	29000 Cf	50	1.40 Q	29000 Cf	48	1.50 Cf	29000 Cf	52	1.60 Cf	29000 Cf	55	2.16 Q	29000 Cf	74	2.15 Cf	29000 Cf	74	2.15 E	29000 Fp	74
Bulgaria	5.34 Q	334865 Cf	16	4.93 Q	349452 Cf	14	5.40 Q	334000 Cf	16	8.50 Q	310928 Cf	27	8.00 Q	409656 Cf	20	11.22 Q	450000 Cf	25	10.10 Q	450000 Fp	22
Cyprus	0.75 Q	44260 Q	17	0.95 Q	46932 Q	20	1.00 Q	47000 Cf	21	0.78 W	45000 Cf	17	0.56 Q	40000 Cf	14	0.56 Q	40000 Cf	14	0.56 Q	40000 Fp	14
Czech Republic	7.55 Q	534814 Cf	14	6.23 Q	537226 Cf	12	5.88 Q	517743 Cf	11	6.30 Q	477743 Cf	13	7.74 Q	556853 Cf	14	8.37 Q	551681 Cf	15	9.08 Q	551681 Fp	16
Denmark										0.00			1.50 Q			1.50 Q			1.50 Q		
Estonia	0.33 Q	23400 Cf	14	0.29 Q	37000 Cf	8	0.77 Q	50000 Cf	15	0.54 Q	50500 Cf	11	0.56 Q	34500 Cf	16	0.64 Q	32700 Cf	20	0.64 Fp	32700 Fp	20
Finland	1.10 Q	42000 Cf	26	1.80 Q	44000 Cf	41	1.70 Q	47000 Cf	36	1.70 Q	37000 Cf	46	1.40 Q	46000 Cf	30	2.30 Q	53000 Cf	43	3.04 Q	53000 Fp	57
France	15.69 Q	1150000 Cf	14	15.38 Q	1150000 Cf	13	16.20 Q	1150000 Cf	14	15.00 Cf	1150000 Cf	13	15.46 Cf	1155712 Cf	13	15.45 Cf	1159588 Cf	13	15.45 Fp	1159588 Fp	13
Germany	20.41 Q	902000 Cf	23	25.95 Q	950000 Cf	27	14.62 Q	930000 Cf	16	23.69 Q	930000 Cf	25	25.58 Q	930000 Cf	28	21.23 Q	930000 Cf	23	21.23 Fp	930000 Fp	23
Greece	14.36 Q	1289572 Cf	11	17.63 Q	1293280 Cf	14	15.70 Q	1300000 Cf	12	15.70 Q	1294086 Cf	12	15.91 Q	1302244 Cf	12	16.27 Q	1313552 Cf	12	16.27 Fp	1313552 Fp	12
Hungary	15.17 Q	590000 Cf	26	15.34 Q	590000 Cf	26	15.20 Q	590000 Cf	26	21.00 Q	614000 Cf	34	19.50 Q	614000 Cf	32	19.71 Q	658000 Cf	30	17.61 Q	658000 Fp	27
Ireland	0.24 Q			0.26 Q			0.20 Q			0.20 Cf			0.20 Cf			0.20 Cf			0.20 Fp		
Italy	10.00 Q	900000 Cf	11	10.00 Q	900000 Cf	11	8.00 X	900000 Cf	9	7.00 X	900000 Cf	8	8.00 Cf	900000 Cf	9	9.00 Cf	950000 Cf	9	9.00 Fp	950000 Fp	9
Latvia																					
Lithuania	0.82 Q	73000 Cf	11	1.08 Q	74800 Cf	14	1.26 Q	76100 Cf	17	1.16 Q	80913 Cf	14	1.13 Q	81106 Cf	14	1.33 Q	82781 Cf	16	1.39 Q	82781 Fp	17
Luxembourg	0.11 Cf	10000 Cf	11	0.13 Cf	10500 Cf	12	0.15 Cf	10500 Cf	14	0.14 Q	10500 Cf	13	0.27 Q	20800 Cf	13	0.18 Q	13900 Cf	13	0.13 E	13900 Fp	9
Malta																					
Netherlands																					
Norway	1.25 Q			1.0 Q			1.9 Q			1.5 Q			1.3 Q			1.5 Q			1.3 Q		
Poland	8.62 Q	1300000 Cf	7	9.53 Q	1300000 Cf	7	9.64 Q	1300000 Cf	7	11.62 Q	1300000 Cf	9	11.96 Q	1300000 Cf	9	9.96 Q	1300000 Cf	8	13.55 Q	1300000 Fp	10
Portugal	4.46 Q	298000 Cf	15	4.54 Q	300000 Cf	15	7.86 Q	300000 Cf	26	7.31 Q	300000 Cf	24	6.74 Q	300000 Cf	22	5.69 W	300000 Cf	19	5.69 Fp	300000 Fp	19
Romania	11.75 Q	614000 Cf	19	12.60 Q	649000 Cf	19	13.43 Q	745000 Cf	18	17.41 Q	781000 Cf	22	19.15 Q	840000 Cf	23	19.20 Q	888000 Cf	22	20.00 E	888000 Fp	23
Slovakia	3.49 Q	267361 Cf	13	3.25 Q	279303 Cf	12	3.09 Q	262250 Cf	12	3.20 Q	192002 Cf	17	3.43 Q	200000 Cf	17	4.26 Q	220000 Cf	19	4.26 Fp	220000 Fp	19
Slovenia	2.30 Q	190000 Cf	12	2.55 Q	210000 Cf	12	2.45 Q	210000 Cf	12	1.85 Q	210000 Cf	9	2.35 Q	210000 Cf	11	2.50 Cf	210000 Cf	12	2.50 Fp	210000 Fp	12
Spain	28.86 Q	2125093 Q	14	31.62 Q	2298112 Q	14	35.72 Q	2227381 Q	16	35.28 Q	2315982 Q	15	36.70 Q	2378958 Q	15	27.23 Q	2400000 Cf	11	30.00 E	2400000 Fp	13
Sweden	2.60 Q	52500 Cf	50	3.00 Q	53000 Cf	57	3.30 Q	53500 Cf	62	3.40 Q	54000 Cf	63	2.94 Cf	45873 Cf	64	2.78 Cf	41462 Cf	67	2.78 Fp	41462 Fp	67
United Kingdom	2.87 Q			3.00 Q			5.00 Q			7.00 Q			5.61 Cf			5.46 Cf			5.46 Fp		

Production (Prod) x 1000 tonnes, Yield (Yld) Kg/bee hive

Codes for source of data Cf = FAOSTAT estimate | E = Expert sources from FAO (including other divisions) | Fp = Provisional computer calculated data | Q = Official data reported on FAO Questionnaires from countries | W = Data reported on country official publications or web sites

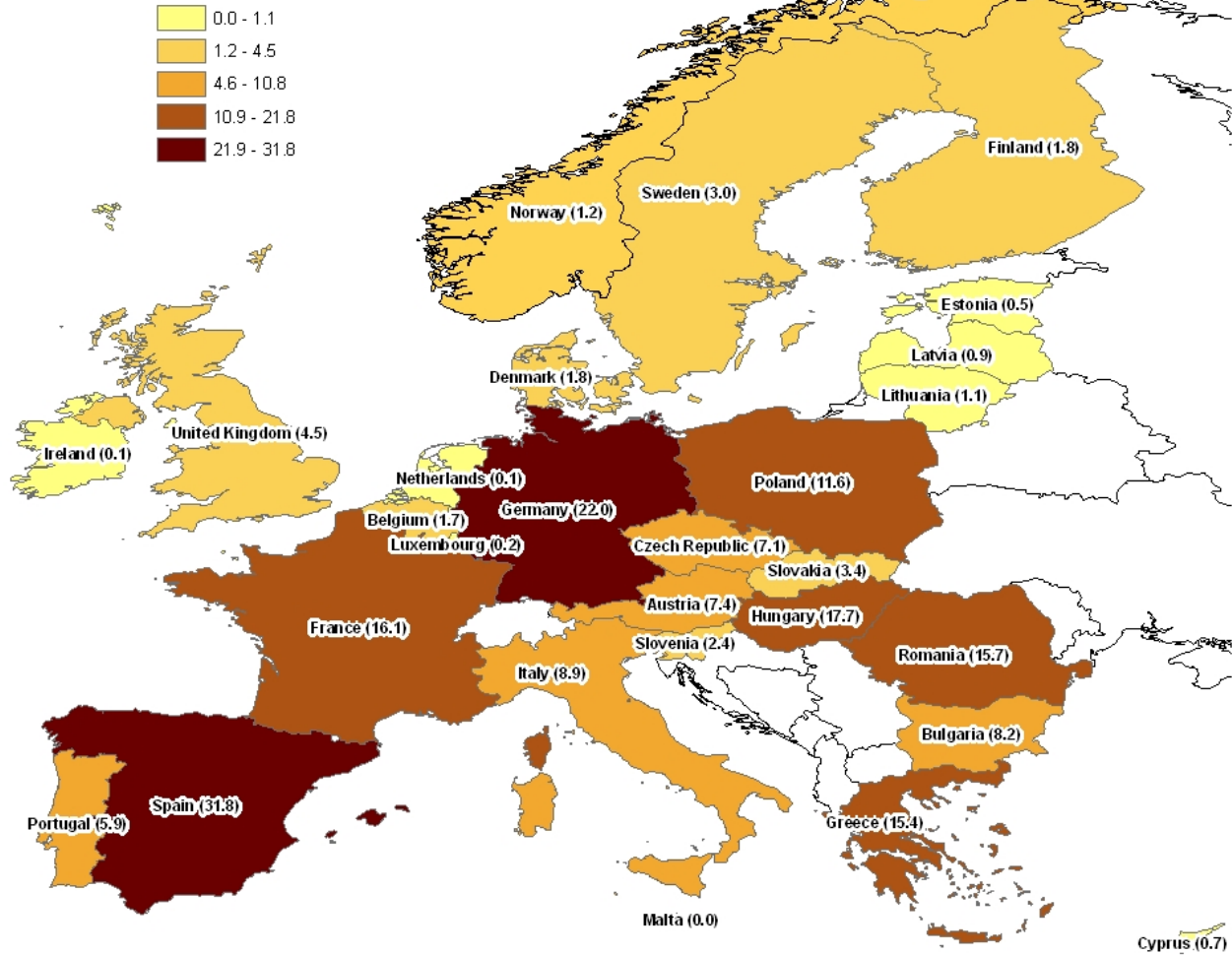
Table 8: EUROSTAT, honey production, number of beehives, number of holdings and yield 2000-2007 by member state

Member states	2000				2001		2002		2003				2004		2005				2006		2007		
	Prod	Bee hives	Holdings	Yld	Prod	Yld	Prod	Yld	Prod	Bee hives	Holdings	Yld	Prod	Yld	Prod	Bee hives	Holdings	Yld	Prod.	Yld	Prod	Bee hives	Holdings
Austria	9				9		8	177	8	45300	5400	177	7.1	157	6.4		0		6.1		6.3		
Belgium	1	6050	580	165	2	394	2	394	1	4090	460	244	2	501	1.65	3900	380	423					
Bulgaria	9				7	17	7	17	8	409660	37640	20	11	27	7.5	396450	25960	19	11.25	28			
Cyprus										21600	270					23110	240						
Czech Republic							6	375		15980	1540					24250	1440						
Denmark	2				2		2		3	0	0		3			0	0						
Estonia	0				0		0		1	20330	2490	49	0.5	22	0.6	25040	2730	24	0.6	24	1		
Finland	2				1		2		2	0	0		2		1.4	0	0						
France	18				21	32	16	24	16	663060	13790	24	14	19	16	788780	12640	20					
Germany	20				20		26		15				24		26				21		25.2		
Greece	14	630400	10890	22	14	20	14	20	15	768100	11440	20	15	20	16	769520	11280	21	16	21			
Hungary	21	589150	12900	36	14	24	13	22	15	587160	9650	26	21.9	36	19.5	641500	9140	30	19.7	31	18		
Ireland	0.1				0.1		0.1		0.1	0	0		0.1		0.01	0	0		0.01				
Italy	10	374730	10790	27	10	30	10	30	3	299250	7030	10	7	14	10	699250	7350	14	13	19			
Latvia	1	49420	8380	20	1	22	1	22	0.8	42620	6120	19	0.6	10	0.7	72760	8940	10	0.9	12	1.4		
Lithuania	0				1	12	1	12	2	84710	10920	24	1.2	11	1	127490	11010	8	1.3	10	1.1	107260	12790
Luxembourg	0.1	530	40	189	0.1	190	0.146	278	0.164	520	30	315	0.137	247	0.27	590	30	458	0.181	307	0.13		
Malta	0.1				0.1		0.1		0				0		0				0		0		
Netherlands	0.1				0.1		0.1			0	0					0	0		0				
Poland	9				9	16	9	16	10	562450	40550	18	12	21	12	604380	39630	20	16	26	21	654660	40440
Portugal	4	285230	17220	14	4	16	4	16	8	228470	14160	35	7	34	7	188480	12230	37	6	32	6		
Romania	11				12	15	13	17	13	776870	41690	17	17.4	20	19.3	949360	52400	20	17.7	19	18.2		
Slovakia	3	80690	3700	37	3	49	3	49	3	42090	1610	71	3.2	76	3.43	41900	1510	82	4.26	102	4.72		
Slovenia		30900	2120	0						24610	1500					40100	2150						
Spain	31	747440	21990	41	29	37	32	41	32	802850	14560	40				831810	12160						
Sweden	3				3		3		4				3		2				3				
United Kingdom	3				3		3		5				8		3.4				3.5				

Production (Prod) x 1000 tonnes, Yield (Yld) Kg/bee hive – for years where no figure for beehives are reported the mean of the previous and subsequent year number of beehives is used

Figure 2: Distribution of average honey production in Europe combining FAOSTAT and EUROSTAT data

Average Honey Production in Europe (1000 tonnes)



Discussion

In response to an urgent request from France (AFSSA), this report describes data collected in the EU on honey production, the residue monitoring programmes for honey, and disease surveillance programmes for bees that exist in Europe.

The reported information was obtained, in part, through a short questionnaire that was distributed through the EFSA Focal Point Network. Responses were received from twenty-two member states plus Norway and Switzerland.

Under the Directive 96/23/EC member states are required to have a national **residue monitoring** plan. In Directive 86/363/EEC there are no MRLs set for pesticide residues in honey, the monitoring programmes for honey focus on residues of veterinary medicinal products and environmental contaminants. The 2003-2005 reports from the national residue monitoring plans show that streptomycin, pyrethroides, organochlorine compounds and organophosphate have been detected at non compliant levels in honey. These substances are used as active substances in plant protection products. It should be noted that compliant levels are set for human safety. Lower levels of residues in honey may indicate an exposure to a chemical that could be detrimental to the health of bees. Regulation 396/2005 will be applicable in September 2008. In this regulation temporary MRLs have been set for 48 active substances in honey. Therefore the results of future national residue monitoring programmes will provide more detailed information on pesticide residues detected in honey. Five member states reported additional investigations to assess chemical residues in honey and bees. The UK and French surveillance programmes included laboratory testing for pesticide poisoning. The Project “Deutsches Bienenmonitoring” tests for pesticide residues in pollen, the Programa Apícola Nacional includes analysis of honey for pesticides and there is a project in The Netherlands testing for natural plant alkaloids in honey.

Sixteen countries reported the existence of bee **surveillance programmes**. Frequently, these programmes were organised by associations / federations of beekeepers. Since beekeeping is largely a non-professional occupation, associations / federations would be the most effective networks to collate information of bee mortality and colony collapse. Eight of the surveillance programmes were designed to assess all three conditions, weakening, colony collapse and mortality. The different outcomes recorded by the surveillance programmes would make the mortality figures difficult to compare. Italy reported a very high mortality rate (40-50%) for the 2007 surveillance figures. Potentially, surveillance data collated by federations / associations will be difficult to analyse at European level without a well defined case definition for colony collapse and weakening and standardised analysis variables. Nevertheless these surveillance programmes could be a useful source for historical data on bee mortality and colony losses. Data prior to 2003 when the first reports of CCD arose would be especially valuable. The data could be used to determine baseline mortality rates for use in epidemiological studies. Internationally bee mortality data is available from the OIE World Animal Health Information Database (http://www.oie.int/wahid-prod/public.php?page=disease_status_detail). This database contains reported outbreaks for six notifiable bee diseases varroasis, American foulbrood, European foulbrood, Acarapisosis, Small hive beetle infestation and *Tropilaelaps* infestation. Additionally organisations involved in bee mortality surveillance are collaborating in the international COLOSS Network (Prevention of honeybee Colony Losses) which aims to explain and prevent large scale losses of honeybee colonies.

The figures for **honey production** and number of beehives at member state level vary according to the data source. The honey production figures reported in the national residue monitoring plans indicated the highest producers of honey where Spain, Germany, France, Greece, Poland and Italy. When honey production figures extracted from EUROSTAT and FAOSTAT were averaged, Spain was the highest producer followed by Germany, Hungary, France, Romania, Greece and Poland. The honey production figures obtained from the

questionnaires were the most accurate if a yield within a biologically plausible range is considered a measure of accuracy. Honey production in tonnes reported in the questionnaires was frequently higher than honey production recorded in the EUROSTAT and FAOSTAT databases and the national monitoring plans. Due to the small percentage of professional bee keepers and the fact that honey is often sold through house sale, production figures obtained through farm surveys may well underestimate honey production in the member states. Information collected by beekeeping associations / federations would therefore be more accurate. The data supplied in the questionnaires identified Hungary and Germany as the greatest producers of honey. Luxembourg produced the smallest amount of honey. Greece reported the largest bee population (1380000 beehives). Analysis of the bee population figures provided by twenty-two countries for 2006-2007 estimates the bee population in Europe at greater than 8 million beehives. This estimate is conservative as data from two of the larger producers of honey Spain and Poland was not available.

Recommendations

In order to investigate further the phenomena of colony collapse disorder in Europe the following actions should be considered:

- Description of the study design of the surveillance programmes identified to assess the feasibility of combining data for EU level epidemiological analysis
- Collation of historical data on bee mortality rates and colony losses from the member state surveillance programmes identified in this report
- Review of reports referenced in the questionnaire and existing scientific literature on possible causes of colony collapse disorder and bee mortality

An EU-wide review of bee mortality and bee surveillance would facilitate an objective assessment of all possible causes of CCD. Additionally it would prepare the grounds and orientate research towards identified gaps in scientific knowledge.

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Wim Reybroeck - T&V-ILVO

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Fattori che possono causare fenomeni di spopolamento. Situazione nel mondo e in Italia. Dr. Franco Mutinelli – Istituto Zooprofilattico Sperimentale delle Venezie – Centro di referenza nazionale per l’apicoltura

Uniti per l’apicoltura Dr. Sergio D’Agostino – Associazione Nazionale Apicoltori Italiani

Influenza della gestione dell'alveare (sanità, alimentazione e tecnica apistica) Dr. Enzo Marinelli – Consiglio per la Ricerca e la Sperimentazione in Agricoltura – Sezione di apicoltura di Roma

Spopolamento degli alveari: il ruolo di vecchi e nuovi parassiti per le api D.ssa Barbara Voltini – Servizi Veterinari regione Toscana

Il ruolo degli agrofarmaci e degli altri fattori nella sindrome della scomparsa delle api in Italia Dr. Claudio Porrini – Università di Bologna – Dipartimento di scienze e tecnologie agro ambientali

A multifactorial analysis approach to quantify the impact of environmental stress factors on bee health Dr. Richard Schmuck – Agrofarma

Il problema dei neonicotinoidi (effetti sulle api e dispersione nell'ambiente) Dr. Moreno Greati – Università di Udine – Dipartimento di Biologia Applicata alla Difesa delle Piante

Sindrome da spopolamento e patologie microbiche: possibili correlazioni con Nosema ceranae D.ssa Elena Bessi – Advanced Analytical Technologies srl, Spin off dell'Università Cattolica del Sacro Cuore di Piacenza

Patologie virali, immunocompetenza dell'ape e sindrome da spopolamento Prof. Francesco Pennacchio – Università degli Studi di Napoli Federico II - Dipartimento di Entomologia e Zoologia Agraria "Filippo Silvestri"

La biologia e la possibilità di controllo della *Senotainia tricuspidis* in apiari Dr. Antonio Felicioli – Università di Pisa – Dipartimento di anatomia, biochimica e fisiologia veterinaria

Integrated Pest Management di Precisione e Salvaguardia della biodiversità agraria Prof. Pasquale Trematerra – Università degli Studi del Molise - Dipartimento di Scienze Animali, Vegetali e dell'Ambiente

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Appendix

REQUEST FOR INFORMATION THROUGH FOCAL POINTS

SURVEILLANCE DATA ON COLONY MORTALITY IN BEES

Background

The *French Agency for Food Safety (AFSSA)* has set up, in May 2007, a Working Group named "*Mortality, collapse and weakening in beehives*", aiming to analyse national and international scientific studies (data and results) on the subject. Given the importance of this topic as an emerging issue in Europe, EFSA agreed to collect, from Member States, the following data: (1) existing surveillance programs for weakening, collapse and mortality in bees; (2) results of chemical residue monitoring in honey; and (3) estimated bee population / honey production figures. In order to collect this data, EFSA has prepared the questionnaire below. We would be grateful if you could liaise with the appropriate national competent organization(s) in your Country and provide answers to the following questions:

1. SURVEILLANCE PROGRAMS

A) Are there bee surveillance programs in your Country relevant to assess:

- A. i) Colony weakening¹ YES NO
- A. ii) Colony collapse² YES NO
- A. iii) Colony mortality³ YES NO

If "YES", please provide the mortality rate in 2006: _____%; mortality rate in 2007: _____%

If "YES", please provide below the details of the program(s):

Name of organization: _____

Name of surveillance program: _____

Name of contact point: _____

Email address of contact point: _____

B) Could you provide any relevant references to reports / literature available in your Country related to colony weakening / collapse / mortality?

¹ **Weakening** - lack of strength (or vigour) of a beehive. It is linked to a decrease in the hive population density over a period of time combined, mostly, with a decrease in the hive activity. Bee disorders can be observed, for example, growth or behaviour disorders. Weakening is combined with a loss of honey production

² **Collapse** - rapid loss of bees in the hive, leading to its destruction

³ **Mortality** - death of bee colonies, expressed as ratio of the number of dead beehives (beehive without any live bees) for a specified time over the total beehive population at that time

2. CHEMICAL RESIDUES

Are there bee monitoring programs in your Country relevant to assess chemical residues in honey? YES NO

If "YES", please provide below the details of the program:

Name of organization: _____

Name of surveillance program: _____

Name of contact point: _____

Email address of contact point: _____

If any results are available in an electronic format, could you send the corresponding files by e-mail with the returned questionnaire?

3. ESTIMATED BEE POPULATIONS

Please provide the following information, concerning the honey production sector in your Country:

	Total ⁴		Professional beekeepers ⁵	
	2006	2007	2006	2007
Number of beehives				
Number of beekeepers				
Estimated bee population in summer				
Estimated annual honey production (x1.000 metric tons)				

Please provide details about the source of the bee population figures:

Name of organization: _____

Name of survey: _____

Name of contact point: _____

Email address of contact point: _____

⁴ Figures reported under this column shall include data for professional and non-professional beekeepers

⁵ Figures reported under this column shall concern solely data for professional beekeepers