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TABLE OF CONTENT

1 INTRODUCTION 7

2 PART I: METHODOLOGY AND INTERVENTION LOGIC 8

Introduction 8

Evaluation approach 8

Intervention logic of the CAP measures and other intervening factors 9
The objectives of the Common Agricultural Policy 9
The measures related to apiculture 11
Intervention logic of the CAP measures related to apiculture 14
Other intervening factors 16

Analytical framework 16

Evaluation tools 17
Desk Research 17
Interviews with key stakeholders 17
Fieldwork and Case studies 18
Web based surveys 18

Limits of the evaluation 19

3 PART II: OVERVIEW OF THE APICULTURE SECTOR 20

The place of the EU in the worldwide honey market 20
The main world market figures 21
Other Market characteristics 27
EU Production 29

Threats for the sector 37
Economic causes for the decline of the number of beehives in Europe 37
Biological threats 38
Chemical threats 40
Environmental threats 42
Beekeeping and processing practices 43

Opportunities for the sector 43
The role of the bees in pollination 44
Existing monitoring systems 46
Applied research perspectives 47
Diversification perspectives 51

The main EU honey production systems 54
Territorial characteristics 54
Typology of farms practising beekeeping 56

The marketing structures of EU honey production 62
Direct sales 62
Main commercialisation chains 65
Description of the demand 66

Apiculture measures **68**
Overall expenditure figures 69

4 PART III: THEME 1: EFFECTS ON PRODUCTION, MARKETING AND TRADE 71

Introduction **71**

Findings **72**

Conclusions **112**

5 PART III: THEME 2: EFFECTS ON THE STRUCTURES OF PRODUCTION 113

Introduction **113**

Findings **113**

Conclusions **122**

6 PART III: THEME 3: EFFECTS ON DOWNSTREAM SECTORS 123

Introduction **123**

Findings **123**

Conclusions **126**

7 PART III: THEME 4: EFFECTS ON RURAL AREAS AND THE ENVIRONMENT 128

Introduction **128**

Findings **130**

Conclusions **141**

8 PART III: THEME 5: EFFICIENCY, MANAGEMENT AND ADMINISTRATION 142

Introduction **142**

Findings **142**

Conclusions **148**

9 PART III: THEME 6: OVERALL COHERENCE WITH CAP OBJECTIVES AND OTHER MEASURES 150

Introduction **150**

Findings **151**

Conclusions **163**

10 PART IV: GENERAL CONCLUSIONS AND RECOMMENDATIONS 164

Conclusions 164
Effects on production, marketing and trade 164
Effects on the structures of production 165
Effects on the downstream sector 166
Effects on rural areas and the environment 166
Efficiency, management and administration 167
Coherence with CAP objectives and other measures; relevance 167

Recommendations 168

List of figures

FIGURE 1 – UPDATED INTERVENTION LOGIC OF THE BEE MEASURES 15
FIGURE 2: TREND IN WORLDWIDE HONEY PRODUCTION 21
FIGURE 3 TREND IN HONEY PRODUCTION ACROSS CONTINENTS 22
FIGURE 4 TRENDS IN BEEHIVES NUMBER ACROSS CONTINENTS 22
FIGURE 5 EXPORTS SHARE PER REGION IN 2010 24
FIGURE 6 IMPORTS SHARE PER REGION IN 2010 24
FIGURE 7 IMPORTS INTO THE EU BY COUNTRY OF ORIGIN IN 2011 (TONNES) 24
FIGURE 8 EU EXPORTS BY DESTINATION COUNTRY IN 2011 (TONS) 25
FIGURE 9: TOTAL NUMBER OF BEEHIVES EU WIDE SINCE 1990 30
FIGURE 10: TRENDS IN NUMBER OF BEEHIVES IN EU COUNTRIES COUNTING LESS THAN 100 000 HIVES 31
FIGURE 11 TRENDS IN NUMBER OF BEEHIVES IN EU COUNTRIES COUNTING MORE THAN 100 000 HIVES 31
FIGURE 12: EU HONEY PRODUCTION 32
FIGURE 13 RATIO OF PROFESSIONAL BEEKEEPERS (%) AND THE RATIO OF BEE COLONIES RUN BY PROFESSIONAL BEEKEEPERS IN THE PERIOD 1999-2009 IN HUNGARY 57
FIGURE 14 NUMBER OF HOLDINGS PRACTICING BEEKEEPING BY AGE CATEGORIES 59
FIGURE 15 EU HONEY CONSUMPTION FIGURES 67
FIGURE 16 - EXECUTION OF BEEKEEPING MEASURES FROM FY2005 TO FY2013 BY MEASURE (EC, FINANCIAL MANAGEMENT OF THE EAGF) 70
FIGURE 17 - EVOLUTION OF HONEY PRODUCTION (2008-2011) 73
FIGURE 18 - EFFECTS OF THE MEASURES ON PRODUCTION (CAPACITY) AND PRODUCTIVITY 75
FIGURE 19 - SHARE OF VARROA CONTROL COSTS IN TOTAL PRODUCTION COSTS 77
FIGURE 20 - FACTORS LIMITING THE TRADE OF HONEY ACCORDING TO BEEKEEPERS' PERCEPTION 79
FIGURE 21 - EFFECTS OF THE APICULTURE MEASURES ACCORDING TO BEEKEEPERS' OPINIONS 80
FIGURE 22 - EFFECTS OF THE APICULTURE MEASURES ACCORDING TO BEEKEEPERS' OPINIONS (COUNTRY RESULTS) 80
FIGURE 23 - EFFECTS OF THE APICULTURE SUPPORT MEASURES IN ENSURING/IMPROVING THE QUALITY OF HONEY ACCORDING TO BEEKEEPERS' OPINIONS 82
FIGURE 24 - AVERAGE PRICES OF INDUSTRIAL AND TABLE HONEY AS REPORTED BY BEEKEEPERS 84
FIGURE 25 - HONEY PRICES PER SALE CHANNEL 85
FIGURE 26 - SHARE OF HONEY SALES PER CHANNEL, AT EU LEVEL 86
FIGURE 27 - SHARE OF HONEY SALES PER CHANNEL, FOR CASE STUDY COUNTRIES 88
FIGURE 28 - OBSTACLES HAMPERING DIRECT SALES TO CONSUMERS 89
FIGURE 29 - FACTORS LIMITING HONEY TRADE OPPORTUNITIES FOR BEEKEEPERS 98
FIGURE 30 - SUPPORT PROVIDED BY THE SUPPORT MEASURES TO THE KEEPING AND TRADE OF LIVE BEES 101
FIGURE 31 - AVERAGE PRODUCTION COST (2008-2012) 104
FIGURE 32 – IMPACT OF THE MEASURES ON REDUCING PRODUCTION COSTS 105
FIGURE 33 – VARROA CONTROL COSTS 106
FIGURE 34 – SHARE OF NATIONAL AND REGIONAL ADMINISTRATIONS TAKING VARROA CONTROL COST INTO ACCOUNT WHEN DECIDING THE TOTAL AMOUNT OF EXPENDITURE ON APICULTURE SUPPORT MEASURES 107
FIGURE 35 - TRANSPORT COSTS 109
FIGURE 36 – SHARE OF PROFESSIONAL BEEKEEPERS AT NATIONAL AND REGIONAL LEVEL 114
FIGURE 37 - SHARE OF BEEHIVES BELONGING TO PROFESSIONALS 114
FIGURE 38 - SHARE OF RESPONDENTS TO THE BEEKEEPER AND BEEKEEPER'S ASSOCIATION SURVEY INDICATING THAT THEY ARE PROFESSIONALS 115
FIGURE 39 - SIZE OF EXPLOITATION (IN TERMS OF HONEY PRODUCTION) 115
FIGURE 40 - IMPACT OF THE MEASURES ON IMPROVING THE LEVEL OF PROFESSIONALIZATION OF THE SECTOR 117
FIGURE 41 - SHARE OF OVERHEAD COSTS IN TOTAL PRODUCTION COSTS 119
FIGURE 42 - SHARE OF INDUSTRIAL HONEY AND TABLE HONEY 126
FIGURE 43- SHARE OF NATIONAL AND REGIONAL ADMINISTRATIONS TAKING RURAL ENVIRONMENT AND THE ENVIRONMENT INTO ACCOUNT FOR THE CAP APICULTURE MEASURES 129
FIGURE 44 - EFFECT OF THE MEASURES ON RURAL DEVELOPMENT 130

FIGURE 45 - DEPENDENCE OF HONEY PRODUCTION ON THE CAP MEASURES SUPPORTING APICULTURE 132
FIGURE 46 - YEARS OF EXPERIENCE IN BEEKEEPING 133
FIGURE 47: PERCEIVED IMPACT OF THE MEASURES ON REDUCING BEE MORTALITY 136
FIGURE 48 - BEE POPULATION EVOLUTION IN GERMANY (DIB AND BRD) 137
FIGURE 49 - LEVEL OF POTENTIAL IMPACT EACH SUPPORT MEASURE CAN HAVE IN SUPPORTING THE ENVIRONMENT 137
FIGURE 50 - SHARE OF BEEKEEPERS BENEFITING FROM THE MEASURES 139
FIGURE 51 - FREQUENCY OF ADMINISTRATIVE BURDEN MEASUREMENT 144
FIGURE 52 – SHARE OF NATIONAL AND REGIONAL ADMINISTRATIONS WHICH USE MEASUREMENT INDICATORS (E.G., THE STANDARD COST MODEL) TO HAVE AN APPROXIMATE IDEA OF THE ADMINISTRATIVE BURDEN AND COSTS INDUCED BY THE MEASURES 144
FIGURE 53 - SHARE OF BENEFICIARIES (BEEKEEPERS, ASSOCIATIONS OF BEEKEEPERS, LABORATORIES, RESEARCH INSTITUTIONS, ETC.) WHICH HAVE REPORTING REQUIREMENTS 145
FIGURE 54 - SHARE OF NATIONAL OR REGIONAL ADMINISTRATIONS WITH MONITORING SYSTEMS 145
FIGURE 55 - EXTENT TO WHICH THERE IS ROOM FOR IMPROVEMENT FOR THE FOLLOWING FACTORS RELATED TO THE SET-UP AND APPLICATION PROCESS OF THE MEASURES FOR BENEFICIARIES 146
FIGURE 56 - PUBLIC AUTHORITIES OR BODIES INVOLVED IN THE DEVELOPMENT OF PROGRAMMES AND MEASURES TO SUPPORT APICULTURE 148
FIGURE 57 - THE RELATIONSHIP BETWEEN THE NATIONAL PROGRAMMES AND THE EU SUPPORT MEASURES AND POLICIES RELATED TO BEES 159

List of tables

TABLE 1: EU MARKET BALANCE DATA 26
TABLE 2: RECENT TREND IN HONEY PRODUCTION IN THE EU, IN TONS 33
TABLE 3 : AVERAGE PRODUCTION PER HIVE (KG/HIVE) 34
TABLE 4 RATIO OF DIFFERENT TYPES OF HONEY IN HUNGARIAN PRODUCTION 35
TABLE 5: NUMBER OF AGRICULTURAL HOLDINGS PRACTISING APICULTURE PER LAND AREA 60
TABLE 6: TRENDS IN THE NUMBER OF HOLDINGS MANAGING MORE THAN 100HA, PRACTISING APICULTURE. 61
TABLE 7 - EU 27 HONEY PRODUCTION (X1000 TONNES) 72
TABLE 8- HONEY PRODUCER PRICES (€/KG) IN SPAIN PER TYPE HONEY AND SALE CHANNEL 84
TABLE 9 - EU HONEY EXPORTS TO THIRD COUNTRIES (IN TONNES) 94
TABLE 10 - EU HONEY IMPORTS FROM THIRD COUNTRIES (IN TONNES) 95
TABLE 11 EU'S HONEY AVERAGE IMPORT/EXPORT PRICE 95
TABLE 12 - INTRA-EU EXPORTS OF HONEY (IN TONNES) 96
TABLE 13 - INTRA-EU IMPORTS OF HONEY (IN TONNES) 96
TABLE 14 - INTRA-EU TRADE OF LIVE BEES 99
TABLE 15- HONEY PRODUCER PRICE (US$/TONNE) 103

1 Introduction

This report describes the evaluation of the measures improving the general conditions for the production and marketing of apiculture products.

The evaluation report is structured as follows:

- **Part I** describes the methodological approach and the intervention logic of the CAP reform, the analytical framework and evaluation tools used to carry out the study as well as any limitation of the evaluation;
- **Part II** includes an overview of the apiculture sector, including a description of the place of the EU in the worldwide honey market, the main threats and opportunities for the sector, the EU honey production and marketing systems as well as an overview of the execution of the measures at EU level focusing on case study countries;
- **Part III** presents the answers for the six evaluation themes;
- **Part IV** presents the conclusions and recommendations by theme.

2 PART I: Methodology and Intervention Logic

Introduction

Part I deals with the key building blocks of the methodological evaluation approach.

This chapter starts with a short description of the general approach followed for this evaluation.

Then the structuring tools that we used to deepen our understanding of the issue at stake and frame the data collection, analysis and judgment phases of the evaluation, i.e. the intervention logic and the analytical framework, are presented. Those tools ensured robust and sound replies to each evaluation theme.

Third, the list of qualitative and quantitative research tools are described such as statistical analysis we used to conduct this evaluation successfully.

Finally, any limitation to the evaluation is highlighted to support the reading of the results of this study.

Evaluation approach

In order to cover all the topics in a logical and interconnected way, the evaluation team followed an approach that allowed handling several issues concurrently. Data collection was organised and analytical tools were selected that have been used to assess specific issues from different angles (e.g. interviews at national level, data mining in European and/or national databases, etc.). We paid particular attention to the involvement of key stakeholders in the evaluation work.

The approach included the following features:

- a comprehensive approach for gathering and analysing data with statistical analysis[1] to ensure a strong base of evidence to reply to all the evaluation questions and international comparisons to illustrate them;
- an open attitude towards stakeholders who wanted to contribute proactively;
- adapted and diversified research tools including a triangulation of qualitative and quantitative methods (documentary or on-site research, telephone and face to face interviews, case studies, statistical analysis…) to handle all the different tasks;
- a strong cooperation with DG AGRI and the involvement of different types of stakeholders at EU and national level;
- an organised and managed work plan to group and handle the different issues to be covered and including six meetings in Brussels for the reviewing progress with the Steering group - consisting of Commission staff members of various Directorates General - and for presenting the different interim-deliverables of the project;

[1] Mainly descriptive statistical analyses.

- interim, draft and final reports in a readable and comprehensive format, combining primary and secondary data, stakeholders' opinions and our objective and independent analysis.

Intervention logic of the CAP measures and other intervening factors

The objectives of the Common Agricultural Policy

The CAP can be traced back to the end of the 50s, beginning of the 60s, where it was set up in order to offer European consumers a stable supply of affordable food by supporting production. This very successfully spurred agricultural productivity and enabled the EU to achieve self-sufficiency by the 80s. The five overall objectives with which the CAP was endowed, and which were included in Article 33 of the Treaty of Rome and can be summarized as follows:

- To increase productivity, by promoting technical progress and ensuring the optimum use of the factors of production, in particular labour;
- Ensure a fair standard of living for farmers;
- Stabilise agricultural markets;
- Secure availability of supply (food security);
- Ensure reasonable consumer prices.

However by the 1980s negative environmental effects of increased production and structural overproduction became clear. Besides, the CAP became increasingly expensive.

Reform of the CAP started in the 1990s with the aim of increasing the competitiveness of European agriculture, integrating environmental goals and the development of a rural development policy. One of the main aims of the CAP reform adopted by the Berlin Summit under Agenda 2000 was to establish a model for European agriculture that would be closely linked to the balanced development of rural areas, which cover 90% of the Community's territory. Agricultural and rural policy plays a key role in the territorial, economic and social cohesion of the Union and in the protection of the environment. Alongside market measures and direct payments (first pillar), rural development policy (second pillar) became an essential component of the European agricultural model.

The MacSharry reform in 1992 marked the beginning of direct payments to farmers in order to compensate for a one off decrease in price support, which had to this point constituted the main form of income support. Before the 1992 reforms, high guaranteed prices (intervention prices), often set above world prices were paid to EU farmers for any amount of product not sold on the market. As a result, the EU became a large stockholder of several agricultural products, including wheat, barley, beef, butter, dry milk powder and wine. Price support had three main drawbacks from an economic point of view: (i) Consumers were implicitly taxed by higher price levels and lost welfare, (ii) producers were provided with an incentive to increase the intensity of production above optimal levels and (iii) the production mix was distorted as the relative price support was not uniform over all products. The 1992 reform reduced, amongst other things, beef intervention prices by 15% and cereal intervention prices by 30%. EU farmers were compensated for the price cuts, as long as they continued to produce, with direct payments based on historic yields and livestock numbers. Several rural development measures were introduced, notably to encourage environmentally sound farming and diversification of farm activities. Setting production limits helped reduce surpluses. Farmers had become more market-oriented, while receiving direct income aid, and able to respond to the changing demand.

This important policy change in the CAP was reinforced by the agreement in 1999 on the so-called 'Agenda 2000' reforms. These reforms reinforced the move to make farmers more reliant on the market and improved incentives to farm in an environmentally sensitive way. They added a major new element – a comprehensive rural development policy encouraging many rural initiatives while also helping farmers to diversify, to improve their product marketing and to otherwise restructure their businesses. The budget available to the CAP was set out and capped for the period 2000 to 2006.

The main objectives of the CAP reforms prior to 2003 can be summarised as follows:

- Cut prices by the introduction of compensatory payments schemes to farmers. From price support to direct payments;
- Promote free-market agriculture by limiting surpluses. This was accompanied by measures aimed at rationalising production through the introduction of set-aside schemes;
- Ensure a fair standard of living for farmers;
- Promote better environmental conditions and the maintenance of the rural environment.

The June 2003 CAP reform was a logical continuation of the Agenda 2000 reforms and was designed to step up decoupling and to prepare the EU for enlargement to include 12 new Member States. The 2003 reform introduced a Single farm Payment Scheme (SPS) to replace most of the direct subsidy payments to farmers offered under Agenda 2000. This reform has also introduced cross-compliance (enforcing environmental and animal welfare standards) and modulation (progressive financial transfer from pillar 1 to pillar 2 of the CAP).

Simplification of the regulatory environment of the CAP has been major concern of the Commission. Indeed, since the PAC was first introduced, the Council has adopted 21 common organisations of agricultural markets (CMOs) for each product or group of products. Each of these was governed by a separate Council basic regulation. With the Council Regulation 1234/2007[2], this simplification need was attended to with the establishment of a single CMO for all agricultural products, including apiculture products. This regulation entered into force on July 1, 2008 and combines and harmonizes as far as possible the different Council acts in areas of market policy covering rules on intervention, private storage, marketing and quality standards, import and export rules, safeguard measures, competition, state aid and the reporting of data. Council Regulation 1234/2007 has been amended by the Council Regulation of 14 April 2008 to incorporate the policy changes agreed in the context of the CMO reforms for fruit and vegetables.

The CAP has adapted to internal and external challenges, thus ensuring its sustainability. **The EU2020 strategy**[3] was designed by the European Commission and later endorsed by the European Council, as a successor of the Lisbon Strategy, to face the immediate challenges resulting from the financial crisis, but also long term ones such as resource scarcity, ageing and globalisation. In order to achieve high rates of employment, productivity and social cohesion, the EU2020 strategy was developed to transform the EU economy into one that is smart, sustainable and inclusive. EU2020 indeed builds on three pillars:

[2] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2007R1234:20100501:EN:PDF
[3] European Commission (2010), "Europe 2020: A European strategy for smart, sustainable and inclusive growth", 3.3.2010., http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF.

- **Smart growth** encourages the development of an innovation and knowledge based economy.
- **Sustainable Growth** promotes an economy that is greener, more resource efficient and competitive.
- **Inclusive Growth** seeks to foster high employment and social cohesion.

The CAP must become an essential means to enable the EU to meet its 6 headline targets[4], under the EU2020 strategy. Consequently, the reform of the CAP in 2013 will tend towards making this policy one that promotes a more competitive and sustainable agriculture, as well as vibrant rural areas.

In this perspective, the Commission launched a public debate on 18 November 2010 with a Communication on "The CAP towards 2020"[5], exposing the key challenges and policy issues in EU agriculture rural areas. This Communication also defined various options for the future CAP, which then served as a basis for the set of legal proposals that the Commission presented to the European Parliament and Council, on the 12 October 2011, in view of the CAP reform. The approval of the various regulations and implementation acts is expected for the end of 2013. The CAP reform is therefore expected to be in place as from 1st January 2014.

The measures related to apiculture

Apiculture plays a crucial role in European agriculture. Not only does the sector generate an annual value added of €1 billion, but it also contributes its part to the total amount of at least €22 billion that is delivered by pollinators to European agriculture through pollination, a key element in the reproductive cycle of crops and plants[6]. Beekeepers thus have a preponderant role in the sustainable development of rural areas and maintaining biodiversity, thus providing a social and environmental public good. Indeed, the health of honeybees can be considered as an important bio-indicator of environmental quality. The number of beekeepers in the EU is estimated to be of 500 000, 95% of which are non-professionals. Almost half of the hives in the EU are concentrated in the following four Member States: Spain (17.8%), Greece (10.9%), France (9.7%) and Italy (8.2%). In depth regional case studies have been carried out in the first two, as well as in Germany, in which almost 200 000 hives have disappeared since 2003, and in Hungary.

In recent years, the general trend has been a decrease in the bee population in the north/west of the EU and a slight increase in the south/east with significant spatial and time variations.

In North America, colony losses observed since 2005 have left the region with fewer kept bees than at any time in the past 50 years. American scientists have coined the term Colony Collapse Disorder (CCD) to describe this phenomenon. CCD is often characterised by the rapid loss from a colony of its adult worker bee population.

[4] The concrete targets to be met are : 75% of the 20-64 year olds to be employed; 3% of the EU's GDP to be invested in R&D; Greenhouse gas emissions 20% lower than their 1990 levels, 20% of energy to come from renewable sources, 20% increase in energy efficiency; reducing school dropout rates by 10%, at least 40% of 30-34 year olds completing third level education; no more than 20 million people in or at risk of poverty and social exclusion.

[5] European Commission (2010), "The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future", 18.11.2010, COM(2010) 672 final, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0672:FIN:en:PDF.

[6] See for references on the pollination effect of beekeeping e.g. http://ec.europa.eu/food/animal/liveanimals/bees/index_en.htm and http://www.efsa.europa.eu/en/topics/topic/beehealth.htm.

No single cause of declining bee numbers has been identified in the academic literature[7]. However, several contributing factors have been suggested, acting in combination or separately. These include the effects of intensive agriculture and pesticide use, starvation and poor bee nutrition, viruses, attacks by pathogens and invasive species – such as the Varroa mite (*Varroa destructor*), the Asian hornet (*Vespa velutina*), the small hive beetle *Aethina tumida* and the bee mite *Tropilaelaps* – genetically modified plants, and environmental changes (e.g. habitat fragmentation and loss)

In Europe, the phenomenon of collapsing bee colonies is impeding the sustainability of beekeeping and increasing the imbalance between supply and demand on the Community market for honey. Indeed, the EU has only very slightly managed to improve its self-sufficiency ratio, which reached 62.0% in 2010, compared with 60.2% in 2008.

Bee population decline, has been observed in both the US and Japan, whereas strong growth in the bee population is observed in Asia, with China now being the EU's first import partner in honey. On world markets, total honey production has remained stable since 2008, whilst prices have surged, notably due to production collapse in Argentina. However, world production remains at a substantially high level by historical standards, particularly when comparing to output levels in the early 80s since which production has increased by over 50%.

This decrease in the bee population is representative of a general decline of pollinator insects reducing the number of potential pollinations, which has a detrimental impact on crop production in the EU and therefore food security[8]. However, beekeepers in the EU derive most of their income from honey sales, as pollination services are less often charged than is the case in the US. Therefore, EU intervention through CAP is of great importance to support beekeepers concerning marketing and production. The following chapters of this evaluation will deal with the question how the honey market has developed in terms of marketing, production, trade and consumer prices, with analysis to put forward conclusions and with forward looking policy recommendations.

Different measures concerning honey have been introduced by the EU, in particular measures to strengthen the production and marketing of honey, including programme facilities to prevent varroasis and restock hives. The Council Regulation (EC) No 1221/1997 first defined the rules for the EU to provide co-financing of 50% to the national apiculture programmes developed by Member States. These rules have been settled while varroa was the main threat to beekeeping, generating an additional cost which was meant to be compensated by the Member States programmes. All bee diseases and pests but varroa are under DG SANCO management. Varroa is an exception because it is, given the present state of scientific knowledge and medical capacity, an ineradicable problem. Council Regulation 797/2004, which was later, included as articles 105 to 110 in Council Regulation (EC) No 1234/2007, added aid for hive restocking to the previously defined measures. A number of simplification measures were also introduced by the Commission in 2007 to enable greater flexibility of the programmes to respond adequately to unforeseen difficulties upon elaboration of the programmes.

The measures that can be included in the national programmes developed by Member States are the following:

[7] See for references e.g. http://www.efsa.europa.eu/en/topics/topic/beehealth.htm.
[8] Reasons and assumptions related to the decline in the bee population is further described in the overview of the apiculture sector in EU – next section.

- Technical assistance to beekeepers and groupings of beekeepers;
- Control of varroasis;
- Rationalisation of transhumance;
- Measures to support laboratories carrying out analyses of the physico-chemical properties of honey;
- Measures to support the restocking of hives in the Community;
- Cooperation with specialised bodies for the implementation of applied research programmes in the field of beekeeping and apiculture products.

Overall, the annual reports of the Commission on the implementation of the measures[9] have suggested that the Member States were highly satisfied with the apiculture measures and made extensive use of the allocated budget (in 2009 88% of the total available budget for the measures – EU and Member States – was used). The most commonly used measures during the period 2007-2009 remained varroasis prevention, although a sharp drop, of 10% points to reach 27% of the used budget, has been registered during the period, and technical assistance, which represented 26-27% of the budget used. With regards to the other measures, the ones designed to ensure rationalisation of transhumance accounted for 19% of total expenditure, while hive restocking measures represented 15%, with an increase of 5 points in the period. Restocking of hives is the most recent of the eligible measures for co-financing offered by the Commission as it was introduced only in 2005. However, since its introduction, the portion of national budgets earmarked for these measures has substantially increased from the 6.2% share allocated to it in 2005, reflecting the growing concern for bee population decline. Finally, measures in favour of honey analysis and applied research represented 6-7% of expenditure in 2009[10].

This evaluation has examined the effectiveness, efficiency, relevance and possible unintended side-effects and dead-weights of the implementation of these apiculture measures with respect to achieving their objectives. Furthermore, this evaluation has also examined the coherence of Council Regulation (EC) No 1234/2007 with rural development measures, bee health initiatives, sanitary measures and EU research programmes, relevant information provision and promotion measures, and measures of the Member States and of private actors in the sector.

In addition to the apiculture measures the European Commission has set up a number of initiatives that are relevant for the apiculture sector, such as the EU Biodiversity Strategy to 2020. The latter promotes the full implementation of EU nature legislation to protect biodiversity, better protection for ecosystems and more use of green infrastructure, more sustainable agriculture and forestry, better management of fish stocks, tighter controls on invasive alien species and a bigger EU contribution to averting global biodiversity loss.

Regarding bee health initiatives, The Animal Health Strategy was designed by the Commission with the aim of reducing the incidence of animal diseases and minimising their impact. This is of particular relevance for bees given the devastating impact of varroasis on the EU's bee population.

Furthermore, the Commission has complemented these initiatives by setting up or financing a number of research initiatives. For instance, an EU reference laboratory in the field of bee health was recently designated. The *Agence Nationale de Sécurité Sanitaire de*

[9] European Commission (2010), "REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT".

[10] Approximately €60 million has been spent in total for this category of measures since the start of the apiculture measures.

l'alimentation, de l'environnement et du travail (ANSES) will establish, in addition to its core tasks[11], the basic conditions for the implementation of effective surveillance programmes in the EU. EU research initiatives supported by the Commission include the Bee Shop, STEP and Bee DOC projects, and the Coloss Network.

Intervention logic of the CAP measures related to apiculture

The Intervention Logic is the guiding principle behind this evaluation study. Interventions are usually defined using rationales and objectives at different levels: implementation-related objectives concerning inputs and outputs, and those concerning effects such as results and impacts (intermediate and global), with connected indicators. This definition is actually a simplification of the action and change models for management purposes.

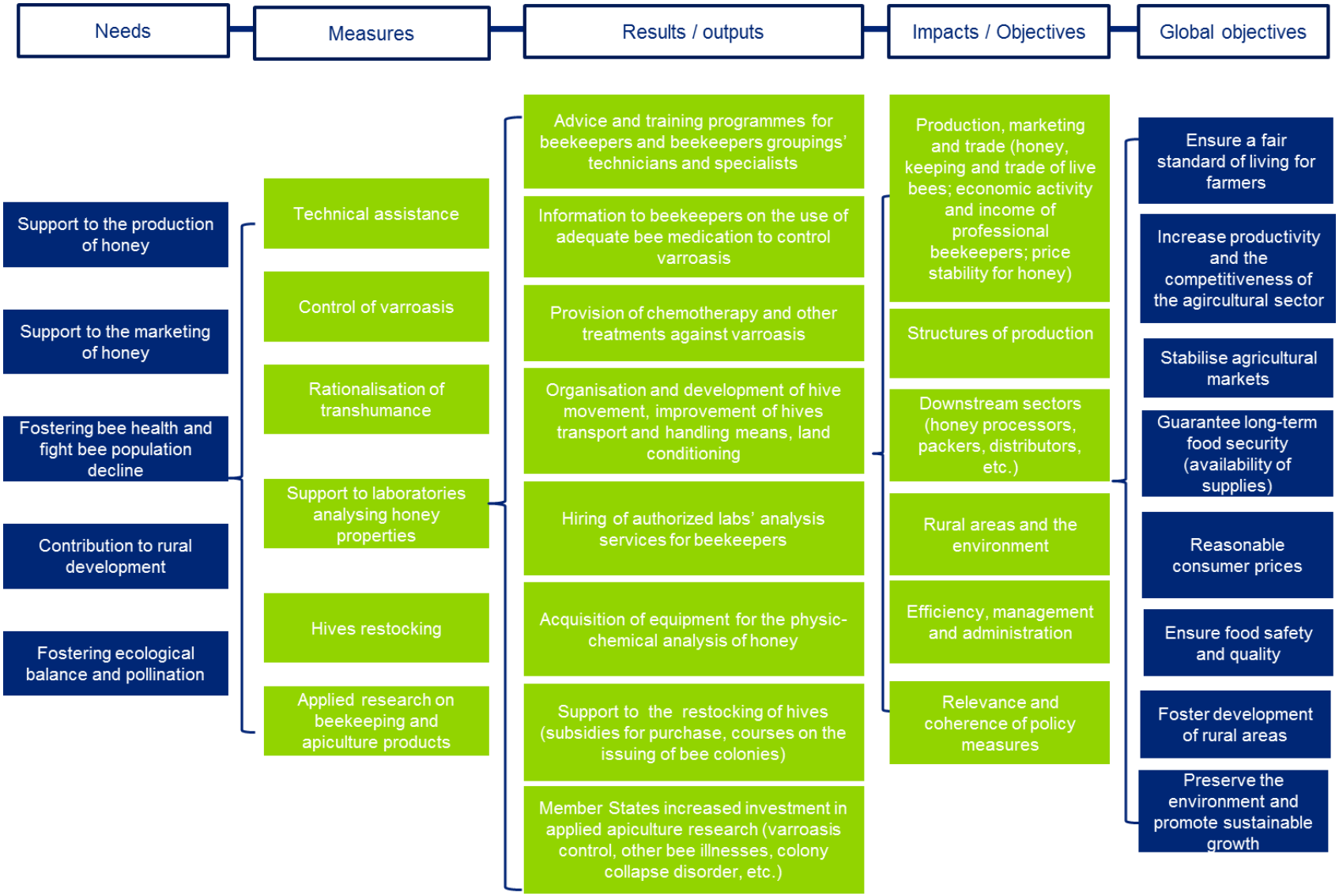
The intervention logic of the bee measures considers the **inputs** of the CAP measures in the apiculture sector as well as the **outputs**, identifying **impacts** at different levels, analysing the efficiency of the measures and their effectiveness, also their expected and unexpected effects at the local and global levels including the relation with the environment. The aim of this exercise is to evaluate whether the apiculture measures were relevant for the needs these were supposed to address. Furthermore the testing of the intervention logic is the vehicle to judge whether the envisaged impacts of the measures indeed occurred, with respect to the overall CAP objectives, the specific objectives laid down in the articles 105-110 of Council Regulation (EC) 1234/2007 and with respect to other EU objectives.

We present below the intervention logic. The green boxes present the components of the bee measures. The blue boxes present on the right side the overall objectives to which the measures should contribute and on the left side, the identified needs that should be met by the measures (expected impacts).

The interview guides and surveys of the evaluation were developed on the basis of this intervention logic.

[11] Article 32 of Regulation (EC) No 882/2004 and Regulation (EU) No 87/2011

Figure 1 – Updated intervention logic of the bee measures



Other intervening factors

In this section we list the other intervening factors that have played a role in the apiculture sector and may have affected to some extent the production level, the marketing and the structure of the apiculture sector.

- Weather conditions are an external factor that is intrinsic to every agricultural activity. For beekeeping, weather strongly affects flora and bee behaviour. This factor explains the relatively high volatility of production. However, a bad year for agriculture is not necessarily a bad year for beekeeping. This is why the evaluation gathered information allowing the analysis of the production systems and the relations between apiculture and other farming activities.
- As 40% of honey consumed in EU is imported, the worldwide market context affects the EU production and marketing. In relation to this, the evolution of EU legislation can have an important role in the market opportunities for local producers. e.g.: legislation about imports.
- Evolution of pests and diseases (hornet, foulbrood, etc.).
- EU legislation about chemical products and allowed pesticides also plays a role in the preservation of bees and therefore on production levels.
- Technological development is a key factor for profitability and differs throughout Member States. This might entail different yield and harvesting facilities.
- The relative importance of the apiculture sector in national and regional agricultural activity.
- The market situation of end users and the general economic conditions affect every market.
- Other human activities: agriculture, land management.

We took due account of all these factors when carrying out interviews and case studies and when analysing the datasets.

Analytical framework

The evaluation was structured and conducted by using an analytical framework based on the evaluation themes and questions and tasks identified in the specifications for this study (Terms of Reference) provided by the European Commission. The analytical framework includes, by evaluation theme and question, the following elements:

- Judgment criteria that have allowed us to answer each evaluation question;
- key criteria/indicators (qualitative and quantitative) that were used to feed the judgment and that assess effectiveness, efficiency, coherence and relevance of the measures;
- The sources we have proposed to use to address the question/issue and to collect the necessary information and the key sources of data and other input.

The use of a structured analytical framework allowed us to conduct robust, logical and solid evaluation work and to elaborate conclusions and recommendations based on the evaluation findings.

The analytical framework is presented in the annex to this report.

Evaluation tools

Desk Research

The desk research constituted a dynamic exercise. We compiled and made use of the general and basic information and data provided at the kick-off meeting with the Commission, the documentation requested via the evaluation unit AGRI L4 –including the national apiculture programmes-, the documents enlisted in the bibliography of the Terms of Reference, regulations, other secondary data sources and information collected by the evaluation team (including the experts in the Member States) as well as data gathered at national level. Therefore, the desk research carried out involved both qualitative and quantitative information.

The documentation gathered is listed in the annex to this report.

Essential sources of data for this evaluation are the European, national and regional databases and their time series. We present in the annex a detailed list of the main databases used in the course of the analysis. These include:

- Eurostat;
- FADN (Farm Accountancy Data Network);
- CATS (Clearance of Account Trail System);
- FAOSTAT;
- The Report from the Commission to the Council and the European Parliament on the implementation of Articles 105 et seq. of Council Regulation (EC) No 1234/2007 on measures improving the general conditions for the production and marketing of apiculture products:
- National Apiculture Programmes (prepared for three-year periods, the current one running from 16th October 2011 to 15th October 2013) and National Studies on the Production and Marketing Structure in the Beekeeping Sector (normally included in the programmes and carried out according to the obligation established, respectively, in articles 105 and 107 of Regulation 1237/2004).
- We have also consulted other databases and sources of information. For example, we have employed data coming from the EU reference laboratory for bee health –the Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail (ANSES). Data from the Ministries of Agriculture, the national statistical institutes and other relevant national or regional database were used by the country experts and were further used to maximise the insights gained during the country visits.

Interviews with key stakeholders

To gain insights into perceptions of the implementation of the CAP measures in the apiculture sector, the evaluation team has conducted interviews with key EU stakeholders, i.e. persons who have been intensively involved in the implementation of CAP measures concerning the apiculture sector. These interviews have been done face to face when the interviewees were based in Brussels, or conducted by phone if this was not the case. We present in the annex the full list of interviewed persons.

The interviews provided feedback on the perceived effectiveness, efficiency and relevance of the CAP measures concerning the apiculture sector and helped the evaluation team to

understand the concerns of the national stakeholders relating to the measures and the apiculture sector prior to our visit to the countries. The questions concerning this phase have properly taken into account opinions on future development of bee measures. Furthermore, the evaluation questions have been tailored by our experts to the interviewee and have been in part structured and in part open and interactive.

The project experts (Maria Bouga in Greece, Laszlo Karpati, Georgina Vanyi Arvane, Zsolt Csapo in Hungary and Werner Von der Ohe in Germany, plus Amélie Joveneau in Belgium) helped us identify relevant interviewees and reach them via their professional network and personal contacts.

In total, we have conducted in-depth interviews with 16 persons.

Fieldwork and Case studies

In each of the four Member States chosen for case studies in the Terms of Reference (i.e. Spain, Greece, Hungary and Germany) interviews have been organised with:

- representatives of the honey industry and retailers;
- representatives of the beekeepers and beneficiaries;
- representatives of the national government involved in the programmes.

This choice reflects different stakeholders with both institutional and technical backgrounds.

We have carried out these interviews after the collection and analysis of secondary data had taken place. As a result, we were able to ask more incisive in-depth questions and to focus on the key issues and challenges that are being faced during the implementation of the CAP measures in the key producers of the apiculture sector.

The case studies have been designed to provide empirical evidence and input to answering the evaluation questions from different contexts, perspectives and choices. For this evaluation we have put together a team of national apicultural experts and Deloitte consultants who speak fluently the country language and have already conducted research, data gathering and analysis on previous evaluation projects. The experts have been assisted by one evaluator during all the country visits.

In total we have interviewed for the case studies:

- 6 persons in Germany;
- 7 persons in Greece;
- 6 persons in Hungary; and,
- 10 persons in Spain.

The case studies have been reported on in monographs which are annexed to this report.

Web based surveys

In order to collect primary data at EU level and not only through four case study countries, two web-based surveys were launched. One survey was addressed to beekeepers and beekeeping associations, and the other one was addressed to the national and regional administrations involved in the management of the apiculture support measures. Both surveys were put online on Thursday 25 October 2012, and were open till 19 December 2012 at noon. Different channels were mobilised to reach the survey's addressees.

To address Commission's request to focus on the four countries selected for case studies and in order to maximise the responses rate, the survey targeting the beekeepers and beekeeping associations was translated in German, Greek, Hungarian and Spanish and the original deadline for the responses was prolonged.

As a result,

- 58 complete responses to the survey for national and regional administrations were received;
- 1019 complete responses to the survey for beekeepers and beekeeping associations were received, of which:
    - 99 from the English version;
    - 702 from the German version;
    - 31 from the Greek version;
    - 130 from the Hungarian version;
    - 57 from the Spanish version.

For the purpose of the assessment of the evaluation themes, it has to be noted that the analysis has been performed taking into consideration the aggregation of the results. It is thus important to bear in mind the over representation of Germany when interpreting the results. When deemed relevant, the evaluators presented the results of the survey per case studies country when addressing the evaluation themes (following sections – Part III).

Limits of the evaluation

A few limitations should be born in mind with respect to the evaluation results, mainly due to specific data problems:

- Only beekeepers who own land registered via the Single Farm Payment Scheme are registered in EUROSTAT statistics. Data coming from this source are therefore not exhaustive;
- Beekeeping techno-economic profiles are very different from one county to another. For example: The profitability threshold is very different from one country to another. The more northern, the lower is the number of hives necessary (because in northern countries of the EU beekeepers use in general bigger hives and prices are higher) for profitable production. The profitability threshold is therefore very variable;
- Member States do not have clear figures about their number of hives: the definitions of "hive" and "colony" are not straightforward (sizes are very different and the use of "nucleus hives[12]" is being generalised. Moreover, the number of hives is evolving constantly);
- The mortality rate is unclear;
- Data on production costs are very limited, only a very small part of the apiculture sector is covered in FADN and this system contains values (total cost amounts) but no prices and production quantities;
- The over representation of German beekeepers and beekeeping associations in the survey results.

[12] nucleus hive = small hive with 5-6 frames used when dividing colonies or collecting swarm

3 PART II: Overview of the apiculture sector

The overview of the apiculture sector is structured into six main sections:

- **The place of the EU in the worldwide honey market**: trends (main producing countries, policies and trade), prices and quantities, quality and production of honey.
- **Main threats for the sector**: the sector is facing threats directly affecting the bees but also coming from adverse processing and marketing practices. The main ones will be briefly tackled in this section.
- **Opportunities to increase profitability of the sector**: description of solutions to the threats described in the previous section as well as an overview of opportunities provided by pollination and the valorisation of other beehive products.
- **The EU honey production systems**: this part of the report first describes some particular territorial characteristics such as the races of bees and floral availability. Based on available data, it also provides an overview of the main characteristics of production factors: the differences between professional and non-professional beekeepers, age categories of beekeepers, relation with land management, variation in levels of production and a description of the modernisation of the sector.
- **The marketing structures of EU honey producing beekeepers**: marketing systems and organisations, price formation in the markets; specialisation and quality labelling.
- **An overview of the execution of the measures** at EU level.

This is based on the information and data available at EU, international and worldwide level. The origin of the figures and facts described in this section is systematically detailed together with eventual missing information and bias in existing data.

The place of the EU in the worldwide honey market

It is essential for the evaluation to understand the current EU position in the honey global market. The main world market figures analysed in the first part of this section show that the EU has contributed to the general honey production increase and plays an important role as a main producer and importer of honey. The increase in the EU self-sufficiency rate that has been observed since 2000 is due to the accessions of several honey producing countries such as Hungary, Bulgaria, Poland and Romania. The self-sufficiency rate has been fairly stable after the accessions.

The second part (Other market characteristics) describes some rules set at the EU level for honey imports which have a great influence on the origin of importations. Among others, only countries listed on the so-called “third-countries list” are allowed to export honey to the EU.

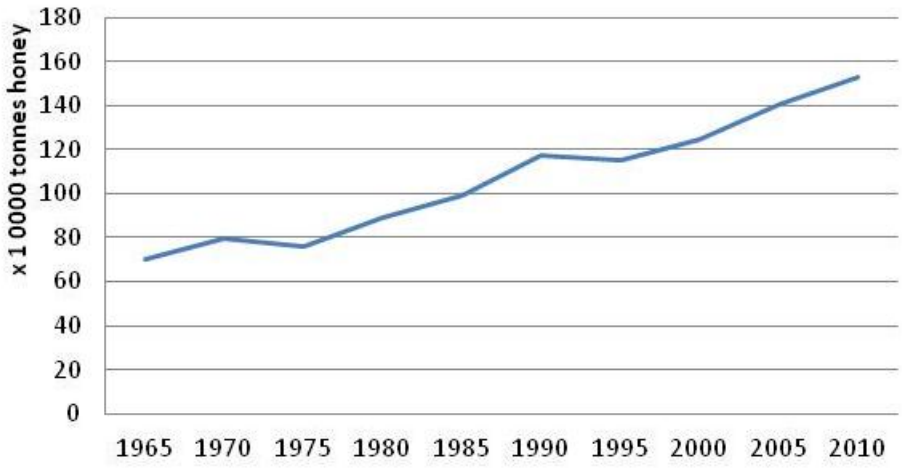
The last part of this section provides a broad picture of the EU production, highlighting the declining number of beekeepers and beehives as well as the existing contrasts among EU countries. After these quantitative aspects, some qualitative specificities of EU honey production are presented (physico-chemical properties, floral origin and quality labelling).

The main world market figures

The main world market figures have been chosen according to their relevance for the evaluation carried out. The main statistical sources are FAOSTAT and the Eurostat Comext database (from primary and secondary sources). The analysis deals with production trends worldwide as well as several trading patterns.

The worldwide production of honey has globally increased to amount to 1.5 million tonnes in 2010. The 10 biggest producers are: China (400 000 tonnes), Turkey and the USA (80 000 tonnes each), Ukraine (70 000 tonnes), Argentina (60 000 tonnes), Mexico and Ethiopia (55 000 tonnes each), Russia and Iran (50 000 tonnes each) and India (40 000 tonnes). Among Member States, Spain ranks 13th, with a production of 34 000 tonnes.

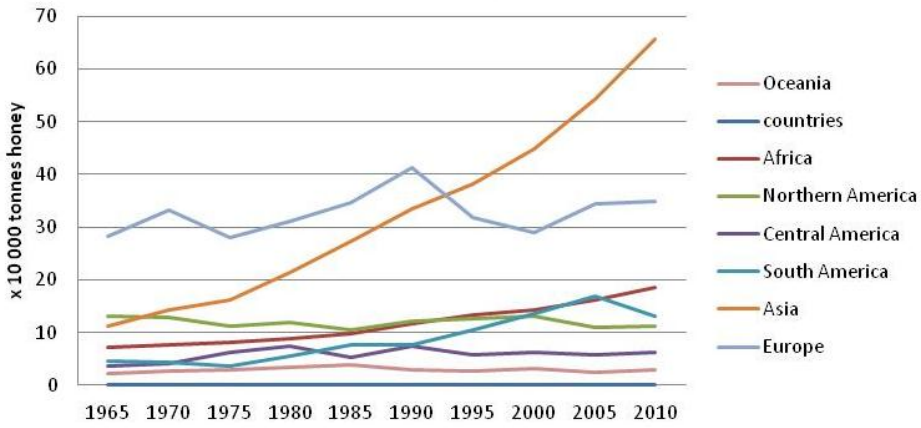
Figure 2: Trend in worldwide honey production



Source: FAOSTAT

As shown in the figure below, the increase in production is especially important in Asia, which counts for 43% of the global production. Following Asia, the EU is the second major global producer of honey producing 23% of the global production. The increase of EU production is mainly due to the accession of countries from Central- and Eastern-Europe between 2000 and 2010.

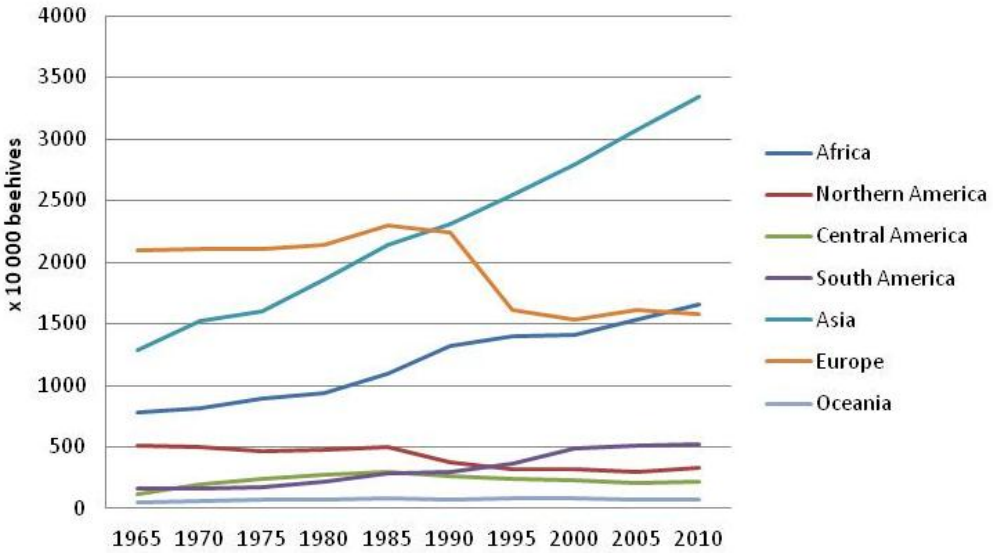
Figure 3 Trend in honey production across continents



Source: FAOSTAT

Cointegration between honey production levels shown in figure 3 and beehives numbers shown in figure 4 below indicates a clear link between the amount of honey produced and the evolution of the number of hives in each continent. This link is particularly strong for the Asian and European curves.[13]

Figure 4 Trends in beehives number across continents



Source: FAOSTAT

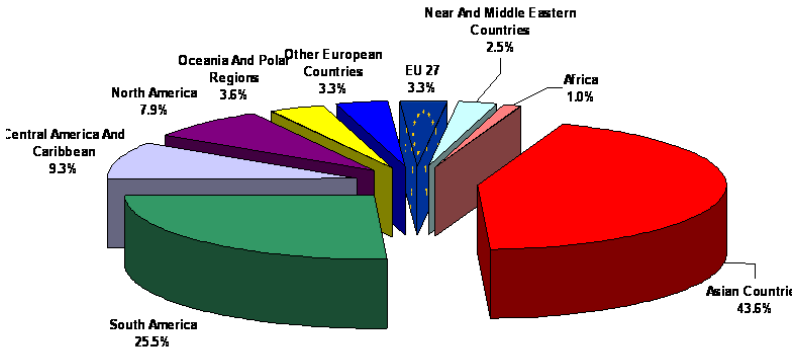
[13] The results of the Johansen cointegration test show that a cointegrating relationship exists between the number of beehives and honey production both in Europe and in Asia. In Europe. The test value for Europe is 19.8, whereas the critical value for a level of significance of 0.05 is 15.43. For Asia, the test value is 21.28, whilst the critical value for a 5% significance level is 15.43. The results are similar using the Least Squares method to calculate correlation. For Europe, the correlation coefficient between the number of beehives and honey production is 0.21; the coefficient for the beehives variable is 16.54 (meaning that on average a hived produces 16.5 kg of honey in Europe), with a clearly significant t-statistic of 18.0. For Asia, the correlation coefficient is 0.99 with a value for the coefficient of the beehives variable of 15.11 and a significant t-statistic of 14.68. Augmented Dickey-Fuller tests show that production is rather stationary for Europe, but not for Asia. The Granger causality test shows that the number of beehives "Granger causes" honey production in Asia (F-test value 2.35, probability 0.246) whilst for Europe honey production "Granger causes" the number of beehives (F-test value 10.02, probability 0.047) –which can indicate that the number of beehives can be largely estimated by honey production-.

Over the period 1965-2010 Europe and Asia have produced a similar amount of honey, with a yearly average of 321000 tonnes for Asia and 326000 tonnes for Europe.

When looking at the worldwide honey consumption patterns, one can see that the three major consumers are the EU (20-25% of global consumption), China (approximately 15%) and the US (approximately 10%).

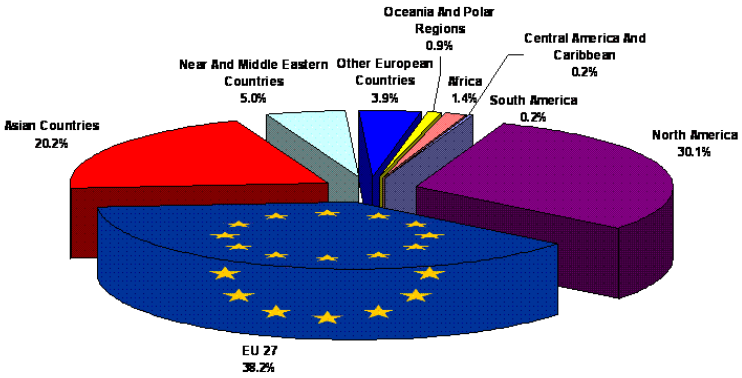
The production and consumption shares presented above are reflected in the export and import figures of honey (Figure 6 and 7 below). These figures also highlight a clear net import balance for the EU, the main importing area in the world (38.2% of the total imported amount of honey), followed by North America (30.1%). In absolute terms, the EU has imported 142 000 tons in 2008 and 146 000 tons in 2011.

Figure 5 Exports share per region in 2010



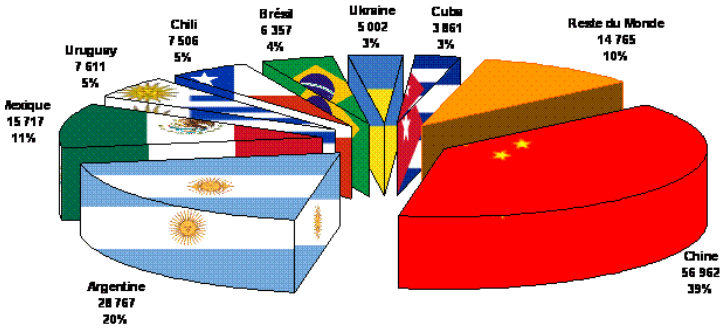
Source: EUROSTAT Comext

Figure 6 Imports share per region in 2010



Source: EUROSTAT Comext

Figure 7 Imports into the EU by country of origin in 2011 (tonnes)



Source: EUROSTAT Comext

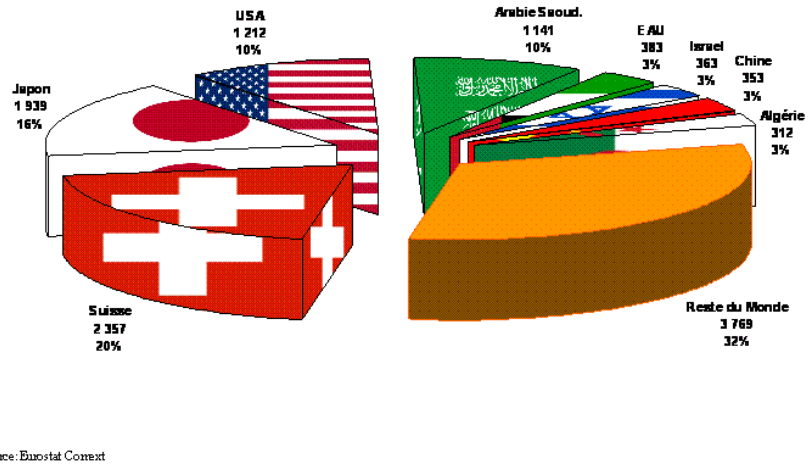
Going further on the description of the honey imports in EU, figure 7 above demonstrates that developing countries together supply 41% of total EU honey imports. Argentina was the traditional leading supplier to the EU. However, the value of supplies from Argentina decreased significantly in the period 2003-2007 and, in 2008 and early 2009, supply volumes

decreased sharply[14]. The Chinese share of EU imports has increased to overtake Argentina in 2010.

Imports are regularly subject to bans from the EU. For example: Chinese honey was banned from 2002 to 2004 because chloramphenicol was found in the honey; in 2011, Chinese, Argentinean and Chilean honey were temporally banned because GMO pollen were found in the honey; in 2007, a ban was imposed on honey from Brazil because no agreement could be made on testing procedures and standards. These bans have huge impacts on international trade and prices.

Despite of being a net importer of honey, Figure 8 below shows that the EU has also a small share of the worldwide exports (3.3%). EU honey is mainly exported to Switzerland (20%), Japan (16%), the USA (10%) and Saudi Arabia (10%). It is interesting to note the significant difference between import prices and export prices. Both prices are rising. In 2011, the average EU import price for honey amounted to €2.08/kg while the average export was €5.04/kg (EUROSTAT data, Comext). This price gap is mainly due to differences in honey quality between exported and imported honey. While imported honey is mostly polyfloral, the EU largely exports monofloral honey.

Figure 8 EU exports by destination country in 2011 (tons)



Source: EUROSTAT Comext

As it will be further analysed in the "EU Production" section, since 2000, the larger growth in EU honey production is to be identified in Central- and Eastern Europe, notably Hungary and Poland. Bulgaria and Romania also increased their production significantly. The accession of these countries to the EU made the EU self-sufficiency rate increase from 54% to 61%[15].

[14] CBI market Survey, The honey and other bees products market in the EU, 2009
[15] http://www.beesfordevelopment.org/portal/article.php?id=1275

Table 1: EU market balance data

	Usable production (1000 t)	Imports (1000 t)	Exports (1000 t)	Population (million)	Consumption (1000 t) (kg/head)		Self-Sufficiency %
2008	200	142	10	495	332	0.6	60.2
2009	203	137	9	499	331	0.6	61.3
2010	224	148	11	501	361	0.7	62.0

Source: data coming from the European Commission Advisory Group on Honey report 2012

Only a few EU countries are completely self-sufficient: Spain, Hungary and Romania. The import of honey is very low in Hungary; its volume is negligible. However over 2/3 of the Hungarian production is exported.

Member States are also trading honey among each other. Germany, Hungary and Spain are leading suppliers of honey. Germany is a major importer and a leading exporter at the same time. The German exports consist both of honey produced in Germany and honey from other countries, meaning export of importing honey. Other exporting countries are Poland, Latvia and Romania. Italy is exporting as much honey as it is importing. Considering only EU trade, the other countries are net importers. The Comext database provides information about the intra-EU trade of honey. Data are missing for several countries, including Germany and Spain. Looking at the results for the year 2012, some main trends can be observed. On average for the EU, export and import prices are similar and are around €3.2/kg. Some countries however export at significant higher price than they import: France, UK and Greece (difference = €1-1.5/kg).

The Spanish case study also provides interesting data to illustrate this section:

Spain has become in the last few years (since 2007) a net exporter of honey. More honey is produced than it is consumed in Spain. This being said, the majority of honey consumed from Spain is imported (while the majority of the national production is exported and consumed abroad). Exports are mainly destined to the EU while imports come mainly from third countries. In 2011, 88.6% of the honey exports went to EU countries, with France and Germany as the main destinations. Outside the EU, Algeria, Morocco and Israel were the most important destinations. On the import side, 75% came from outside the EU. China was by far the largest origin, followed by Argentina. Among other EU countries, Spain imported principally from Portugal, Germany and France.

Table 5 shows the evolution of honey consumption per capita in Spain as well as the level of self-sufficiency (rate of national production vs. national consumption of honey):

Table 5 – Evolution of honey consumption per capita and the self-sufficiency rate in Spain

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Per capita consumption (kg)	0.9	0.8	0.9	0.8	0.8	0.9	0.7	0.8	0.6	0.7	0.7	0.7
Self-sufficiency (%)	84	84.3	82.8	112	102	90.7	84.2	82.7	112	98.8	102	113

Other Market characteristics

Honey production and distribution is subject to the European General Food Law which represents the legislative basic requirements on 'safe food': food safety management systems, rapid alert system, responsibilities within the food supply chain, the application of HACCP and traceability principles as well as requirements about labelling and packaging.

In addition, Directive 2001/110/EC specifies additional requirements applied to honey market which are particularly influencing the trade within and towards the EU: honey definition, the recognition of specific types of honey, composition and labelling requirements.

First of all, the European definition of honey (presented below) is based on the definition provided by the Codex Alimentarius. The most important difference is that it specifies honey as being produced only by one species of bees, *Apis mellifera*. It therefore excludes all type of honeys produced by other species, meaning excluding most types of honey produced in Asia and several types of honey produced in Africa.

***Honey** is the natural sweet substance produced by Apis mellifera bees from the nectar of plants or from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in honeycombs to ripen and mature*[16].

Secondly, the Directive recognises several types of honey, which have been designated with specific product names (honeydew honey, chunk honey, bakers' honey, etc.). Only these types of honey may be placed on the EU market as honey intended for human consumption. The table below presents the designated product names and the three designation criteria: origin, mode of production or presentation. The Directive also defines industrial honey also called bakers' honey.

[16] Directive 2001/110/EC

Designated product names	
According to origin	i) *blossom honey or nectar honey:* obtained from the nectar of plants ii) *honeydew honey:* obtained mainly from excretions of plant sucking insects (*Hemiptera*) on the living part of plants or secretions of living parts of plants
According to mode of production and/or presentation	i) *comb honey*: stored by bees in the cells of freshly built broodless combs or thin comb foundation sheets made solely of beeswax and sold in sealed whole combs or sections of such combs ii) *chunk honey or cut comb in honey*: contains one or more pieces of comb honey iii) *drained honey:* obtained by draining decapped broodless combs iv) *extracted honey*: obtained by centrifuging decapped broodless combs v) *pressed honey:* obtained by pressing broodless combs with or without the application of moderate heat not exceeding 45°C vi) *filtered honey:* obtained by removing foreign inorganic or organic matter in such a way as to result in the significant removal of pollen
Baker's honey	Suitable for industrial use or as an ingredient in other foods which are then processed. Baker's honey may have: • a foreign taste or odour, or • begun to ferment or have fermented, or • been overheated

Honey intended to human consumption also has to comply with composition requirements listed in the same Directive 2001/110/EC. These requirements have been developed for food safety issues and are one of the bases on which importers and producers are analysing honey together with the legislation on maximum levels of residues of pesticides, antibiotics, heavy metals and sulphonamides.

Requirements	
Sugar content	1) Fructose and glucose content (sum of both): • blossom honey not less than 60g/100g • honeydew honey, blends of honeydew honey with blossom honey not less than 45g/100g 2) Sucrose content: • in general not more than 5g/100g • false acacia (*Robinia pseudoacacia*), alfalfa (*Medicago sativa*), Menzies Banksia (*Banksia menziesii*), French honeysuckle (*Hedysarum*), redgum (*Eucalyptus camadulensis*), leatherwood (*Eucryphia lucida, Eucryphia milliganii*), Citrus spp. not more than 10g/100g • lavender (*Lavandula spp.*), borage (*Borago officinalis*) not more than 15g/100g
Moisture content	• in general not more than 20% • heather (*Calluna*) an baker's honey in general not more than 23% • baker's honey from heather (*Calluna*) not more than 25%
Water-insoluble content	• in general not more than 0,1g/100g • pressed honey not more than 0,5g/100g
Electrical conductivity	• honey not listed above, and blends of these honeys not more than 0,8 mS/cm • honeydew and chestnut honey and blends of these except with those listed above not more than 0,8 mS/cm • exceptions: strawberry tree (*Arbutus unedo*), bell heather (*Erica*), eucalyptus, lime (*Tilia spp.*), ling heather (*Calluna vulgaris*), manuka or jelly bush (*leptospermum*), tea tree (*Melaleuca spp.*)
Free acid	• in general not more than 50 milli-equivalents acid per 1000 grams
Diastase activity and hydroxymethylfurfural content (HMF) determined after processing and blending	a) Diastase activity (Schade scale): • in general, except baker's honey not less than 8 • honeys with low natural enzyme content (e.g. citrus honeys) and an HMF content of not more than 15 mg/kg not less than 3 b) Hydroxymethylfurfural content (HMF): • in general, except baker's honey not more than 40 mg/kg (subject to the provisions of (a), second bullet) • honeys of declared origin from regions with tropical climate and blends of these honeys not more than 80 mg/kg

Finally, in addition to general labelling requirements for all food products, the Directive establishes specific requirements for honey intended for human consumption: product names, "intended for cooking" if baker's honey and country of origin.

In addition to these specifics rules at the product level and again for food safety purposes, exports of honey to the EU are restricted to countries which are on the so-called 'third country list'. The list states the non-EU countries which are allowed to export honey to the EU (2012/302/EU). Countries not on the list are not allowed to supply honey to the EU. In order to be on the list, a country should have a Residue Monitoring Plan for the analysis of residues of antibiotics, sulphonamides, pesticides and heavy metals.

The list was updated in the Annex issued on 16 March 2011 (India was removed from the previous list).

The 38 recognised countries are: Argentina, Australia, Brazil, Belize, Cameroun, Canada, Chile, China, Croatia, Cuba, El Salvador, Ethiopia, French Polynesia, Guatemala, Israel, Jamaica, Kyrgyzstan, Macedonia, Mexico, Moldova, Montenegro, New Caledonia, New Zealand, Nicaragua, Pitcairn, Russia, San Marino, Serbia, Switzerland, Tanzania, Taiwan, Thailand, Turkey, Uganda, Ukraine, Uruguay, USA and Zambia.

In addition of being on the list, each batch of honey must be accompanied by a health certificate signed and stamped by an authorised veterinary officer of the national competent authority.

According to several stakeholders, issues about the quality of imported honey do exist despite this requirements framework. Honey can be adulterated by being mixed with sugar and syrup in proportions which are not detectable by current analysis methods. Moreover, it will be further explained later in this report that honey can be over-filtrated to eliminate pollen and destroy all proves of its origin. Some examples are provided in the section dealing with the main threats on the sector.

EU Production

1. Quantitative aspects

This section focuses on EU honey production and first considers quantitatively production factors (beehives and beekeepers) in order to understand better production levels. Data provided by FAOSTAT show a decline in the number of beehives as well as very different trends in honey production among the Member States.

According to the Member States national apiculture programmes for 2011-2013, there are approximately 500 000 beekeepers in the EU, holding around 14 million hives.

The distinction between professional and non-professional beekeepers is a challenging issue because, as pointed out elsewhere in the report, yields, costs and therefore, profitability thresholds are very different from one country to the other.

A threshold of 150 hives has been set in Spain. Following current regulation the same is applied to all EU Member States, which can be considered as quite arbitrary as it does not reflect the factual situation in most Member States. For example, in order to stick better to international situation, the reports published under the COLOSS network consider a beekeeper as professional if he has more than 50 hives. On the other hand family beekeeping

is in fact sometimes non-professional despite the fact that the number of hives exceeds twice the administrative EU threshold mentioned before.

According to the EU definition (>150 hives), around 95% are non-professional beekeepers, who keep approximately 60% of EU hives. Non-professional beekeepers are not exclusively hobby beekeepers because most of them are depending on beekeeping for living while the economic incentive and profit is not usually the primary interest of hobby beekeepers.

Several sources reported that the overall trend for Europe has been a decline in the number of beekeepers[17] since 1965[18]. Related to this fact, the number of beehives has fallen by 25% between 1965 and 2010 in Europe (FAOSTAT data).

The bee colony decline is not uniform around Europe. Indeed, since 1965 the number of bee colonies maintained by beekeepers has decreased in Central and Western Europe while in Mediterranean countries (especially Spain, Greece, Italy and Portugal) a slight increase took place between 1965 and 2005 (according to the figures presented in "Declines of managed honey bees and beekeepers in Europe"[19]). Figure 9 below shows the development of beehives in Europe since 1990.

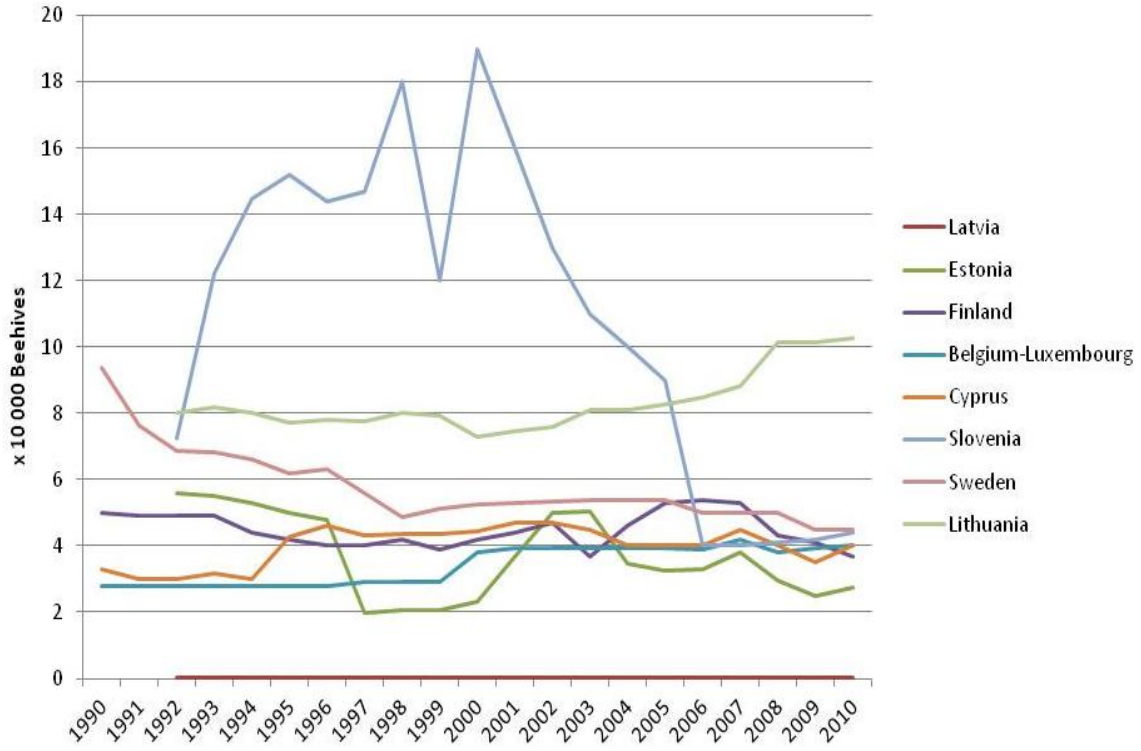
Figure 9: Total number of beehives EU wide since 1990

Source: FAOSTAT, 2010

In order to detail this general trend, Figures 10 and 11 below show two categories of countries: counting less than 100,000 beehives in 2010 and more than 100 000 beehives. They show that trends can be very different from one country to the other and therefore justify the importance of cases study data collection.

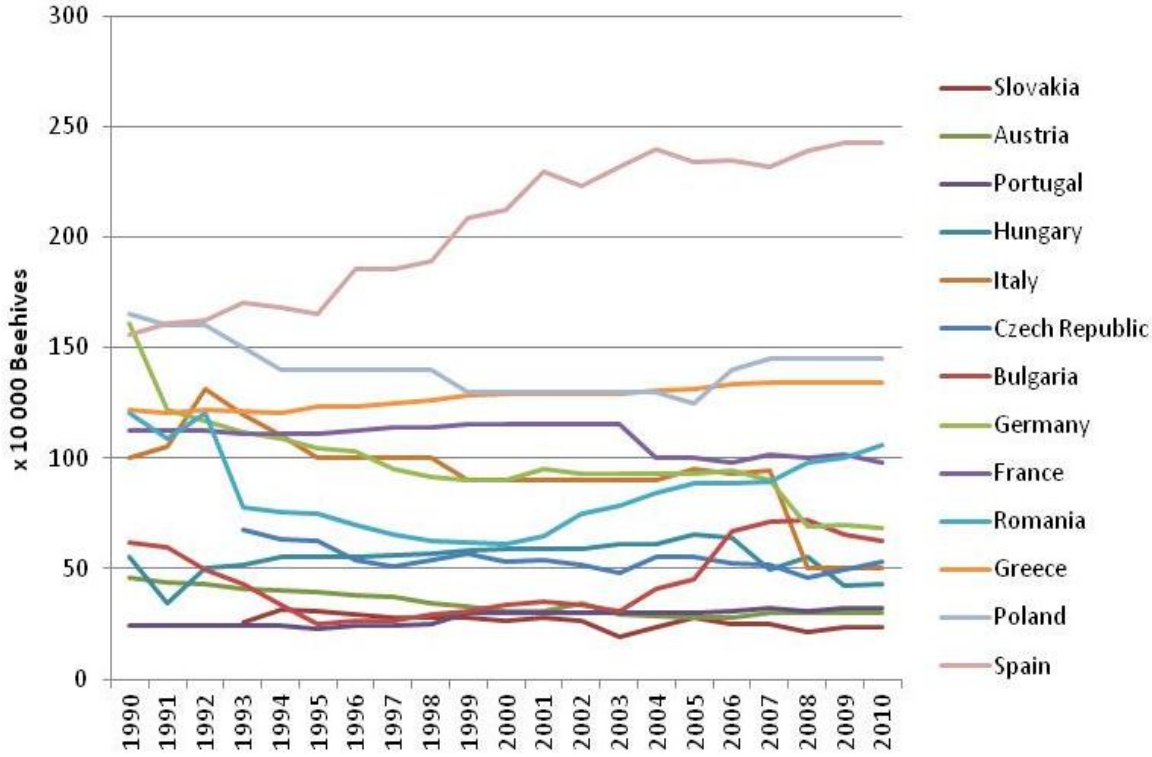
[17] ECPA/ELO/RifCon/E-Sycon, Pollinators and Agriculture, 2011
[18] Figures form 1965 are used in the descriptive part of the report to make it possible to appreciate long-term trends. This also allows a sufficient number of observations for certain statistical test.
[19] Simon G. Potts, Stuart P M Roberts, Robin Dean, Gay Marris, Mike A Brown, Richard Jones, Peter Neumann and Josef Settele, "Declines of managed honey bees and beekeepers in Europe", 2009

Figure 10: Trends in number of beehives in EU countries counting less than 100 000 hives



Source: FAOSTAT, 2010

Figure 11 Trends in number of beehives in EU countries counting more than 100 000 hives

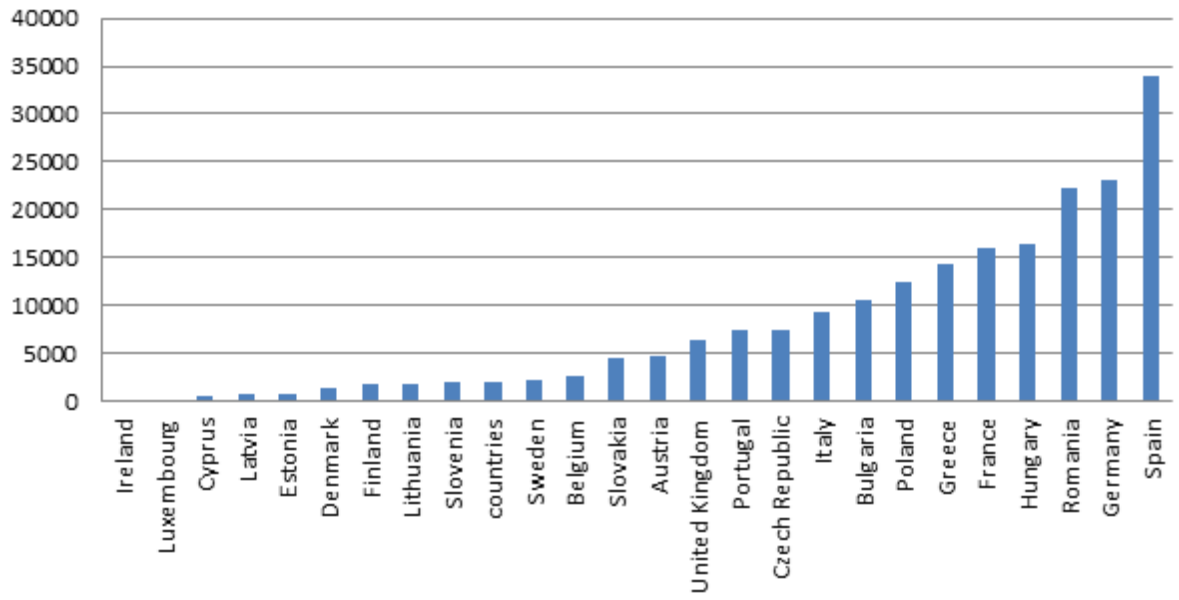


Source: FAOSTAT, 2010

Countries counting more than 100 000 hives are among the major producers of honey in the EU, notably Spain, Germany, Romania, Hungary, France, Greece, Poland, Bulgaria and Italy.

Figure 12 and table 2 below show the amounts produced by country and provide a view of the recent trend in production.

Figure 12: EU Honey production



Source: FAOSTAT, 2010

Table 2: Recent trend in honey production in the EU, in tons

	2000	2005	2010
Luxembourg	122	148	204
Ireland	240	181	170
Latvia	333	916	676
Estonia	334	638	681
Cyprus	750	562	590
Denmark		1 500	1 300
Finland	1 100	2 300	1 700
Belgium	1 460	2 150	2 600
Slovenia	2 300	1 650	1 910
Sweden	2 600	3 301	2 300
United Kingdom	2 870	4 824	6 300
Slovakia	3 493	4 258	4 500
Portugal	4 461	5 686	7 426
Bulgaria	5 337	11 221	10 595
Czech Republic	7 553	8 371	7 455
Poland	8 623	9 955	12 467
Austria	8 700	6 100	4 700
Italy	10 000	13 000	9 400
Romania	11 746	19 200	22 222
Greece	14 356	16 297	14 300
Hungary	15 165	19 714	16 500
France	15 691	15 965	15 974
Germany	20 409	21 232	23 137
Spain	28 860	27 230	34 000
EU	**168 503**	**198 404**	**203 117**

Source: FAOSTAT

Levels of production per farm evidently depend on the number of hives and on the bee health situation but also on a lot of other factors such as the type of hive, the density of bee colonies in the area and availability of proper and healthy habitats and food.

Unfavourable years with low production are not occurring uniformly on EU territory and the figures presented above do not show particular problematic decreases in honey production. For individual countries these adverse situations do however occur, as mentioned in the case studies. In Greece, the particularly hot summer in 2007 together with the fires of the previous years had damaging consequences on beekeeping. According to the special committee formed for this reason by the Greek Agricultural Insurance (ELGA), production decreased in 2007 in comparison to normal levels by: 45% in the North and Central Greece, 50% in South Greece and Ionian Islands and 55% in Aegean Islands and Crete.

As mentioned in the case study on Greece, the country has a high number of bee colonies per beekeeper: 70. As for Hungary, the average number of hives per family has been estimated to 35-40 and in Belgium it has been estimated to 14 hives/beekeeper.

FAOSTAT data allow for calculating average production per hive for several countries. Although slightly different from data reported in the case studies, the results in table 3 show that the highest yields are often observed in Northern countries:

Table 3 : Average production per hive (kg/hive)

Countries	Average honey production
Poland	9
Greece	11
Spain	14
Czech	14
Cyprus	15
Austria	16
France	16
Bulgaria	17
Lithuania	17
Italy	19
Slovakia	19
Romania	21
Portugal	23
Estonia	25
Germany	34
Hungary	38
Slovenia	43
Finland	46
Sweden	51

Source: FAOSTAT, 2010

This variability in yields is due to several differences in the environment (climate, nectar quantities, density of bee colonies, etc.) but also to the variable size and forms of the hives used in each region. For instance, the most extended model of beehive in Spain is the *Layens* model. It has been traditionally prevalent in Spain, particularly as it is easy to handle for transhumance purposes. Layens hives are horizontally arranged. In the Northern area, top bar hive types such as the *Langstroth* (widely used around the world) and the *Dadant* types prevail. These vertically arranged hives facilitate the treatment of hives against diseases without risking that the products employed also affect the honey, and usually produce higher yields. In Greece, beekeepers are using Langstroth hives which technically provides inferior yields compared to Dadant hives because of the shape of the hive and the frames. In Hungary, the majority of beekeepers are using traditional technology (only about 1/3 of the hives can be considered as more modern mobile hives).

In Greece, the case study reports an average yield of 17-20kg/hive and the highest density of hives of Europe (10 colonies/km^2). In the case study for Hungary, the average yield for 2010 has been estimated to be 27.4 kg. In Belgium the observed average yield was rather low in 2012: 17.9 kg/hive. Finally, in Spain, the yield per hive amounted to only 14.0 kg/hive in 2010, representing an increase from 2006 (12.5 kg/hive). This level is however still considerably lower than previous historical levels. To put these figures into historical perspective; during the 1960s the average productivity in Spain was around 20kg/hive (per year).

2. Qualitative aspects

The EU as a whole produces mainly *polyfloral* honey but beekeepers often maximise the production of *monofloral* honey. This is especially possible in some countries such as Hungary which have an environment favourable to monofloral production (see table 4 below). To provide another example, multi-flower honey is the most common variety produced in the large majority of Spanish regions, partly due to transhumance. However, 4 regions out of 17 have specialised honey production: for the same time period, orange-blossom honey was the most produced variety in Murcia and Valencia, while in Cantabria it was heather honey; in Catalonia, the production of monofloral honey includes a range of floral origins including heather, eucalyptus, orange blossom, honeydew and forest. In the Region of Valencia, beekeepers do produce almost 20% of the Spanish production.

Table 4 Ratio of different types of honey in Hungarian production

Ratio of different types of honey in production							
Year	*1999-2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
Ratio	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Rapes	11	19	19	9	18	12	5
Acacia	54	50	32	35	50	40	55
Sunflower	14	11	18	30	12	30	20
Mixed flower	13	9	20	11	11	10	12
Other	8	11	11	15	9	8	8

Source: Hungarian National Beekeeping Program 2010-2013

Research undertaken in the framework of the German case study estimates that 1/3 of German honeys are sold as monofloral honey. The report states that a higher quantity could be sold as monofloral quality if the necessary physico-chemical analysis were not so expensive.

The main monofloral honey produced in the EU is Acacia honey, as the black locust tree from which it is obtained is widely planted in Europe. The main producers of Acacia honey in Europe are Hungary, Bulgaria and Romania, although it is also produced in other EU

countries. Other types are linden blossom, heather, lavender, rosemary, thyme, orange blossom, sunflower and forest honey[20].

In some countries such as Greece, honeydew honey represents the major part of produced honey (namely 70% according to case study data).

Honey attributes such as geographical origin or specified floral origins often lead to a premium price due to their organoleptic or pharmacoactive properties. In addition, the increased importance of quality, integrity, sanitation and nutritional value of honeys also contribute to a rising demand for organic honey. Statistical data to demonstrate these facts are however missing. These will therefore only be illustrated with a few examples based on the case studies and observations.

In the EU, 16 categories of honey have been recognised as *Protected Designation of Origin* and three categories as *Protected Geographical Indication*. One such category comes from Greece: Vanilla FirTree of Mainalo Mountain (PDO). Examples in Spain include three Protected Designations of Origin (Miel de Granada –since 2005-, Miel de Tenerife –since 2005- and Miel de La Alcarria –granted in 2012-) and one Protected Geographical Indication (Miel de Galicia –since 2007-).

The research undertaken in the framework of the German case study mentions an average price for honey around €8/kg, while prices for honeys from specific botanical origin go up to €16/kg. In Hungary, in the case of Acacia honey the characteristic consumer price of one kilogram is around €7-7.5/kg while it is only around €4.5/kg in the case of polyfloral honey. Prices for special quality honey are significantly higher than mixed flower honeys.

The apiculture programmes evaluated here are directly linked to the identification of honey specific properties and therefore to the development of labels, as measure 4 provide facilities for physico-chemical analysis of honey. The analysis presented in the Spanish case study however highlights the application limits existing in relation with geographical designations: as a result of transhumance, it is hard to comply with the rules demanding production in a specific location, according to local characteristics. This is why Autonomous Regions are giving place to a wide array of regional quality certifications; all together, these quality honeys accounted for almost 3% of total honey production in Spain in 2009.

The only data available about prices for all EU countries are coming from FAOSTAT and are not distinguishing specific honey types. For countries in Southern and Eastern Europe, the price varies generally in the range of €1200-2800/ton with the exception of Greece where the price is higher. For Northern European countries the average price is in the range of €3200-5600/ ton, with the exception of UK where the price since 2004 is above €6 400/ton to reach €9600/ton in 2010. For the Western European countries, the price has fluctuated generally between €4800 and €6400/ton in the reference period. The Opera Research Centre's study on bee health has found that accession to the EU of the 10 New Member States in 2004, and the additional two in 2007, has not made any significant impact on these gaps in prices[21].

[20] CBI, The honey and other bee products market in the EU
[21] Opera Research Centre, Bee Health in Europe – Facts and Figures, 2012

Threats for the sector

The main threats facing the sector are linked to honeybee health issues. These will be therefore the main focus of this section after a brief insight on economic considerations.

In this section, it will firstly be highlighted that high and unpredictable rates of colony losses threatens the sustainability of the European production systems.

Concerning bee health issues, there is currently a consensus amongst the scientific community[22] : the causes of colony losses in Europe and USA are multifactorial (combination of factors at one place and different factors involved according to place and period considered). In other words, researchers agree that even if infestation with *Varroa* spp. is one of the major factors, a multi-factorial origin of the observed colony losses is most likely to be the cause for bee mortality. Other factors include a multitude of diseases and parasites, hive management and beekeeping practices, climatic factors, queen health issues, nutritional problems, loss of genetic diversity, and environmental factors such as the structure of modern agricultural landscapes. The critical literature review implemented to provide information to EFSA[23] classifies them into four groups of factors, all considered as probably contributing to colony losses: biological factors, chemical factors, environmental factors and beekeeping practices. This section is structured according to this classification.

Economic causes for the decline of the number of beehives in Europe

This section aims to highlight the simple fact that, despite many factors seriously impacting honeybee health, the number of colonies in some areas is also linked to the number of beekeepers. One example provided by the Opera Research Centre's report on bee health is the dramatic decline in bee colonies in Eastern Europe in the 1990's which occurred because many beekeepers had abandoned their activity because of disappearance of state support.

An overwinter colony loss rate of 10% is usually considered as normal in bee production systems. Higher rates of loss occurring in some areas are causing important economic losses and its unpredictable nature is a source of uncertainty which could limit recruitment of a new generation of beekeepers. The decline in the number of bee colonies can consequently be considered both as a cause and an effect of the decline in the number of beekeepers.

Another element reducing the profitability of the sector is that the price of treating bee diseases has increased to the extent that the cost treatments may equal or exceed the income from a colony for an entire year[24].

The fact that the relative profitability of beekeeping operations is likely to be a major influence on the number of managed colonies has been reported in several reports. However, interviews with stakeholders have confirmed that little or no systematic information can be found on the economic aspects and challenges of beekeeping in Europe. While some national evaluations might be available, there is no comprehensive EU wide study publicly available to evaluate the economic situation of the beekeeping sector. It is therefore difficult to go further in this economic analysis.

[22] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009
[23] EFSA plans to launch an EU-wide collective study on CCD. This requires and EU-wide literature review on the topic and description of active surveillance systems.
[24] Simon G. Potts, Stuart P M Roberts, Robin Dean, Gay Marris, Mike A Brown, Richard Jones, Peter Neumann and Josef Settele, "Declines of managed honey bees and beekeepers in Europe", 2009

Beyond economic threats related to production, several reports mention the existence of marketing difficulties faced by European beekeepers. Among other difficulties, some stakeholders have mentioned the difficulties to compete with the low prices of imported honey. Additionally, the professional European agricultural association COPA COGECA pointed out that the marketing problems that beekeeping is facing in Europe are related to the lack of market information, such as market statistics and forecasts, and to the difficulties in placing the products on the market. The last one is exacerbated by the heterogeneous marketing standards for certain hive products, by unfair practices of adulteration of honey and by residues in hive products.

Biological threats

This section describes pests and diseases that are considered as the most damaging factors to bee colonies. Viruses are the biological agents most frequently mentioned in the scientific literature. This is because a high number of viruses are infecting bees and often co-infecting them. After viruses, varroa, nosema and Acarapis woodi are the three other most commonly mentioned biological factors. American and European foulbrood have been more studied in the past than now[25]. Finally, the recent accidental introduction of the Asian hornet (Vespa *velutina)* into Europe (south-west of France) represents a new threat to pollinators, mainly honeybees. This new problem will therefore also be described briefly.

As for viral pathogens, at least 18 viruses have been identified that affect brood and/or adult honeybees but their full significance remains largely unexplored. Even healthy colonies are usually covertly infected by several viruses. *V. destructor* has been shown to be an important vector for several of these viruses. Likewise, a number of viruses seem to be closely linked to *Nosema* infections. The most well-researched and potentially problematic viruses to date are: Deformed Wing Virus (DWV) Black Queen Cell Virus (BQCV) Israel Acute Paralysis Virus (IAPV). The last is the most frequently mentioned in the scientific literature and sometimes considered as a "marker" of CCD in USA[26].

The parasitic mite *Varroa destructor* is a highly specialised parasite of the honeybee. It reproduces in the brood cell; with a preference for the male brood cell. The male developing cycle is indeed longer and corresponds better to the development cycle of the *Varroa*. Although the mite causes little damage to its original host, the Asian honeybee *Apis cerana,* it has more severe effects for European *Apes mellifera* colonies to which it was transferred more than 30 years ago.

Varroa mite control presents a range of challenges: it has to be timely, efficient, repeatable (often actually repeated several times) and profitable. One of the major problems about *Varroa* mite control is that a lot of chemicals used by beekeepers end up as residues in honey and other bee products. Under the "Technical Assistance measure" in Belgium, a global overview of existing treatments has been distributed to the members of several beekeeping associations[27]. This document gathers results of research and provides information about residues and effectiveness of each treatment. Highly effective treatments were found in the biotechnical, the natural and "delicate synthetic" treatment categories (e.g. heat, powder sugar, oxalic acid). None of the "strong synthetic" treatments reaches the highest level of efficiency. The most effective treatments are therefore also the ones with the lowest level of

[25] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009
[26] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009
[27] Varroase, quels traitements choisir?, CARI 2012 (l'essentiel du programme européen miel)

residues. This observation offers good perspectives regarding the efficiency and residue challenges in *Varroa* control.

In the "Applied research" section of the apiculture programmes, another positive perspective will be dealt with: the genetic selection of *Varroa* resistant bees. There are indeed several tiny populations of European honeybees that survive *Varroa* mites without chemical control. This offers a window of opportunity for further research on the topic.

Nosema fungi are wide-spread microsporidian gut parasites of adult honeybees. Two species have been reported in *Apis mellifera: Nosema apis* and *Nosema ceranae. Nosema apis* is well established in the EU and causing moderated damage. *Nosema ceranae* has recently been introduced into European honeybee population via the apicultural trade around the globe.

Many cases of infection by *Nosema ceranae* have been reported in Spain and a study is being conducted by the Agriculture Centre of Marchamalo in Ciudad Real (Castile-La Mancha), a world-renowned centre, particularly regarding the study of Nosema ceranae, covering 2,000 apicultural holdings spread over the territory of Spain. While other studies had documented the large spread of Nosema in Spain, finding its presence in around 90% of the apiaries analysed, they had not been able to establish a direct link with the mortality of beehives. What had been documented previously, however, was the negative effect of Nosema on treatments against varroa (such treatments proved significantly less effective in beehives with high levels of Nosema parasites). The high colony level virulence of *Nosema ceranae* in Spain may be a regional phenomenon[28]; however, similar preoccupations have emerged in Greece where Nosema infections were associated with average winter losses of 15.8% (3.6% higher than the annual average). Between February 2007 and February 2009, 125 bee samples from the whole country were sent to the Hellenic Institute of Apiculture to be analysed for Nosema infection, providing an idea of the prevalence of the parasite in the country. Almost half of the samples (48%) were collected from apiaries reporting high losses and a high average number of Nosema spores per bee. These apiaries had losses (reported by the beekeepers to the Greek Agricultural Insurance Organisation) ranging from 30 to 50% (Hatjina et al., 2010).

Again, the impact of *Nosema* on bee mortality is not easy to demonstrate as several viruses are associated with *Nosema* infections that can significantly affect the apparent virulence of *Nosema*.

American foulbrood (AFB) and European Foulbrood (EFB) are caused by fungi spores and are two of the most destructive diseases for bee brood. EFB can be treated by antibiotic treatments. AFB being a lot more dangerous, it consequently leads to the destruction of contaminated hives. In most European countries, the legislation requires to report any infection by AFB to Authorities.

After having accidentally been introduced in Europe before 2004, the Asian hornet (Vespa *velutina)* that originated from northern India to the Indochinese Peninsula, Taiwan and Indonesia, seems to have itself well adapted to its new environment and have spread very quickly in France and Spain. This is why the scientific community has concluded it was no longer possible to eradicate it and that further expansion is likely to occur into other European countries where the hornet can find a suitable environment.

Hornets attack honeybee colonies to feed their brood. Vespa *velutina* is characterized by a larger size of nests and colonies; it is therefore more competitive than the two other hornets

[28] Mortiz et al., Research strategies to improve honeybee health in Europe, 2010

species present in Europe (*crabro* and *orientalis*). Its attacks can lead to the death of the bee colony and therefore represents one more serious economic risk for the beekeepers. Efficient defence technics have been observed on several bee species and subspecies (Apis *mellifera cypria*, Apis *florea*, etc.). However, native European honeybees (e.g., mellifera, ligustica, carnica ssp.) may not be able to compete with the new invader, as confirmed by observations made in the field on Apis *mellifera* and Vespa *velutina* in France.

Only a collective strategy based on further research on hornets' biological cycles could succeed in controlling hornet's population. It therefore relies on efficient and timely alert systems. Alert systems should rapidly evolve to take into account the surveillance of the evolution of hornet distribution area and contribute to further field observations. Alert systems should also be designed to help preventing similar intrusion of other damaging species which is currently facilitated by globalization and climate changes.

Chemical threats

The honeybee is unusually sensitive to a range of chemical insecticides, most likely due to a relative deficit of detoxification enzymes. Foraging bees can encounter lethal and sub-lethal pesticide levels when foraging but they can also bring back contaminated nectar and pollen to the hive. In addition to the pesticides the bees are exposed to during foraging, beekeepers also use various acaricides to control mite infections, particularly *Vespa destructor*.

Most of agricultural and apicultural pesticides are lipophilic and accumulate in the wax, increasingly contaminating the combs where the brood develops and where honey is produced.

As for agricultural pesticides, three neonicotinoid insecticides are particularly considered as damageable for bees and pollinators. In March 2012, the European Commission has asked EFSA to assess the risks associated with the use of clothianidin, imidacloprid and thiamethoxam as seed treatment or as granules. Results published in January 2013 conclude that risks do exist but for some of the uses authorised in the EU, it was not possible to conclude because of the existence of a number of data gaps that would have to be filled to allow further evaluation. The recent opinions published by EFSA's Panel on Plant Protection Products and their Residues therefore recommend a much more comprehensive risk assessment for bees in the pesticides registration procedures and also introduced a higher level of scrutiny for interpretation of field studies. Until now, the EU directive 91/414 Section 2.5.3 regulates the use of pesticides in the context of apiculture:

". . . no authorization will be granted if the hazard quotients for oral or contact exposure of honeybees are greater than 50, unless it is clearly established through appropriate risk assessment that under field conditions there are no unacceptable effects on honeybee larvae, honeybee behaviour, or colony survival and development after the use of plant protections product according to the proposed conditions of use".

In 2008 and 2009 several Member States reported accidental releases of clothianidin, thiamethoxam, fipronil and imidacloprid, resulting in substantial losses of honey bee colonies. For example, the Greek case study reports colony losses during the spring and summer of 2008 (approximately 3-6%), thought to be due to plant protection products. Of these, 70% occurred on cotton fields, where imidacloprid is sprayed or used as a seed dressing.

The Commission started implementing measures by reinforcing in Commission Directive 2010/21/EU the conditions for the placing on the market and the use of those active

substances. Furthermore, this Directive requires Member States to initiate specific monitoring programmes to verify the real exposure of honeybees to those active substances.

EFSA is now developing a guidance document for the risk assessment of plant protection products and bees[29]. The aim is to adapt the Directive mentioned above in order to impose more comprehensive tests in the procedure preceding approval of pesticides.

In March 2013, the European Commission has responded to the last EFSA report published in January 2013 submitting a proposition for a ban on three pesticides (neonicotinoids (NNI) - clothianidin, imidacloprid and thiametoxam) to Member States' experts meeting at a Standing Committee on the Food Chain and Animal Health. The European Council decided in April 2013 to impose a temporary ban of the three neonicotinoid insecticides to be reviewed after two years.

Pesticides can cause acute mortality which is easily diagnosed by the presence of many dead bees in front of the hive. In other cases, lethal effects of pesticides can induce slow mortality which is more difficult to detect. Furthermore, pesticides are also affecting longevity or behaviour and such sub-lethal effects can cause disruptions in social interactions that are essential for colony function and productivity. These are also more difficult to detect.

In addition, a study undertaken within the BEE DOC research network[30] highlights that nothing was known yet about the interactions between agricultural pesticides foraged on by bees, the acaricides applied by the beekeeper, and pests and pathogens.

For example, since many pathogens have similar sub-lethal effects on longevity and behaviour, the cumulative impact of different sub-lethal effects may be significant at colony level, even when they are not immediately apparent when studied in isolation, and at individual bee level.

Even though, as described above, measures are currently undertaken to monitor and prevent adverse effects of some pesticides (neonicotinoids), there is such a wide range of agro-chemicals currently used in agriculture that it is clearly impossible to implement experiments to test the effects and interactions of all of those compounds.

For example the BEE DOC research network will focus only on two major compounds, one neonicotinoid agro-pesticide, thiacloprid, and one pyrethroid acaricide, τ-fluvalinate. Thiacloprid and τ-fluvalinate therefore represent the two most important and common pesticide groups (pyrethroids and neonicotinoids) with different modes of action on the target organisms[31].

The fact that only acute mortality is easily diagnosed allows for using the argument of weak correlation between the use of pesticides and colony losses to maintain the use of most products. Among others, the Opera Research Centre's study[32] considers that none of the pesticide-related bee monitoring in real-life conditions of use have, so far, found a clear connection between bee colony mortality as a general phenomenon and the exposure of bees to the pesticides.

The divergence of opinions and the knowledge limits reflected in the above paragraphs illustrates why the issue of the effect of pesticides on bee colonies decline is really

[29] http://www.efsa.europa.eu/en/press/news/130116.htm
[30] Mortiz et al., Research strategies to improve honeybee health in Europe, 2010
[31] Mortiz et al., Research strategies to improve honeybee health in Europe, 2010
[32] Opera Research Centre, Bee Health in Europe – Facts and Figures, 2011

controversial. There is a lack of objective data and conclusions of the studies carried out so far are not always straightforward. Among others this is why a lot of stakeholders are insisting for a better application of the precaution principle and several are pointing out the lack of independence of the reference expertise bodies and individual experts on the topic. The effect of pesticides on bee mortality will not be further analysed in this report as it is not directly linked to the evaluation scope.

Environmental threats

The above sections have already pointed out concerns about the decline of honeybee colonies in many EU regions. In addition to the potential factors previously described, environmental threats do contribute to honeybee and wild pollinators decline. The anthropogenic degradation of the environment indeed induces the disappearance of appropriate habitats providing healthy food and shelter for pollinators. As already explained, it is often difficult to determine the causes and the consequences of pollinators decline. However, for all pollinators, especially wild bees, the composition of landscapes and the availability of suitable habitats are key factors influencing the survival and the development of bee populations (Potts et al., 2010). The importance of environmental quality in maintaining colonies in a high health status has been confirmed by pesticides post registration and multifactorial studies.

The two main environmental factors of bee decline mentioned in the literature are the role of climate and the incidence of the lack of biodiversity (both on a qualitative and a quantitative way)[33]. Cropping regimes and land management have therefore a significant impact on pollinators decline. Indeed, a communication of the European Commission[34] highlights that there is growing scientific evidence that bees which have access to a mixture of pollen from different plants are healthier than those fed only with one type of pollen and that an environment with sufficient biodiversity is critical for bee health.

In several reports[35], it is recommended to use multifunctional landscaping and active management of the areas adjacent to the cropped fields, to provide additional food and habitat resources for pollinators. They are recommending the connection of habitats by the management of flower strips, the provision of nesting sites for wild bees (dead wood, etc.), the application of crop rotation using flowering plants in intensified uniform agricultural landscapes, etc.

Without entering in the above mentioned debate on effects of pesticides, if this kind of measures should actually ensure resources to pollinators, areas adjacent to cropped fields are also contaminated by pesticides and would therefore contribute to increase residues in beehive products and undesired effects on pollinators. This kind of measures should therefore be promoted in pesticide free areas or when the harmlessness of registered pesticides has been proven for animal and human health.

With respect to its multiple impacts on the quality of environment, agriculture plays an important role in the preservation of pollinators on which a large number of crops depend on. This is why a growing number of governments recognize the need to include ecosystem services in economic accounts. The importance of the pollination services and the need for

[33] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009
[34] COM(2010) 714 Final
[35] Among others: ECPA/ELO/RifCon/E-Sycon, Pollinators and Agriculture, 2011, Klein et al., Importance of pollinators in changing landscapes for world agriculture, 2007, Opera Research Centre, Bee Health in Europe – Facts and Figures, 2011

their valuation is largely discussed in the section about the opportunities for the sector (next section).

Beekeeping and processing practices

Beekeeping practices themselves are considered as possibilities of "opening the door" to biological agents and thus contributing to the appearance of colony losses. Apiary management, nutrition and migration conditions as well as sanitary treatments can stress the colonies. Moreover the use of inappropriate treatment measures are influencing the levels of pathogen infestation in colonies and is therefore often suspected to contribute to colony losses. However, none of the factors related to beekeeping practices have been proven to be linked to events of colony losses tackled in the scientific papers analysed in the framework of the Scientific Report submitted to EFSA on Bee Mortality and Bee Surveillance in Europe[36].

From a totally different perspective, another threat for the sector is induced by processing practices leading to adulterated forms of honey. Adulteration generally consists in adding cheaper similar substances to honey or in pushing thermic treatments too far.

Honey adulteration is a complex problem which has undeniable nutritional and organoleptic consequences but which is usually not injurious for health. The main problem of honey adulteration is the significant economic impacts it induces. Adulterated forms of honey are competing with quality products, pushing prices down. Compulsory analysis undertaken before commercialization should help to highlight honey quality and to fix the prices objectively. Several stakeholders however complain about the competition of adulterated honey on the market. European beekeepers are especially suspicious about imported honey but importers are on their side guaranteeing importing honey respects the same quality criteria as European honeys.

The issue of adulteration of honey also impacts the demand, inducing suspicious behaviours from consumers. Suspicion can be justified or not but in every case it kills consumers' confidence. For example, in several countries, although it is not true, the belief that crystallisation of honey is a sign of adulteration can be widely spread.

Opportunities for the sector

Opportunities for the sector encompass ways to reduce the above mentioned threats (monitoring systems, applied research) but also take into account other solutions to increase the profitability of apiculture. This section will therefore present the importance of bees in terms of pollination as well as the foreseen opportunities related to commercialisation of other beehive products.

[36] CFP/EFSA/AMU/2008/02. Accepted for Publication on 03 December 2009

The role of the bees in pollination

Biotic pollination is the result of the movement of pollen by living organisms; it is the most common form of pollination and accounts for an estimated 90% of pollination of all flowering plants[37]. Several of Earth's animal families have developed pollination capacities and specialisation; not only insects, but in Europe, only insects act as pollinators.

When wild bees do not visit agricultural fields, managed honey bee hives are often the only solution for farmers to ensure crop pollination. Indeed, *Apis mellifera* remains the most economically valuable pollinator of crop monocultures worldwide.

It is estimated that 35% of the human food consumption depends directly or indirectly on insect mediated pollination: for 87 out of 115 leading global crops, fruit or seed numbers or quality were increased through animal pollination[38]. In the US, the pollination services are a source of income for many professional beekeepers, e.g. in almond pollination, the cost of renting a single honey bee colony increased from $35 in the early 1990's to $150 in 2007 due to honey bee health problems. In the EU it far less common that beekeepers are paid for pollination services.

Pursuing with economic considerations, several estimations of the value of crop pollination by animal pollinators are presented in the next paragraph. However, there is still no generally accepted valuation method to measure this positive externality.

In 2005, for the then 15 members of the EU, the total added value to crops due to pollination services has been estimated at €14.2 billion (€22 billion in 2006 according to TEEB report, 2010) while the direct value of the honey produced annually by the bee industry in the EU is about €140 million (calculated from producer prices). In their study, Gallai et al.[39] demonstrate that the total economic value of pollination by honeybee colonies worldwide amounted to €153 billion in 2005 and the Millennium Ecosystem Assessment project estimates the global annual monetary value of pollination to be many hundreds of billions of dollars.[40] Gallai et al. have based their valuation on a bioeconomic approach which integrated the production dependence ratio on pollinators for 100 crops used directly for human food worldwide. To complete their conclusion, additional calculations show that the production of three crops categories whose yields are particularly sensitive to adequate pollination (fruits, vegetables and stimulants) will be clearly below the current consumption level at the world scale after pollinator loss.

Some will claim underestimation of the value presented here for not taking into account costs of health problems engendered by the lack of nutritional food, others will claim overestimation for not subtracting the cost of inputs from the value of pollination.

The objective here is not to find the most uncontroversial value but to show that research is done to raise awareness of the dependence of our natural and artificial ecosystems on pollinators. The multiplication of research on pollination services valuation also respond to the growing demand from governments to include their value in decision making. However, from a more general point of view, the value of insect pollination to biodiversity is simply inestimable. In light of the constant decline of wild non-honeybee pollinators, the importance

[37] ECPA/ELO/RifCon/E-Sycon, Pollinators and Agriculture, 2011
[38] Klein et al.," Importance of pollinators in changing landscapes for world crops", 2007
[39] Nicola Gallai, Jean-Michel Salles, Josef Settele, Bernard E. Vaissière, « Economic valuation of the vulnerability of the world agriculture confronted with pollinator decline », 2008
[40] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009

of beekeepers and managed bees is greater today than ever.[41] Other authors will say that given current declines in populations of managed honeybees, and abandonment of beekeeping in regions affected by "Africanisation" of honeybees, the importance of wild pollination is likely to increase[42].

In order to provide a more detailed point of view, some studies tried to differentiate the pollination service provided by wild pollinators from the service provided by managed honeybees; the results of two of them are described here. The first one[43] shows that native bees provide 62% of the pollen deposited on female watermelon flowers while honeybees only provide 38%. The results of the second study, which has surveyed 41 crops in 600 fields from different regions of the world, shows that wild pollinators tend to perform better than honeybees in contributing to increased fruits yields. The study also concludes that high abundance of managed honey bees supplemented, rather than substituted for, pollination by wild insects[44].While there are claims that managed bees can be competitors with wild non-honeybee pollinators and even drive their decline, others will say that the service provided by wild insects is enhanced by the presence of managed honeybees. Since biodiversity losses contribute to the decline of both wild insects and managed bees, it may not be of first importance to determine each contribution before undertaking actions to protect pollinators.

Being aware of the economic importance of biodiversity, the European Commission has set up a number of initiatives that are relevant for the apiculture sector, such as the *EU Biodiversity Strategy to 2020*. The latter promotes the full implementation of EU nature legislation to protect biodiversity, better protection for ecosystems and more use of green infrastructure, more sustainable agriculture and forestry, better management of fish stocks, tighter controls on invasive alien species and a bigger EU contribution to averting global biodiversity loss.

The important points in the framework of the present evaluation is that the valuation of pollination services can help in establishing a fair remuneration to beekeepers and that pollination services on specific crops such as rape or orange orchards provide the production of monofloral honey with higher value-added. This is also why remuneration of pollination services is not automatically occurring at the same level. In the USA, transhumance of hives in widely used for pollination of almond crops from which bees do nearly not harvest nectar, the production losses of the beekeepers have therefore to be more compensated. In France, when this system of pollination is used on rape crops, beekeepers can harvest a particularly tasty and creamy honey that meets strong demand from consumers. The beekeepers do not encounter any losses and are therefore not remunerated. In Germany, the fee paid to beekeepers varies between €20/colony in oilseed rape crops to €50/colony in orchards. In Greece, because of the high density of honey bee colonies there is high availability of honey bees for pollination purposes all year round and no need for farmers to rent hives for pollination purposes. In Spain, according to the latest data published by the Ministry of Agriculture, in April 2012 there were, out of 24 230 beekeeping holdings, a total of 322 apicultural holdings dedicated mainly to pollination (i.e., pollination was their principal activity).

[41] Mortiz et al., Research strategies to improve honeybee health in Europe, 2010
[42] TEEB report, 2010
[43] Winfree et al., Valuing pollination services to agriculture, 2011
[44] Garibaldi et al., Wild Pollinators Enhance Fruit Set of Crops Regardless of Honey Bee Abundance, 2013

Existing monitoring systems

The availability of reliable data sets is necessary to demonstrate and quantify bee colony decline as well as to identify its causes and solutions. From 2003, several research projects have been launched worldwide to study the decline of pollinators. Examples of non-concluding results for the existence of important data gaps are numerous and usually provide recommendations for the adoption of standardised methodologies for surveys, standardised criteria and protocols to assign actual or probable causes of loss and the development of coordinated research program.

The COLOSS network, to be presented in the next section, has been created to improve knowledge and prevent large scale losses of honey bee colonies taking these recommendations into account. As part of the process, international standards are developed for the monitoring.

In order to prepare an EU-wide collective study on bee mortality, EFSA has decided to launch a project targeted on the assessment of existing surveillance systems[45]. A survey established on the basis of the Surveillance Network Analysis Tool (SNAT) has been directed to each European country; 25 questionnaires from 24 countries have been collected. The answers allow describing and critically analysing the existing monitoring systems, it is interesting in the framework of this evaluation to take into account the fact that existing monitoring systems should be improved in order to provide data to better identify the mechanisms of colony losses and to develop adequate solutions. This is why some results of the study undertaken for EFSA are presented here.

Two countries with no surveillance systems have not completed the questionnaire: Portugal and the Republic of Ireland. Some interesting results presented in the report are:

- half of the systems still have room for improvement in the important area of the relevance of their surveillance objectives;
- the majority of pests and diseases targeted by the surveillance systems are notifiable, for example AFB, EFB, Tropilaelaps spp., and the Small hive beetle (Aethina tumida). Other pathologies such as Varroasis, Acarapisosis or Nosemosis are also monitored in a high proportion;
- less than half of the systems were found to have a steering committee, which is an important decision making level in the monitoring;
- most of the surveillance systems appear to have a small human resources input;
- only around 30% of systems were found to have dedicated field agents or provincial units;
- over one third of surveillance systems covered by this study were found to have no laboratory facilities to support them;
- the majority of surveillance systems lack a consistent definition of what constitutes colony losses;
- the level of training for field staff is very low: only 14% of surveillance systems implementing it;
- only six systems do generate representative data: Germany, Denmark, Finland, England and Wales, Italy and Sweden.

[45] Hendrikx et al., Scientific report submitted to EFSA « Bee mortality and bee surveillance in Europe », December 2009

The European Commission has published a thematic Communication on Honeybee Health in 2010[46] setting up or financing a number of initiatives on a wide range of areas influencing bee health (most of which are described in the other sections). For instance, the *Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail (ANSES)* has been designated as the EU reference laboratory in the field of bee health. The main task is to implement a pilot monitoring project over the EU to assess the situation and then to propose a framework for the implementation of a harmonized monitoring system. A concrete monitoring project involving 17 European countries has been launched by ANSES. In Belgium, it is implemented through AFSCA and involves beekeepers who receive a dedicated training program. This partnership is promising in terms of standardization of data and improvement of the relations between beekeepers and the controlling agency.

Applied research perspectives

Looking at what has been described above, research results on control of Varroasis and investigations on the causing factors of pollinators decline should help reducing crucial knowledge gaps and therefore contribute to the sustainability of the apiculture sector in Europe.

This section first presents the recent research developments at EU level and then, focuses on Varroa control and on the importance of better understanding the interactions between pollinators and agriculture. It finally deals with research efforts regarding the characterisation of honey.

Key knowledge gaps in the research on pollinators have been identified and addressed by the scientific community in different projects. In addition to the difficulty to gather evidence to pollinator decline, the problems lie in the fact that the causes for colony death are not only multi-factorial but also interacting with each other. This current consensus justifies the complexity of the problem and the lack of clear results from research implemented at individual country level. Recent developments at EU and international levels, especially the creation of research networks on the topic try to provide answers. For instance, the COLOSS network has been set up by the EU to standardize and use inter-regional data in order to improve detection, further understanding, and mitigation of the drivers of colony losses and losses of bees.

1. Recent development at EU level

Long-term research efforts have been focused on developing ways to manage landscapes to safeguard pollinators and allow them to continue to provide pollination services, which benefit everyone. To meet these goals, there are several large-scale global research programs, including projects specific to pollinator research and many more on biodiversity and climate change impacts.

On top of the applied research programmes co-funded by the apiculture support measures, a number of basic and fundamental research projects related to bees have been financed by the EU. The bee-related projects funded by DG RTD include:

- ALARM (Assessing Large-scale Environmental Risks for Biodiversity with Tested Methods) *(FP6)*: the ALARM project quantified the declines in European wild bees

[46] COM(2010) 714 final

and other insect pollinators. It also assessed the drivers responsible for the observed losses of bees, including habitat loss, fragmentation, pesticides, invasive species and climate change. It was carried out between 2004 and 2009 and counted with a budget of €12 million.

- BRAVE (Bee Research and Virology in Europe) *(SSA FP6)*: running on a budget of €0,9 million and conducted in 2009, the BRAVE project intended to assess the level of risk and the likely consequences for honeybees and other closely related pollinators of the introduction of bee viruses to European colonies of honeybees and ecosystems. It also aimed at knowledge transfer between experts with a broad base of skills in insect virology, diagnosis, immunology, epidemiology, international trade and risk management, along with scientists involved in fundamental and applied research on bees and related pollinator species. Two meetings were held in 2005 in France (Sophia-Antipolis and Tortour), producing as a result the book "Virology and the Honey Bee".
- BEE-SHOP[47] *(IP FP6):* The main goal of BEE SHOP was to reduce potential sources of honey contamination due to both foraging contaminated nectar and chemotherapy of honeybee diseases. As such, it addressed specific issues related to honey contamination by pesticides and treatments used to combat pests and pathogens in the hive. The project produced a manual for beekeepers on the best husbandry practices to preserve the hygiene of the hive and a number of outcomes on the potential to increase bee resistance to viruses and parasites. It was conducted between 2006 and 2009 with a budget of €1,8 million.
- Bee DOC[48] (Bees in Europe and the Decline of honey bee colonies,) *(CP FP7)*: The BEE DOC research project comprises a network of eleven partners from honeybee pathology, chemistry, genetics and apicultural extension aiming to improve colony health of honeybees. The aim of BEE DOC is to empirically and experimentally fill knowledge gaps in honeybee pests and diseases, including the 'colony collapse disorder' and quantify the impact of interactions between parasites, pathogens and pesticides on honeybee mortality. In particular interactions affecting individual bees and colonies are studied through several models: two model parasites (*Nosema* and *Varroa* mites), three model viruses (Deformed Wing Virus, Black Queen Cell Virus, Israel Acute Paralysis Virus) and two model pesticides (thiacloprid, t-fluvalinate). The project started in 2010 and is scheduled to end in 2013. Its budget is €1,8 million.
- CLEANHIVE *(FP7 (SME))*: The objective of the project was to develop an efficient and cost-effective tool for the detection and identification of both Nosema species under field conditions to stop the spread of Nosema ceranae. It was based on studies linking Nosema ceranae to deaths of large amounts of bees, and on the spread of the pathogen (initially restricted to Asiatic bees). The project, developed from 2008 to 2012, was endowed with a €2,4 million budget.
- DISCONTOOLS (Disease control tools for varroa) *(FP7)*: The DISCONTOOLS project is a joint initiative of industry and a wide range of stakeholders including the research community, regulators, users and others. It aims, inter alia, at improving the tools for the detection, diagnosis and treatment of varroasis. It should also provide a mechanism for focusing and prioritising research that ultimately delivers new and

[47] http://www2.biologie.uni-halle.de/zool/mol_ecol/bee-shop/index.html
[48] http://www.bee-doc.eu/

improved vaccines, pharmaceuticals and diagnostic tests. The project started the 1st of March 2008 with an expected life of five years.

- SWARMONITOR *(FP7 (SME))*: started in 2012 and scheduled to end in October 2015, the project aims to develop a monitoring tool capable of detecting changes in honey bee activity within the beehive for the effective management of bees. The tool would allow beekeepers to remotely diagnose colony status without the invasive opening of hives for physical inspection. Several benefits for both small and hobby beekeepers, on one hand, and commercial beekeepers, on the other hand, could stem from the project. €1,4 million out of the expected total cost of €1,8 million are funded by the EU.
- The International Research Network COLOSS *(COST action)*: The COLOSS network (Prevention of Honey Bee Colony LOSSes), created in 2008, consists of 150 partners in 41 countries. It has been formed by honey bee experts from Europe and the USA and is now one of the main initiatives implemented to prevent large scale losses of honeybee colonies. In June 2008 COLOSS obtained four years support from the EU and was designed as COST Action FA0803 – COLOSS. A common questionnaire was designed and data is collected on this basis in several regions: Europe, USA, China, This work is organised around four working groups focusing on: i) monitoring and diagnosis; ii) pests and pathogens; iii) environment and beekeeping; and iv) diversity and vitality.[49] At present this network is not financed by the EU anymore. The experts however continue to meet each other and are trying to find new financing sources to continue their research and their work on data standardisation.
- STEP[50] (Status and Trends of European Pollinators) *(FP7)*: based on the work of the ALRM project, STEP is an on-going project that is assessing the impacts that pollinator declines are having on agriculture, biodiversity and the wider society. The project is developing mitigation strategies to ensure pollinators are protected and managed for sustainable pollination services. STEP should provide evidence to help adapt existing policies and management practices and also develop novel policies where needed. The project started in 2010 and will end in 2015. It has a budget of €3,5 million.

2. Focus on Varroa

The parasitic Varroa mite remains the main cause of colony health problems, and it is generally accepted that more could be done to control the impact of the mite on European bee hives. There are already several tools at the disposal of beekeepers, such as synthetic and natural chemical treatments, including modern application technologies where developments are on-going. The physical removal of heavily infested (often drone) cells is a common intervention.

In its study on Pollinators and Agriculture[51], ECPA considers continued research and development of chemical treatments as a realistic option for future improvements in Varroa management. It also insists on the necessary precise monitoring of the Varroa infestation rate by the beekeepers.

[49] Opera Research Center, Bee Health in Europe – Facts and Figures, 2011
[50] http://www.step-project.net/
[51] ECPA/ELO/RifCon/E-Sycon, Pollinators and Agriculture, 2011

However, even with proper management it is impossible to keep apiaries 100% free from Varroa mites. Nevertheless, some strategies have been proven to be successful, the most efficient being collective action within an entire area with coinciding treatments, but require extensive knowledge in order to manage the possibilities and limitations of the different treatments. This statement confirms the importance of having a precise monitoring basis in order to organise effective collective action.

Another solution being studied and often considered as ideal is the honeybee selection towards Varroa resistance. This has been recognised as a relevant selection criterion in most European bee breeding programs.

The rich variety of native honeybee subspecies and ecotypes in Europe offers a good genetic resource for selection towards *Varroa* resistance. There are some examples of mite resistance that have developed as a consequence of natural selection in wild and managed European populations. However, most colonies are influenced by selective breeding and are intensively managed, including the regular use of miticides[52].

In Belgium, a group of beekeepers is trying to stabilize the Varroa Sensitive Hygiene related genes in the local bee genome. An American laboratory [53] has indeed bred bees that hygienically remove mite-infested pupae from capped worker brood. This ability is called varroa sensitive hygiene, and bees expressing high levels of this behaviour are called VSH bees. According several beekeepers, this kind of selection can be very promising.

In most European countries, selection and breeding activities are mainly realised by numerous small-scale beekeepers with or without the support governmental institutions. In most countries, specialised bee-breeding associations have been formed, and selection guidelines have been compiled by beekeeper associations and governmental authorities to coordinate activities.

Most breeding programs use pure subspecies and are oriented towards preserving and improving local populations. Recently, significant progress has been achieved by establishing a genetic evaluation of performance test data, based on a BLUP animal model adapted to the peculiarities of honey bee genetics and reproduction[54].

The European Commission has recently launched a call for projects aiming to understand natural resistance mechanisms to infectious and parasitic diseases (varroa as a parasite and a virus vector) in honey bees (new call KBBE.2013.1.3-02: Sustainable apiculture and conservation of honey bee genetic diversity). Moreover, this kind of research is also one of the fields that was dealt with in the past in the framework of the COLOSS network.

[52] Büchler et al., Breeding for resistance to *Varroa destructor* in Europe, 2010 (COLOSS network)
[53] USDA-ARS Baton Rouge Bee Lab
[54] Büchler et al., Breeding for resistance to *Varroa destructor* in Europe, 2010 (COLOSS network)

3. Research on qualitative properties of honey

In the framework of the evaluation, it is also important to deal with applied research implemented with the aim to better identify and highlight specific honey properties. It has been observed that honey of particular botanical origin or containing higher poly-phenols rates can be sold at higher prices. In Belgium, within the framework of the measure on applied research, two projects have been emphasised:

1) Infra-red analysis to specify botanical origin

2) Poly-phenols content to differentiation of products

By facilitating physico-chemical analysis of honey, apiculture measure 4 has also contributed to the creation of labels in Germany, Luxembourg, Poland, Czech Republic and Slovenia.

Diversification perspectives

By diversification, we mean here, production and marketing of other apiculture products. In Spain, the official registry, on which registration is mandatory to benefit from any aid or publicly funded programme, distinguishes four main types of beekeeping holdings depending on their predominant activities: production of apiculture products; selection and breeding of queen bees; pollination; mixed (when the holding is alternate with similar importance more than one of the previously mentioned activities). There is also a category of "other", for those whose main activity does not fit into the previous categories, and a residual category of beekeeping holdings "without classification". Detailed statistics on beekeepers' specialisation, however, do not exist in other EU countries.

1. Trade of live bees

In terms of intra-community trade, the general conditions that apply to 'other' live animals also apply to bees. Hence consignment of bees must conform to the general animal health conditions laid down in Council Directive 92/65/EC before they can be traded in the EU. The Directive also lays down a model health certificate for bees which must be completed by the competent authority to signify that the health conditions as laid down in the Directive are met. This certificate must accompany consignments of bees when they enter intra-community trade within the EU.

Among others rules includes the verification about the origin of the bees. It should

- come from an area not subject to an American foulbrood prohibition order;
- come from an area of at least 100km radius which is not subject to restrictions associated with the suspicion or confirmed occurrence of the small hive beetle or the Tropilaelaps mite;
- as well as their packaging, have undergone a visual examination to detect the occurrence of the small hive beetle or other infestations affecting bees.

More recently, the European Commission has set up a new animal health strategy for the European Union. It provides a harmonised framework to update the animal disease control. It aims to replace existing series of linked and interrelated policy actions by a single policy framework. One of the objectives is to involve stakeholders, encourage risk-reducing behaviour from all parties and better identify responsibilities to implement sound compensation schemes. The implementation of this strategy could theoretically lead to changes in regulations related to trade and import of live bees.

Comext database for 2012 shows that very few countries are active in intra-EU trade of live bees: France, UK, Hungary, The Netherlands, Portugal and Slovenia are importing bees while Sweden does import and export live bees. FAOSTAT data about intra-EU trade of live bees shows an increase of about 9% in the number of traded consignments from 2012 compared to 2006. This is however not totally due to an increase in trade but also to better compliance in registration.

About extra-EU trade, it is also important to note that import of bee colonies or swarms in the EU is prohibited and bee import is limited to cages containing one queen with 20 accompanying bees. Regulation 206/2010, article 7, sets the general conditions for the introduction into the Union of certain species of bees. Only Apis mellifera and Bombus spp. can be imported from countries listed in Annex II part I of the above mentioned regulation.

These rules designed for animal health reasons do not impede movements of subspecies which can be considered as damaging in general because the hybrid generations of bees do often loose desired characteristics. This is why Member States do implement specific rules for the conservation of local subspecies:

- Italy has laws to protect the local subspecies (Apis mellifera ligustica).
- Slovenia has a specific line in the act officialising its adherence to EU to preserve their native bee subspecies Apis mellifera carnica. This bee itself is of high value and the program, via measure1 (technical assistance), is contributed to its preservation.

According to the results of interviews, trade of live bees offers opportunities to secure profitability of apiculture businesses: the production of swarms is directly linked to the necessity of restocking and queen breeding activities are targeted towards more resistant and adapted bees. Rules on trading have been settled to preserve animal health. If well organised, trade of live bees at regional level can also contribute to spread selected bees resistant to Varroa and other pathogens.

It should be always borne in mind when trading live bees that it should always take hybridisation risks with the local subspecies living in the introduction area. Each type of bee is good for a certain environment, but not for others. The problem has been often highlighted in case studies and interviews. In Greece for instance, the importation of queens from other races jeopardises the conservation of the characteristics of the local populations.

In Spain, beekeepers usually breed their own bees; beekeepers dedicated to breeding are therefore very scarce. As evidence, according to the latest data published by the Ministry of Agriculture, of the 24 230 apiculture holding registered in Spain in April 2012, only 37 were dedicated to the selection and breeding of bees. This figure has been stable in the last three years after a big drop in 2010 (the number of breeding holdings fell from a total of 83 in 2009 (52 were located in the Basque Country), to 41 in 2010, 43 in 2011 and 37 in 2012).

In Hungary, the centralisation of bee breeding and trading can be seen as a way to keep control of the dissemination of specimens. The Hungarian Bee Breeders National Association (MMOE, Hungarian abbreviation) is the only organisation responsible for breeding and trading of live bees of *Krajna* type live bees (Apis mellifera carnica). The supervisors of this association are: Ministry of Rural Development, National Agricultural Qualifying Institute (OMMI), and Institute for Small Animals Research and Coordination Centre for Gene Conservation (KÁTKI). The basis of the control is the Law of Hungarian act of animal breeding. Those breeders who are not satisfying this law or a special legislation: honey bee „production evaluation codex" or breed a in an inappropriate variety can be sanctioned under

this legislation[55]. FAOSTAT data shows that Hungary is exporting very few live bees. Breeding efforts are therefore mostly directed to local improvement of subspecies.

2. Other hive products

All apiculture products are important for the stability of revenues and not only honey (20 years ago, it was only honey in EU). However, other products are difficult to study because some of them (propolis, royal jelly) have no definition and are therefore not registered. It would be impossible to find any (custom) statistics about these products.

This section is providing information about each apiculture product and its possible use.

Wax is produced by glands of worker bees and is used in cosmetics, pharmaceuticals and candles. It is also of course used by the beekeepers to renew their frames.

Propolis is a resin coming from trees. It contains components that suppresses bacteria and other microorganisms and is recognised for its anti-bacterial, anti-virus and anti-fungal properties. It is use through dermal and internal application in naturopathic treatments.

Pollen is the flowers' anthers. It is a highly nutrient product containing proteins, amino acids and B vitamins. It is sold as a food additive.

Royal jelly is produced by glands in the throats of worker bees. It is also a highly nutrient product containing among others carbohydrates, proteins, B vitamins, sugar and water. It has various applications in naturopathy for its strengthening effects and anti-depressive properties.

Venom is coming from abdominal glands of female bees. It contains a large variety of proteins (melittin, apamin and others) which act as neurotoxins. Its positive effects have been recognised and proven in 'apitherapy' procedures for the treatment of complaints such as multiple sclerosis, rheumatism and sciatica. These procedures are frequently used in the USA and Asia but not broadly recognised in Europe yet.

In order to provide a broad idea of prices for other apiculture products, some observations from short commercialising chains are presented here. Prices for brown raw propolis vary from €10 to €15/10g, for royal jelly from €8 to €25/10g, for pollen from €15 to €80/kg.

It is important to note that, as for honey, other hive products have a wide range of qualities depending on origin, storage forms, etc. Moreover, the production of some products is not compatible with honey production. Producing royal jelly and swarms cannot be done with the hives dedicated to honey production. Beekeepers therefore require market information in order to make the right diversification decisions. As for propolis, the levels of production depends on the availability of resins, the form of hives and bee subspecies and valuable properties depends on the tree species on which bees are collecting resins.

In order to compensate the lack of statistical data, local experts provided the evaluators with observations on this topic.

In Hungary, other apicultural products are not very important both in production and consumption. They make up only a few per cent of the bee production.

In Germany, very few beekeepers are harvesting propolis for commercial reasons and pollen supply is just sufficient to meet the needs of colonies and is therefore not harvested. As for royal jelly, only a very limited number of beekeepers have specialised themselves as

[55] More information can be found on www.katki.hu

producers. The current estimate is less than twenty of such producers in Germany. Approximately 5% of beekeepers have specialised in the sale of colonies or swarms. Finally, selling queens is important as beekeepers like to change their queens from time to time. So there is a very good market for queens. Many beekeepers – estimated more than 5 % - have specialised in the breeding of queens which they then sell.

In Greece, pollen and royal jelly production is increasing year after year, following consumers' demand. Poor quality Chinese royal jelly is however also intensively imported in Greece (at lower prices) as there are no general specifications for the characteristics of the royal jelly.

In Spain, wax and pollen constitute the main apiculture products other than honey. Although production changes have been mixed across regions (waning in some but raising in others), the total production of both wax and pollen grew significantly from till 2009 (by 23% and 12.4% respectively).

Andalusia, Castile-La Mancha, Castile-Leon and Extremadura comprise around 77% of the wax production. On the other hand, Aragon (significant rise in pollen production since 2007), Castile-Leon (particularly the province of Salamanca) and Extremadura account for almost 85% of the Spanish pollen production.

The main EU honey production systems

This section aims to provide the most accurate picture possible of the main EU honey production systems. It is based on literature review, EUROSTAT data, case-studies and experts' interviews. Each region has specificities influencing the practice of apiculture. The first part of this section describes territorial characteristics. The second part of this section provides data to characterise the farms practicing apiculture.

Territorial characteristics

To answer the evaluation questions, it is necessary to study the production systems. Beekeeping practices and production systems mostly depend on:

- bees: subspecies, number, distribution, development of the bees population, number and capacity of the hives;
- climate;
- particular flora: species and blooming period.

1. Only Apis mellifera is managed in EU

In Europe, there are at least 700 bee species but only one Apis *mellifera* is managed for honey production.

In Greece, natural selection and selective breeding has resulted in a number of strains specific to certain regions that may have different susceptibility to pests and diseases. For instance, the honey bee species that exist in Greece are: Apis mellifera (A.m.) adami in Crete Island, A.m. macedonica in the North part of Greece, A.m.cecropia in Central and South Greece, A.m.carnica in Ionian Islands. As mentioned earlier, commercial breeding, migratory beekeeping and uncontrolled importation of bees have affected the distribution and the existence of these species.

Also, there is high hybridisation, and A.m.ligustica is imported from Italy, A.m.carnica from Germany, and other species are imported from the neighbouring countries as well as commercial strains (Super Bee from Cyprus, Buckfast bees).

The example also shows that the natural distribution of honeybee subspecies in Europe has been significantly affected by human activities during the last century. Non-native subspecies of honeybees have been introduced and propagated, and it has been reported that native black honeybee (Apis mellifera mellifera) populations lost their identity by gene-flow or went extinct[56].

2. Floral characteristics

Some Member States are recognised for producing specific monofloral honeys. These can be obtained thanks to the presence and abundance of certain floral species at some specific periods of the year. For example, top quality well-known honey types are Acacia honey from Hungary, Lavender from France, Heather from Germany and Chestnut from Italy.

In Greece, the greatest proportion of the forest honey production is the pine-tree honey, the fir-honey and the oak-honey. The most famous monofloral categories are thyme-honey, the orange-honey, erica-honey, oak-honey, and the rich in antibacterial attributes cotton-honey, the chestnut-honey. Other floral honeys derived from aromatic plants of Greek countryside as the wild-oregano, the wild-levanter, salvia etc.

Other examples on the importance of floral characteristics are provided by the Hungarian case study, among other:

Several Brassica species are important crop plants in Hungary, similarly to other temperate regions of the world. Oilseed rape provides the first mass blooming in the early spring period (Eöri 1983) and is considered to be an excellent early nectar plant that fills the gap between fruit tree and black locust bloom.

The apicultural significance of fruit trees is huge, because they bloom in spring-time when abundant availability of pollen and nectar sources are essential for adequate development of honeybee colonies (Örösi 1962). Fruit tree honey is very favourable for bee colonies, together with pollen, and honeybees usually consume it themselves. With the spread of large-scale orchards, however, there is a greater chance for extracting fruit tree honey.

Black locust usually blooms at the middle or end of May in Hungary. More than half of Hungarian honey production is Acacia honey which is recognised worldwide for its quality considered as among the highest in the world.

All over Germany oilseed rape and lime-tree honey is produced. Also more locally produced: chestnut, acacia and the famous heather honey. In the Southern part, the honey produced is mostly of the honeydew type. Other honey types produced in some regions include sunflower, dandelion and clover honeys.

These examples show that quality of monofloral honeys vary according to location and seasonal variations. Research is undertaken to better characterise specific properties and better manage the production of specific honeys. These findings help the beekeepers in formulating precise product descriptions for communication and promotion of the honeys towards the

[56] Jensen AB et al., Varying degrees of Apis mellifera ligustica introgression in protected populations of the black honeybee, Apis mellifera mellifera, in northwest Europe. 2005

consumers. In particular, some monofloral honeys are known for their highest contents in phenolic which is a recognised qualitative criteria allowing for price determination.

Typology of farms practising beekeeping

As secondary data are lacking, production systems have in this evaluation been mainly studied through the case studies. In this section it is also worthwhile to deal with the production of "other apiculture products", identifying countries relying more on these .

1. About data availability and representativeness

Data on apiculture sector are often not representative for the lack of standardisation as already mentioned in the section on monitoring but also because several countries do not have beekeeper registration system and even where registration is compulsory not all beekeeper do comply. For this particular section, the only data available are coming from EUROSTAT and have several pitfalls:

- Data are only available on the holdings which develop, besides beekeeping, other agricultural activities = 215 000 holdings = 31% of the European beekeeper population
- This cannot be considered as a representative sample because the population of the sample has too specific characteristics
- Data are not available for UK, Finland, Denmark, Germany, Ireland, Malta, The Netherlands, Austria, Sweden, Norway

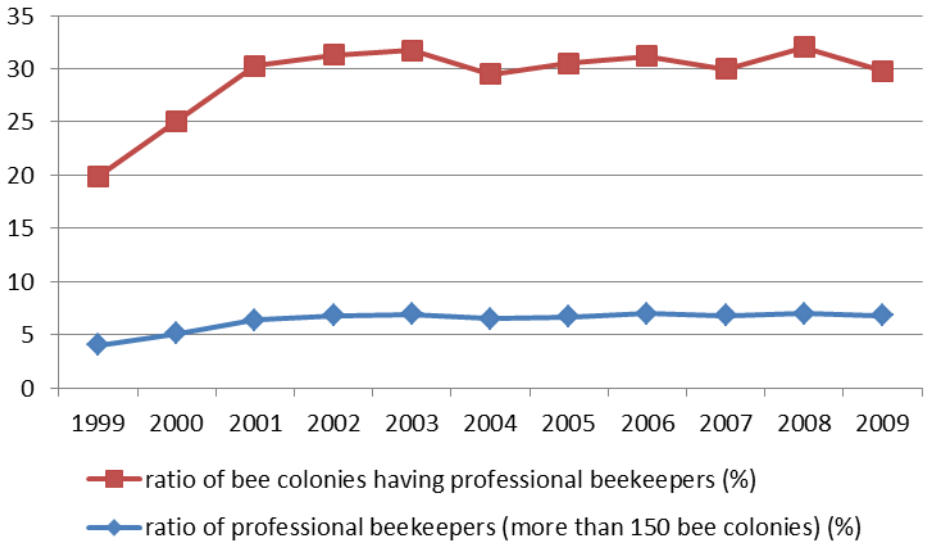
Cases study data collection and analysis will therefore be of first importance to complete the overview in this section.

2. Number of professional and non-professional beekeepers

Hungary is a good example to illustrate the issue on the distinction between professional and non-professional beekeepers (section on EU Production).

The diversity of the sector is very high, which is proven by the fact that the ratio of beekeepers having more than 150 bee colonies is only 5-7%. This ratio is stagnating. Beekeepers with more than 150 hives comprise about 1/3 of the total bee colony in Hungary. The ratio of professional beekeepers is shown in figure 13 below.

Figure 13 Ratio of professional beekeepers (%) and the ratio of bee colonies run by professional beekeepers in the period 1999-2009 in Hungary



Source: Hungarian case study – input from national expert

In beekeeping the professionalization rate is generally low all over Europe. In Germany e.g. there are more than 80 000 non-professional beekeepers and less than 200 professional beekeepers[57]. In Belgium, only 1% of beekeepers are considered as professionals.

The Hungarian case study also points out that the highest concentration of bee colonies is found in the least developed regions in the country, showing that honey production contributes to the welfare of rural families in relatively undeveloped regions. This illustrates the fact that being a non-professional beekeeper does not necessarily mean that honey do not represent a significant source of income.

In Spain, the first country to set the threshold of 150 hives to define professional beekeepers, the number of apicultural holdings per Autonomous Community in Spain was distributed as followed (table 2):

[57] http://www.deutscherimkerbund.de/index.php?zahlen-daten-fakten

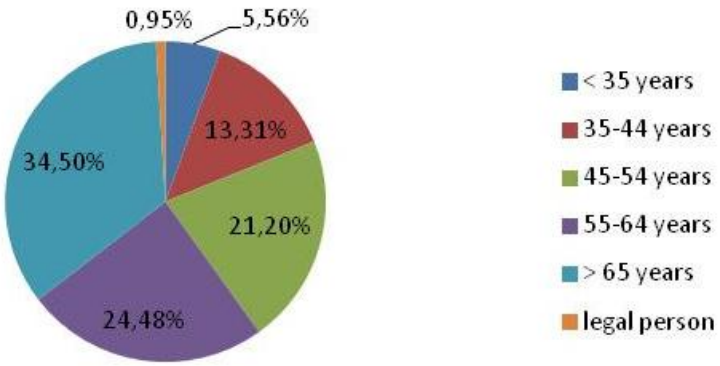
Table 2 – Number of beekeeping holdings per region (April 2012)

Autonomous Community	Non professional	Professional	Unknown	Total
Andalusia	1 476	1 400	654	3 530
Aragon	1 142	169	20	1 331
Asturias	751	31	618	1 400
The Balearic Islands	476	12		488
Canary Islands	1 193	18	4	1 215
Cantabria	229	13	3	245
Castile-La Mancha	1 088	361	267	1 716
Castile-Leon	3 239	500		3 739
Catalonia	1 183	218	11	1 412
Extremadura	206	800	5	1 011
Galicia	3 433	82	10	3 525
Madrid	141	27	21	189
Murcia	311	158	1	470
Navarre	392	13	28	433
Basque Country	1 417	86		1 503
La Rioja	221	33		254
Valencia	959	810		1 769
Spain	17 857	4 731	1 642	24 230

3. A high proportion of the beekeepers' population > 65 years old[58]

More than half of the beekeepers are older than 55 years, less than 6% is younger than 35 years (figure 14). The number for the over 55 year olds is slightly higher than the general average of farm holders in the EUROSTAT sample.

Figure 14 Number of holdings practicing beekeeping by age categories



Between 2003 and 2007, the share of beekeepers older than 65 years increased stronger than the total farm holders' sample in Belgium (+3%), Czech Republic (1%), Estonia (10%), Spain (6%), and Slovakia (6%)

Between 2003 and 2007, the share of beekeepers older than 65 years decreased stronger than the total farm holders' sample in Greece (-5%), France (-3%), Italy (-1.5%), Hungary (-4%), Romania (-1%).

In these countries, the share of young beekeepers is rising in accordance with the total farm holders' sample.

In 2007, the share of beekeepers older than 65 years is higher than the European average (34.5%) in Bulgaria (51.2%), Estonia (37.6%), Croatia (40.2%), Lithuania (48.4%), Portugal (42.6%), Romania (41.7%), Slovenia (38.5%), and Slovakia (40.9%).

The average age of beekeepers is an issue. The entrance into the market of younger beekeepers should be fostered so as to ensure honey production levels in the future.

[58] No data available for UK, Finland, Denmark, Germany, Ireland, Malta, The Netherlands, Austria, Sweden, Norway

4. Very few beekeepers manage big agricultural areas

According to EUROSTAT data presented in table 5 below, 80% of farmers practising beekeeping manage an agricultural area smaller than 10 ha[59].

Table 5: Number of agricultural holdings practising apiculture per land area

Agricultural areas	Number of holdings practising beekeeping	Percentage
0 ha	10740	6%
>0-<2 ha	78130	40%
2 - <5 ha	42470	22%
5 - < 10 ha	27330	14%
10 - <20 ha	18460	10%
20 - < 30 ha	6280	3%
30 - < 50 ha	5390	3%
50 - < 100 ha	2910	2%
>= 100 ha	2050	1%
Total	**193760**	**100%**

Source: EUROSTAT, 2010

EUROSTAT data allow us to pinpoint, in some countries**,** specific trends in the number of holdings practicing beekeeping and managing more than 100 hectares (table 6):

[59] No data available for UK, Finland, Denmark, Germany, Ireland, Malta, The Netherlands, Austria, Sweden, Norway

Table 6: Trends in the number of holdings managing more than 100ha, practising apiculture

Country	Number of holdings 2000 or 2003	Number of holdings 2007	Trend
Belgium	0	10	+10
Bulgaria	80	110	+30
Italy	90	110	+20
Latvia	90	150	+60
Lithuania	190	240	+50
France	520	490	-30
Portugal	190	110	-80

Source: EUROSTAT, 2010

In several countries (e.g. Germany, Belgium, France, UK) the number of apiaries located in cities has increased in larger proportions than the number of apiaries located in the countryside. Very few data do however exist to describe this new trend in a better way.

5. Modernisation of apiculture

The distinction between traditional and modern apiculture is often made and a few words on the meaning of *modern apiculture* are necessary here to understand the limits of modernisation of apiculture.

Modern beekeeping makes use of tools and techniques that simulate or force natural colony functions, for example:

- It is common practice to use apparatus to artificially inseminate queen bees.
- The natural reproductive cycle of a colony - the 'swarm' - is suppressed to prevent periods of reduced colony size and consequent reduction in hive productivity.
- Colony diseases and parasites are controlled with chemical applications.
- Targeted breeding is used to generate honey bee varieties with traits beneficial to the beekeeper, such as high disease and parasite resistance, good honey production, prolific breeding, and low aggressiveness[60].

Nevertheless, unlike other companion animals, automation of the beekeeper's work with the colonies, for the most part, is not possible. Automation is limited to honey extraction, filling, and labelling. Some technological advancement has been developed for moving colonies, but usually these are affordable only for professional migratory beekeeping. Modernisation of hive systems, technical support and market demands (despite the lack of sufficient forage during the year in some regions) have led to an increase in migratory beekeeping[61].

[60] ECPA/ELO/RifCon/E-Sycon, Pollinators and Agriculture, 2011
[61] Opera Research Centre, Bee Health in Europe – Facts and Figures, 2011

The marketing structures of EU honey production

This section is focusing on the description of the main marketing systems. It provides data on direct sales practiced in the case studies countries and presents the stakeholders involved in the downstream sector. Data has been mostly acquired through case studies.

Direct sales

The first part of this section is closely linked to the beekeepers typology as small-scale beekeepers only practice direct sales to consumers.

In Greece and Germany, 70% of the honey production is sold by the beekeepers themselves directly to consumers while 30% is sold via the local retailers.

The Greek case study mentions the fact that it may not be profitable for the small and medium beekeepers to sell their production to big companies or cooperatives.

The situation in Hungary is very different. According to the OMME and Bartos (2008), direct sales represent only 13% of the consumption while sales through intermediaries represents 87% of the consumption. The low rate of direct sales is certainly due to the high proportion of exports (2/3 of honey production is exported). The export sales are treated mostly by the intermediaries.

The marketing of honey in Spain is predominantly by the sale of honey to the industry or wholesalers (49%), followed by the marketing through cooperatives (29.5%). Direct sales to consumers (10.8%) and jarred sales to retailers (10.6%) split almost evenly the rest of the market. Table 9 below provides data about average prices for each commercialisation channel.

Table 9 – Honey prices in Spain (€/kg)

	Multi-flower honey		Other honeys	
Commercial mode	**2007/2008**	**2008/2009**	**2007/2008**	**2008/2009**
Direct sales to consumers	5	5	6	6
Sales through cooperatives	2.20	2.35	2.60	2.60
Jarred sales to retailers	3.64	3.57	3.89	4.10
Sales to industry or wholesalers	1.98	2.16	2.27	2.53

Direct sales lead to better prices but on the other hand, it implies for beekeepers to process honey and to carry out analysis at their own costs. This is why it has been judged important here to complete this part of the study with a short description of the processing operations as well as with information of beekeepers' organisations.

1. **Rather simple processing operations**

After honey being collected by bees and harvested by the beekeepers, it has to pass through several processing steps which are summarised in this section.

First of all, honey needs to be purified by straining or decantation.

> Straining: the honey is heated to 30°-35°C and then filtered through a strainer (mesh size 0.8 to 1 mm) or a tubular sieve (0.4 to 0.5 mm) and put in the honey ripener. Wax particles and foreign matter (e.g. bee fragments, small pieces of propolis, wood splinters etc.) are removed.
>
> Decantation: the honey is put into the honey ripeners, maintained at 25°C, so that the air bubbles and the waxy and other impurities (except the pollen grains) come up to the surface[62].

The liquid honey is then kept for about 2 weeks at 15°C for ripening. The honey can then be drawn off, generally by pumping, and distributed into containers.

Honey stored in sealed containers can remain stable for a very long time. For practical purposes, a shelf life of two years is often stated. Processed honey should be stored between 18° and 24°C.

Honey can be exposed to higher temperature for brief periods. However, heat damage is cumulative, so exposure to heat should be limited. When honey is overheated, hexoses like fructose or glucose lose three molecules of water to form 5-hydroxy-2-furaldehyde also named hydroxy-methyl-furfural (HMF) (cf. section 1.2.1 for legislation on HMF content).

Some optional operations are also often practiced.

Most honeys are supersaturated with respect to glucose, which may cause glucose to crystallise spontaneously at room temperature in the form of glucose monohydrate. The rate at which crystallisation occurs depends on the composition of the honey and therefore, mostly from its floral origin. Controlled crystallisation is a common operation consisting of mixing a totally liquid honey (90%) with a fine crystallised honey (10%) at 25°- 27°C. After 4-5 days, this process yields very fine crystals and a smooth product with a texture resembling peanut butter[63].

Honey is not often pasteurised because the exposure to heat is damaging its quality as previously explained. It is however sometimes heat-treated to prevent unwanted fermentation: 2 minutes at 77°C followed by a rapid cooling to 54°C.

Fine-filtration is not often practiced neither because the result of this operation is the removal of almost all of the extraneous solids and pollen grains. The disadvantage of this process is that it becomes impossible to determine the floral origin, and consequently the geographical origin, of such filtered honey without the pollen grains. Another risk is that the HMF level of the filtered honey may exceed the upper limit of 40 mg/kg fixed by Council Directive 2001/110/EC.

Processing of honey can be more or less concentrated or spread and very different levels of concentration can be found among EU member states. In the main producing countries, processing is usually concentrated in a few plants in order to take profit of scale economy and to facilitate the completion with quality control obligations. For instance, in Hungary there are 11 large scale honeys processing factories where the capacity is over 1000 ton per year. In addition there are more than 400 small scale honey processing plants in order to process local

[62] EC, Opinion of the scientific committee on veterinary measures relating to public health on honey and microbiological hazards, 2002
[63] EC, Opinion of the scientific committee on veterinary measures relating to public health on honey and microbiological hazards, 2002

honey production. Previously the number of processors was higher but due to the strict quality control in the recent years their number decreased.

2. Beekeepers' organisations

The description of beekeepers' organisation is relevant in this section because, as shown in the examples provided here, organisations usually provide their members with support to commercialisation by better guaranteeing quantitative and qualitative supply than beekeepers on their own.

Germany and Hungary are clear examples of centralised organisations.

In Germany, there are two major beekeeping associations. The first organisation is the D.I.B, which consists of approximately 80 000 members (all beekeepers). Local beekeeper organisations do belong to the D.I.B. This national organisation is the head of all the federal associations.

The second national beekeepers association is the group of professional beekeepers (DBIB). This organisation has around 500 members, but not all of them are professional beekeepers. Furthermore, many of the members of DBIB are also members of the D.I.B.

The DIB has developed a quality label which is used by most beekeepers. Therefore, relatively high quality characteristics have to be fulfilled. Also those beekeepers not selling under the label of the German beekeeping association try to fulfil the quality criteria of the D.I.B.

In Hungary, the OMME is organised in every county based on voluntary and self-governance organisations[64]. The Hungarian Professional Beekeepers Association was established recently with the main purpose of representing large scale beekeepers.

On the other hand, in Greece, there are 80 autonomous cooperatives or PASEGES members, 70 Beekeepers Associations, one Association of professional beekeepers, and the Hellenic Association of Honey Packaging/Exporters.

The situation in Spain can be characterised as in between the two extreme models described above. The largest beekeeping association in the country is the apiculture branch of C.O.A.G. (Coordinadora de Organizaciones de Agricultores y Ganaderos), the largest agriculture trade union in the country. COAG has a wide presence in the top-four producing Autonomous Communities (Andalusia Castile-Leon, Extremadura and Valencia). It has a particularly strong position in Andalucía -the largest producing region in the country- where it represents some 1800-2000 beekeepers who possess around 70% of the beehives of the region (approximately 350000 out of a total of 525000). Other relevant trade unions in the country include A.S.A.J.A. (Asociación de Jóvenes Agricultores) and U.P.A. (Unión de Pequeños Agricultores y Ganaderos).

Among the largest producing regions, cooperatives are relatively extended in Castile-Leon in Extremadura, but not so much in Andalusia and Valencia. Ayora, village in the province of Valencia, hosts the largest cooperative of Europe measured by its turnover. There are over 90 associations and cooperatives at regional and local level.

[64] More information can be found on www.omme.hu

Main commercialisation chains

The honey downstream sector is very particular with a few processing and distribution structures: only 10 enterprises are managing honey conditioning in EU. It is crucial to understand how these are linked to the numerous local honey producers.

Packers are the first to intervene in the marketing chain after production. They sell the end product to wholesalers and retailers in consumer packaging. Three distinct types of packers can be found in the sector:

- packer-producers are beekeepers with facilities for processing and packing honey. They sell direct to consumers or to retailers. They are usually small businesses, and do not market imported honey;
- packer-cooperatives are groupings of beekeepers which purchase, process, pack and market honey, often under their own brand label. They sometimes purchase imported honey;
- packers purchase honey both from beekeepers and from importers. They have their own brand label, although they may pack honey for other brands. They sell both to retailers and to industry.

It is estimated that 85% of honey in the EU is sold as table honey directly to consumers or through intermediaries. About half of the honey produced in the EU is sold directly to consumers; the other half is sold to packers and conditioners.

Retailers are buying table honey from packers. Retailers often belong to big retail groups like Metro (Germany), Carrefour (France), Tesco (UK), Ahold (The Netherlands), REWE (Germany), Groupe Casino (France), Auchan (France), Delhaize Group (Belgium), Sainsbury (UK).

Due to their size, these retail groups have substantial buying power. They have used their buying power to create their own private labels, next to the brands of honey packers. The private label products are generally sold at very competitive prices and threaten the brands of honey packers. The latter generally respond by creating higher value honeys and positioning them as premium products. However, these honeys account for only a small share of supermarket sales[65].

In order to obtain acceptable table honey at acceptable prices, packers usually blend several honeys (eight on average). This type of honey is the most common honey found in retail outlets. This is why it is often labelled as "*produce of EU and non EU countries*", which can be considered as rather value-free information, despite complying with the law on labelling

Single-origin and monofloral honeys are offered in specialised retail shops which form the second retail channel for honey in EU.

Table honey is opposed to industrial honey or bakers' honey (the remaining 15% of the consumption in the EU). Industrial honey is honey that does not meet fully all the criteria for table honey, for example, the hydroxymethylfurfural (HMF) content may be higher than 40 mg/kg. This may be because it has been heated too much, or it naturally has a high HMF, and is therefore regarded, according to the EU criteria, to be of lower quality than table honey. In this case, it still qualifies for use in the food industry, for the manufacture of bakery goods, confectionery, breakfast cereals, sauces, tobacco, and products such as honey-roasted nuts and

[65] CBI, Trade Structures and channels for honey

pharmaceutical products. Industrial honey competes with substitute products such as sugar, invert sugar syrup and corn syrup.

The data provided in the overview of apiculture sector in Hungary/Germany reflects the overall European pattern: from the quantity of honey consumed internally (30%/80%), 90%/80% of the honey produced is consumed directly by citizens while the other 10%/20% are sold to the industry.

In Germany, a very low part (estimation < 5%) is sold to bottler / packers. There are many bottlers / packers in Germany: e.g. Fürstenreform (Bihophar, Langnese), Breitsamer, Göbber, Allos, Tuchel, Lang and Dreyer[66].

Despite the emergence of low-cost substitutes, honey is still used in food products both for its characteristic taste and because there is added value in mentioning honey in the list of ingredients.

The EU honey market is characterized by a rising concentration of actors. The most important group acting in the commercialization chain is FEEDM, the European Federation of Honey Packers and Distributors (importers and wholesalers), which has been established in 1989. It is composed of fourteen national honey associations or individual companies of different European countries and one associated member from Switzerland[67]. The members of FEEDM represent about 80% of the total European honey imports, but also buy European honeys. Some members even buy 100% European honeys. FEEDM aims to co-ordinate the interests of the European honey business and to obtain relevant information with regard to honey.

There are important challenges for beekeepers to market their main product on the European market. First, not all beekeepers can take advantage of the same market opportunities in terms of prices. Second, their comparative advantage to imports lies in the superior quality of the honey they produce, but this is relevant only if the origin of the honey can be proven and the producer is recognised by the consumer, hence there exists local orientation of the markets. The quality aspect of honey is less important when the honey is used for processing purposes[68].

Description of the demand

Demand is very different from one country to the other and is evolving quantitatively and qualitatively. This section will describe the broad trends and again focus on case study countries to meet the lack of secondary statistics.

The first part of the present section provides figures about the overall consumption of honey in EU member states, showing great variation within the EU. The second part is providing an overview on the new tendencies of the demand.

The description of specific qualitative properties and of the existing quality labelling honeys (AOP, IGP, organic) has been integrated to the section on the EU production.

[66] More information can be found on http://www.honig-verband.de/index.php?id=16&language=1)

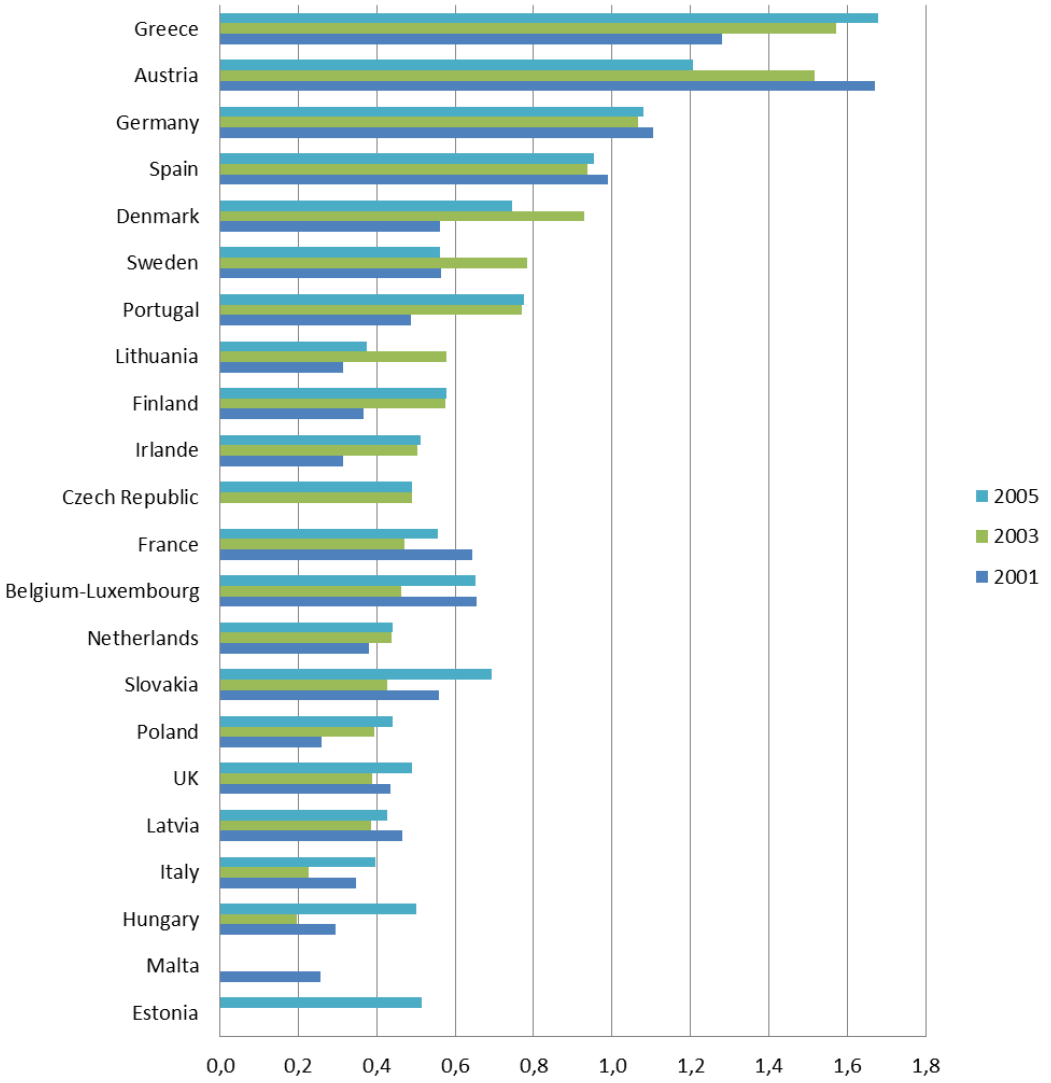
[67] Darbo AG (Austria), Meli (Belgium), Hunajainen SAM Oy (Finland), Syndicat français des miels, Honig-Verband e.V. (Germany), SETSEM (Greece), Magyar Mézkereskedök és Csomagolók Egyesülete (Hungary), A.I.I.P.A. (Italy), De Traay B.V. (Netherlands), CORPO Sp. z o.o. S.K.A. (Poland), Apisland LDA (Portugal), Medex d.o.o. (Slovenia), Asemiel (Spain), Narimpex AG (Switzerland), British Honey Importers & Packers Association

[68] Opera Research Centre, Bee Health in Europe – Facts and Figures, 2012

1. Great variation among EU countries

The EU accounts for approximately 20-25% of the world's honey consumption. According to the data presented in table 15, Greece, Austria, Germany and Spain are the major EU consumption countries.

Figure 15 EU honey consumption figures



Sources: EUROSTAT, Member states statistics and DG AGRI estimates

From a qualitative point of view, each country has got its main trends of consumers' preferences.

For example, Hungarian consumers favour the Acacia honey which has light greenish and yellow colour and it maintains its liquid phases for the longest period of time. The majority of Hungarian consumers considers the crystallisation of the honey as a negative symptom that is why the Acacia honey (which never crystallises) is the very much preferred. The other preferred type honey is mixed flower honey, tilia honey. The sunflower honey is mostly used by the industry. The rape honey is mostly exported especially to Germany.

2. New tendencies in EU consumption

Although the honey market is generally a stable market, the market is still evolving. Market shares of monofloral and single-origin honeys are increasing and increased concerns about the effects of intensive farming on the countryside, as well as on the environment in general, have also intensified interest in organic honey.

Also, consumers are generally willing to pay more for quality honey. Each type of honey can only be sold at certain prices; consumers' willingness to pay varies depending on the honey. Prices previously presented showed that monofloral honeys can be sold at double price compared to classic polyfloral honeys.

A fact mentioned several times by interviewees: in Spain, the difference in honey demand has been made in the sector by the massive advertising campaign the market leading brand (Miel de La Granja San Francisco) started in the 1980s. It is generally agreed that the ubiquitous advertising helped increased the consumption of honey significantly. However, the honey portrayed in the television advertisements was rather liquid, extremely liquid and not crystalized at all. If any, Spanish honey tends to be darker, more dense and prone to some degree of crystallisation. Ultimately, the honey consumed in Spain is on the majority light and liquid, but it is, for the most, imported.

The increasing health and safety concerns make specialised retail shops becoming more popular during recent years. The problem is that the production of organic honey in Europe is very limited because of the presence of the varroa and the lack of unpolluted areas.

As direct sales are already so widely spread for honey production, it would be worth studying the increased demand for products sold directly from producers to consumers and undertake actions to assure quality criteria.

Finally, the case studies are also mentioning new trends such as honeys mixed with fruits, nuts or essential oils. Such products are already widely consumed in Italy but the Hungarian consumers are quite conservative in their taste and are not especially attracted to these new products. In Germany, during the Christmas season, aromatised honey such as honey with cinnamon, nuts, and vanilla is popular. These new trends can be considered as ways to add value to honey production without undertake costly physico-chemical analysis to prove floral origin, phenolic content or any organoleptic property.

Apiculture measures

Different measures concerning honey have been introduced by the EU, notably measures to improve the efficiency of production and marketing of honey, but also to prevent varroasis and restock hives. The Council Regulation (EC) No 1221/1997 first defined the rules for the Commission to provide co-financing of 50% to the national apiculture programmes developed by Member States. These rules have been settled while varroa was the main threat to beekeeping, generating an additional cost which was meant to be compensated by the Member States programs. All diseases and pests control but varroa are managed by DG SANCO. Varroa is an exception because it is, according to present scientific knowledge, an ineradicable parasite, meaning that it is only possible to reduce its population to an acceptable level. Council Regulation 797/2004, which was later, included as articles 105 to 110 in Council Regulation (EC) No 1234/2007, added aid for hive restocking to the previously defined measures. A number of simplification measures were also introduced by the

Commission in 2007 to enable greater flexibility of the programmes to respond adequately to unforeseen difficulties upon elaboration of the programmes.

The measures that can be included in the national programmes developed by Member States are the following:

- Technical assistance to beekeepers and groupings of beekeepers (A)
- Control of varroasis (B)
- Rationalisation of transhumance (C)
- Measures to support laboratories carrying out analyses of the physico-chemical properties of honey (D)
- Measures to support the restocking of hives in the Community (E)
- Cooperation with specialised bodies for the implementation of applied research programmes in the field of beekeeping and apiculture products (F)

This section will first present overall figures on the execution of the measures at EU level and then focus on the cases study countries by summarising their National Programs.

Overall expenditure figures

As provided for in Article 2 of Regulation (EC) No 917/2004, Member States provide notification of their programmes to the Commission before 15 April once ever three years.

On the basis of Member States' expenditure forecasts, Commission budget funds available are distributed with reference to each Member State's share in the total number of beehives in the Community, as shown in Annex I to Regulation (EC) No 917/2004. The hives belonging to each Member State, calculated as a percentage of the total number of hives, determine the theoretical maximum percentage of the budget to which each Member State is entitled, before any allocation of amounts not requested[69].

It is important to note that all Member States, without exception, have provided notification of an apiculture programme; this is indicative of their interest in this area and the needs of the European apiculture sector.

Overall, Member States expressed a high satisfaction with the programme [70] and made extensive use of the allocated budget (88% in 2009). The most commonly used measures during the period 2007-2009 remained varroasis prevention (although a sharp drop, of 10% points to reach 27% of the used budget, has been registered during the period), and technical assistance, which represented 26-27% of the budget used. With regards to the other measures, the ones designed to ensure rationalisation of transhumance accounted for 19% of total expenditure, while hive restocking measures represented 15%, with an increase of 5 points in the period. Restocking of hives is the most recent of the eligible measures for co-financing offered by the EU as it was introduced only in 2005. However, since its introduction, the portion of national budgets earmarked for these measures has substantially increased from the 6.2% share allocated to it in 2005, reflecting the growing concern for bee population decline. Finally, measures in favour of honey analysis and applied research represented 6-7% of

[69] REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT on the implementation of Articles 105 et seq. of Council Regulation (EC) No 1234/2007 on measures improving the general conditions for the production and marketing of apiculture products

[70] European Commission (2010), "REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT".

expenditure in 2009[71].Figure 16 presents an overview of the budget spent over the six measures in the period 2005-2013.

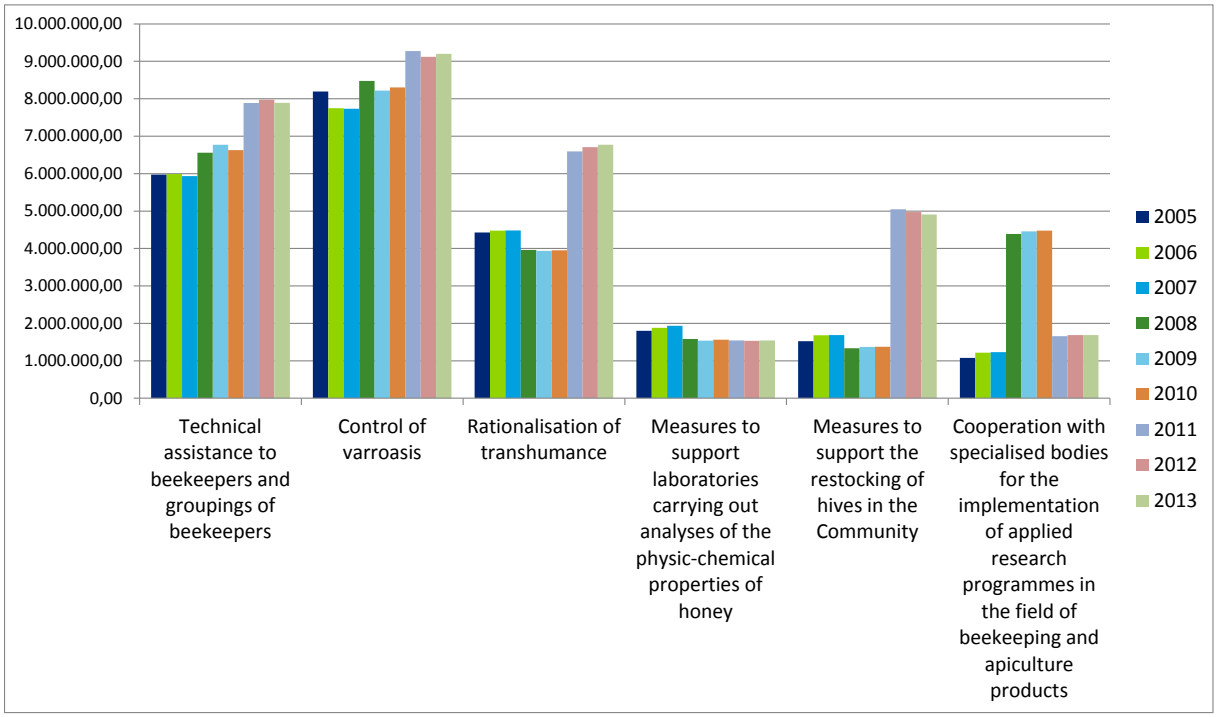


Figure 16 – Execution of beekeeping measures from FY2005 to FY2013 by measure (EC, Financial management of the EAGF)

[71] This corresponds with an amount of approximately € 60 million since the introduction of the measures.

4 PART III: Theme 1: Effects on production, marketing and trade

Introduction

The objective of the CAP measures supporting apiculture is to improve the general conditions for the production and marketing of apiculture products.

The first evaluation theme addresses the effect the measures have had on the production, marketing and trade of apiculture products, with a focus on honey.

Issues such as the impact of the measures on the evolution of the honey production in Europe, the main sales channels and the exports and imports of honey will be dealt with. The keeping and trade of lives will also be treated. In connection with general CAP objectives, specific sub-sections will deal with the support the measures provided to the economic activity and the income of professional beekeepers, as well as to honey price stability.

As a starting point, the available figures will be presented in each case. Later, the link with the support measures will be established.

Given the variety of topics included in this section, more details about the judgement criteria employed are provided in each evaluation sub-question.

All the main data collection tools were used to reply to the evaluation questions of this theme. These include desk research (including data coming from FAO, EUROSTAT and the Report from the Commission to the Council and the European Parliament[72], the National Apiculture Programmes, and additional reports and studies[73]), interviews carried out at EU and national level, the four country case studies, and the online surveys directed to beekeepers and beekeeping associations, on one side, and to national and regional administrations on the other side.

It should be borne in mind that the measures and the concrete activities carried out under each measure vary significantly across countries. Therefore, conclusions can rarely be drawn for each and every one of the Member States. The results presented constitute the main findings of the evaluation, but do not apply homogeneously to all Member States. Whenever recourse is made to anecdotal evidence, it is clearly stated.

[72] REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT on the implementation of Articles 105 et seq of Council Regulation (EC) No 1234/2007 on measures improving the general conditions for the production and marketing of apiculture products SEC(2010)655

[73] Such as CBI's documents on EU honey exports and legislation on honey for human consumption, FAO's study "Value-added products from beekeeping" and DG AGRI website's information on Quality policy, including the DOOR database.

Findings

The first evaluation question relates to the effects on production, marketing and trade, for which we must answer the three following questions:

Q1.1: To what extent have the six measures supporting the apiculture sector affected the production, marketing and trade of honey as well as the keeping and trade of live bees?

Q1.2: To what extent have the measures contributed to support economic activity and the income of professional beekeepers?

Q.1.3: To what extent have the measures supporting apiculture contributed to price stability for honey?

Q1.1 To what extent have the six measures supporting the apiculture sector affected the production, marketing and trade of honey as well as the keeping and trade of live bees?

We analyse in this question the extent to which the support measures have affected, respectively, the production of honey, the marketing of honey, the trade of honey, and the keeping and trade of live bees. The indicators used for the analysis of each topic are presented in more detail in their respective sections.

1. Production

The extent to which the measures have affected the production of honey can be measured along three main dimensions: quantity and quality of honey and characteristics of the producers. The amount of honey produced and its quality relate directly to the general objective stated in Council Regulation (EC) No 1234/2007, that is, "to improve the production and marketing of apiculture products in the Community". Such improvement can be quantitative, via higher production amounts, or qualitative, via honey of higher quality (ensuring, beyond pure food safety requirements, that the composition of honey is such that it maintains its natural properties). The type and characteristics of producers constitutes a variable related to both the quantity and the quality of production, as both are affected by the level of professionalization and technical knowledge of beekeepers. This topic will be dealt with more in detail in the second evaluation theme (effects on the structures of production), as it is closely related to the evolution of the level of productivity and the degree of professionalization of the sector.

Effect on the quantity of honey

Overall, the measures have been found to contribute positively to the production of honey by stabilising the amount of honey produced in the EU and by contributing to ensure its quality.

Honey production in the EU-27 as is shown in table 7 has remained stable since 2003, when a significant increase in production was experienced. Since then, the largest annual variation was the 4.4% decrease between 2006 and 2007.

Table 7 – EU 27 honey production (x1000 tonnes)

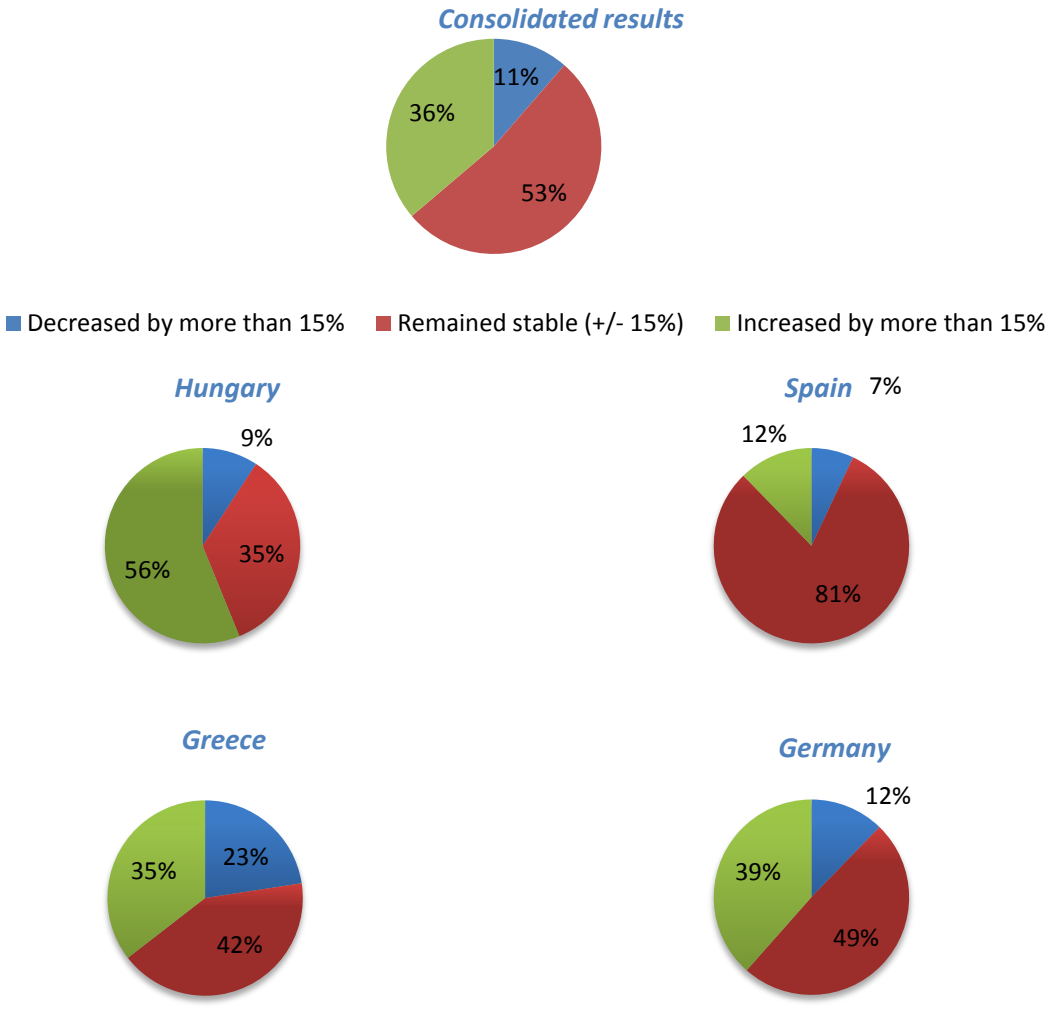
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010

180	176	198	204	198	204	195	197	202	204

Source: FAO

The survey addressed to beekeepers, which enquired about the change in production between 2008 and 2012, provides a slightly more positive picture. Overall, 35% of the respondents declared that their production remained stable (no increase or decrease over 15% in the amount of honey produce), while 56% reported a significant increase in production (over 15%). The remaining 9% signalled a decrease in honey production over the period.

In three of the four case study countries, the answers point towards an increase in production. In Germany and Hungary, the amount of beekeepers experiencing an increase in production clearly outnumbers the amount experiencing a decline, while in Greece the difference is smaller but still significant. Production remained stable for an important share of the beekeepers in all three countries (35% in Hungary, 42% in Greece and 49% in Germany). In Spain, data point clearly towards a marked stability in production (81% of the beekeepers declared that their production remained stable between 2008 and 2012). The data are presented below.



According to FAO data, the EU's honey self-sufficiency rate has also remained stable in the last few years (even increased slightly, going from 60.2% in 2008 to 62% in 2010).

Therefore, evidence suggests that honey production in the EU has mainly remained stable in the last few years, with a possible upward trend since 2010.

In light of the answers to the beekeepers' survey and the evidence gathered through the case studies and interviews, it appears that the support measures have contributed positively to this stabilisation. Increases in production costs (those are analysed later in the report) and the constant threat of varroa, amongst other factors, put pressure on honey production. This supports the notion that the contribution of the measures to maintain the levels of production can be deemed as successful.

By design, all the support measures have a potentially beneficial effect on production, be it by increasing the number of hives or beekeepers and/or the productivity of the existing holdings, by contributing to control production costs or by tackling the harmful effects of pests (notably varroasis) and diseases on bee population.

The results of the survey to beekeepers suggest a particularly beneficial effect of the measures supporting **technical assistance** and the **fight against varroa**. In Spain and Greece, 56% and 58% of the respondents, respectively, assigned the maximum value to the contribution of technical assistance measure to maintaining or increasing their production capacity and productivity. In Hungary, 21% also valued the support of the technical assistance measure to production as excellent, while an additional 10% deemed it highly positive and another 10% moderately positive. As for the measure supporting varroasis, 25% of the respondents in Hungary, 23% in Spain and 29% in Greece considered its contribution as very positive, while an additional 17%, 39% and 10% of beekeepers, respectively, rated it a positive. The contribution of these two measures to production was rated as positive by a low share of German beekeepers (12%). Given the large amount of German beekeepers who responded to the survey, this skews the consolidated results.

The contribution of the **restocking of hives** measures was rated very positively in Greece, but not so much in the other case study countries (Spain does not apply this measure as such but provides some support to the restocking of hives under the measure for the rationalisation of transhumance). The **support to laboratories** was not perceived to provide much support to production (its effect lay more on the side of marketing and trade).

Greek beekeepers valued strongly the support provided to production and productivity by the **applied research measure**. This opinion was not echoed in the other study countries, or in the EU-wide online survey.

The effects of the measure supporting the **rationalisation of transhumance** are highly location-specific. In Greece and Spain, where the beekeeping sector is highly professional and transhumant, the contribution of this measure was highly appreciated by beekeepers (35% of beekeepers in Greece judged it to be very positive and an additional 10% as positive, while 46% of the respondents in Spain considered it positive, 5% very positive and 14% moderately positive). Interviews carried out in these countries confirmed these results. The measure was appreciated more moderately in Hungary, and not at all in Germany (beekeeping in Germany is barely transhumant and the spending on this measure is marginal -€26,500 out of a total of approximately €3 million-).

The aggregated results are provided below, and the country specific results in Annex 6:

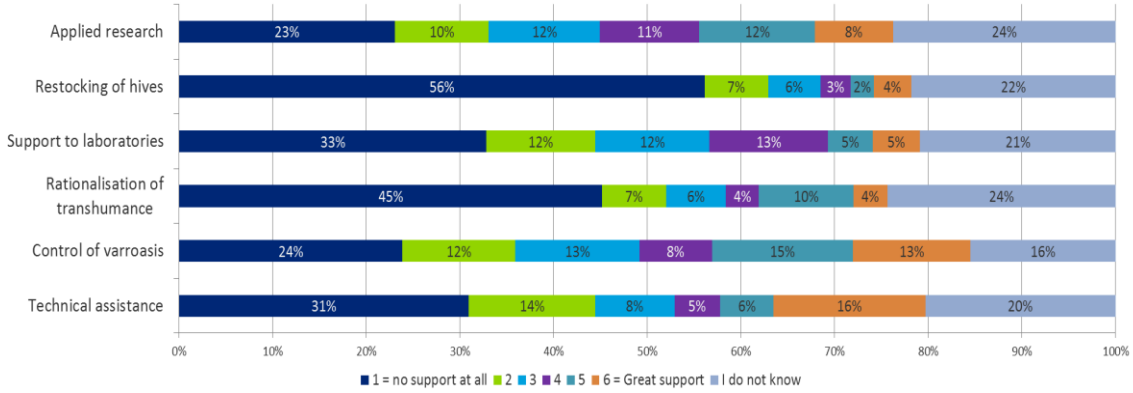


Figure 18 – Effects of the measures on production (capacity) and productivity

Interviews conducted in the four case study countries largely confirmed the results of the surveys.

The support of **the technical assistance measure** to production capacity and productivity was valued very positively in Greece, Hungary and Spain. In Germany, such contribution was not considered particularly relevant, but the overall impact of the measure was considered to be positive.

Both in Hungary and Spain, the programme makes beekeeping consultants available for beekeepers. The specialists provide advice on production and marketing issues. Particularly in Spain, the measure was perceived to raise the level of productivity and professionalization of the sector, since beekeepers could obtain immediate advice on the phone or direct help on the ground in less than 48 hours. The support provided by the National Apiculture Programme, combined with the positive effects perceived from the technical assistance, would have contributed, in the view of the stakeholders interviewed in the country, to a general development and structuration of the sector in Spain. Currently, the main beekeeping associations provide similar services to their members.

Interviews conducted in Germany, which has over 80000 non-professional beekeepers (the largest figure in the EU), revealed that the measure has succeeded in raising awareness about the existence of trainings at local and regional level. It was also perceived that measure had a positive impact on (new) beekeepers' understanding and know-how of issues related to apiculture (e.g., varroasis control, marketing, physico-chemical properties of honey, and labelling). Given the exceptional characteristics of the beekeeping sector in this country, namely the amount and share of non-professional beekeepers, it can be considered that the technical assistance measure has been successful. The number of (non-professional) beekeepers is actually on the rise, including more women (13-14% of the new beekeepers are women). It seems this measure would have also contributed to a moderate extent to the observed heightened awareness about beekeeping activities among the general public in Germany.

The potential for this measure still seems high in the EU. According to the EC Communication on Honeybee Health (COM 2010(714) final), around 97% of the approximately 700,000 beekeepers of the EU are non-professional. While the non-professional character of these beekeepers does not imply an utter lack of knowledge about

beekeeping (including production techniques and treatments against diseases), making information and trainings for them seems beneficial. Professional beekeepers who invest a largest part of their time and have stronger financial interests, are likely to dedicate more time to refine and expand their knowledge of beekeeping.

Given the importance of professional beekeepers in certain countries (they own over 80% of the beehives in Spain and over 60% in Greece), improvements in the knowledge and training of this group would likely lead to sizeable effects on productivity levels and overall production.

Several interviewees at EU level, providing a cross-country view, underscored the need for continuous action focused on dissemination of information due to the rapidly changing conditions of the environment. They also agreed on the still wide margin for improvement in the knowledge of both non-professional and professional beekeepers.

This view seemed to be shared by the Member States. In the survey directed to national and regional administrations, the level of technical knowledge and training of beekeepers was the factor most taken into account (by 77.6% of the respondents) for deciding on the expenditure allocated to each measure.

Main finding:

- All in all, the technical assistance measure was perceived as having had highly beneficial effects on production. This vision is backed by expenditure data, as the Member States allocated the second-most funds to it for the period 2007-2009, and are expected to continue to do so for the period 2011-2013, according to the latest 3-year national programmes.

The interviews carried out at the EU and national level, backed by desk research, underscored the threat varroa poses to the sector. In this light, the measure aimed to support **the fight against varroa** has been generally found to help the production of honey. While it is generally agreed that varroa presents a significant threat to beekeeping in the EU, opinions on how to fight it best, the effects of treatments and other measures, as well as the actual effects on production, vary widely across countries.

In a questionnaire launched by the EU Reference Laboratory for Bee Health, varroasis was identified by far as the main threat for bee's survival.

Beekeepers and beekeeping associations interviewed across Europe raised two particular concerns: the need for more effective medicines to fight varroa, and the high cost of the treatments currently available.

An analysis of the treatments approved in the case study countries shows that, regardless of their commercial name, similar medicines are used in different countries. Common active ingredients for medicines used in Greece and Spain include: Coumpahos, Flummetrin, Fluvalinate and Thymol. With the exception of Check Mite (Coumaphos), which was introduced in Spain in 2008, all had been used for over a decade. It seems from these result that no new medicines have been developed.

Beekeepers across Europe, together with several interviewees at EU level and certain National Authorities shared the opinion that the reason for the lack of development and approval of new medicines against varroasis lies in the lack of financial return for pharmaceutical and chemical companies. According to their views, it seems that developing new medicines to fight against varroa would be too expensive; the demand for these treatments and the willingness to pay for them would not be enough, in an *a priori* estimation, to compensate for such investments. The prices beekeepers would be willing to pay (determined by their productivity gains, other production costs and the price obtained by their honey), would not be, in principle, enough to compensate for the expenditure required. The financial incentive for the companies able to develop new treatments would be missing.

The need for more effective medicines was widely shared. In view of the perceived low likelihood that the private sector will autonomously develop new treatments, many claimed the need for public support for this purpose. In this context, the fragmentation of research efforts across countries was perceived as detrimental.

The high cost of the treatments against varroasis was also quoted during the interviews. This cost would in turn drive up total production costs. In this light, the support measure to fight varroa mainly takes the form of subsidies for the application of approved treatments against varroasis. Additional funds are allocated to research and other ways to combat varroa (for instance, with equipment such as covering meshes), but the bulk of the spending is devoted to the subsidisation of treatments. Varroasis prevention received the largest amount of financing among all the measures for 2007-2009, and remains the most-funded measure for the period 2011-2013.

The consolidated results of the online survey for beekeepers and beekeeping associations show that varroa control costs represent between 10% and 20% of production costs for 1/3 of the beekeepers, and more than 20% of production costs for an additional 19% of beekeepers. These results point to high costs of control for around half of the beekeepers. The most common answer (41%) was for a cost of control between 0 and 10%.

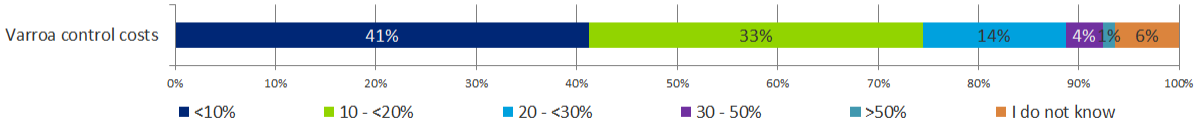


Figure 19 – Share of varroa control costs in total production costs

Results of the survey in Germany, Greece and Spain were very similar to those presented above. In Hungary, the respondents reported an even higher importance of varroa control costs: 39% reported they represent between 10% and 20% of production costs, 28% stated that they account for between 20% and 30% of production costs, and 12% said they were above 30%. 18% of the respondents in Hungary estimated the costs of treating varroa to be below 10% of the total costs of production.

In accordance with the high costs of varroasis control in Hungary reported through the survey, the beekeepers and beekeeping associations interviewed in the country judged the financial support to fight varroa to be essential. The measure accounts for about 50% of the budget in Hungary. Similarly, beekeepers in Spain defended vehemently the need for the support to fight varroa. Except for some doubts expressed by older beekeepers, those interviewed expressed their firm belief in the need for treatments, and the need for financial

support given their cost. The consequences of missing the treatment for one year would be, in their view, catastrophic. Furthermore, it was reported that given the warm weather in the country (which favours the reproduction of varroa), applying two treatments per year is necessary in certain areas (which increases production costs). The approval and co-financing of treatments was also perceived as a problem. While the Spanish Medicines and Health-Care Products Agency is in charge of authorising products for the treatment of varroa, the regions (Autonomous Communities) decide which specific products from that list are co-financed in their territory. This results in different products being financed in different regions. Reductions in costs due to economies of scale and sales rebates are thus forgone.

Interesting evidence regarding varroasis was gathered in Germany and Greece:

1. In Germany, it was reported that the demand for the measures to control varroa is low. The State Programme of Lower Saxony, for example, does not include any support of measures to control varroasis and related illnesses. Beekeepers and beekeeping associations reported that the application process for co-financing of the treatments to control varroasis is excessively bureaucratic. As a result, many beekeepers do not apply for support. This presents a major problem in the successful application of recognised methods for the treatment of varroasis across Germany.

2. In Greece, the measure to support the fight against varroa was excluded in the last three-year programming period. No co-funding is provided for it. The three main reasons behind this change of policy are:

   - The pest has become very resistant and cannot be combated
   - The treatment generates residues that affect negatively the hives' products
   - The price of the medicines has risen and is currently too high

   The rise in prices of medicines would allegedly be linked to the subsidisation of their cost. The stakeholders interviewed in the country agreed on this point, supported by the fact that prices of other subsidised items (such as beehives) would have also increased. In addition, it was argued that varroasis cannot be permanently combated due to the hot summers in Greece and the appearance of brood all the year round.

The high production costs were also mentioned recurrently during the interviews carried out. The effect of the measures on the costs of production will be analysed more in detail in Question 1.2. In a context of high production costs, support to these has a direct effect on production.

We address here the importance of production costs as an obstacle to the trade of honey, and the extent to which production is dependent on the support measures.

Among the factors related to the costs of production, including the cost of varroasis control, the costs of maintaining the bee population and/or restock hives, and the low accessibility to and/or high price of honey analysis services, beekeepers signalled "other high production costs" as the factor hurting more the trade of honey (the other factors listed, not related to production costs, will be analysed more in detail in the section on trade).

As can be seen in the graph presented below, 19% of the beekeepers who responded to the online survey considered it a moderate limitation for trade, while 17% deemed an important

limitation and 12% stated that it is a major limitation. The high costs of varroasis control are the second most relevant limiting factor related to production costs.

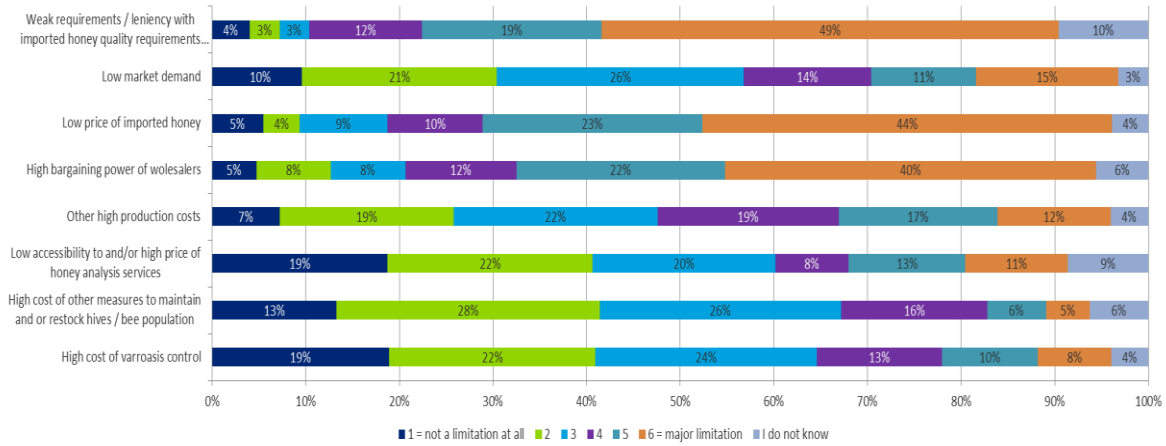


Figure 20 – Factors limiting the trade of honey according to beekeepers' perception

Given the extent of disparities across Member States, it is worth commenting on some country-specific reports.

In Spain, the high costs of varroasis control and of maintaining their bee population/restocking their hives (in view of the high mortality rates experienced) were cited by a majority of beekeepers (around 60%) as a factor limiting the trade of honey, albeit moderately. And additional 7% (varroasis) and 9% (need for restocking) of the respondents considered these factors as an important limitation and an extra 15% considered it, in both cases as a major limitation. Beekeepers were also concerned about other high production costs, as 48% considered them as a limitative factor, 16% as highly limitative factor and 7% more as a major limitation. In contrast, the low accessibility and/or high price of honey analysis services was not identified by the majority of beekeepers as an obstacle.

In Greece, production costs seem to present a major preoccupation for beekeepers. Around ¼ of the beekeepers regarded the high cost of varroasis control and of the restocking of hives as major problem. The concern appears to come even more from the extent of other production costs, as the majority of them (around 2/3) considered them as an issue, and a significant one (34% of the respondents considered it as a major obstacle, and an additional 24% as an important obstacle).

Data suggest some concern in Hungary about "other high production costs", while in Germany the only relevant cost reported was that of honey analysis services, which was regarded as an obstacle to some extent by almost 40% of the responding beekeepers.

The survey data for the four case study countries are presented in Annex 6.

In spite of the perceived need to restock hives in view of the losses of bees suffered annually, the measure for the restocking of hives is not applied either in Greece or Spain. Some support to it is provided in Spain under the measure supporting the rationalisation of transhumance, but its effects were minor. Nevertheless, the general perception by beekeepers and beekeeping associations in both countries was that what is really important is to tackle the

root causes for bee mortality. Supporting the restocking of hives is, to a certain extent, only a short-term solution. The causes of mortality should be researched and acted upon.

Overall, the measures were perceived to contribute positively to reducing bee mortality, and less so to reducing production costs. Half of the beekeepers who responded to the survey estimated that the measures contributed positively to reducing bee mortality (18% of them said they had an important effect on it and 20% reported that they had a major effect on it). 30% of the beekeepers considered, to a greater or lesser degree, the effect on reducing production costs as positive. The results are shown in figure 21 below:

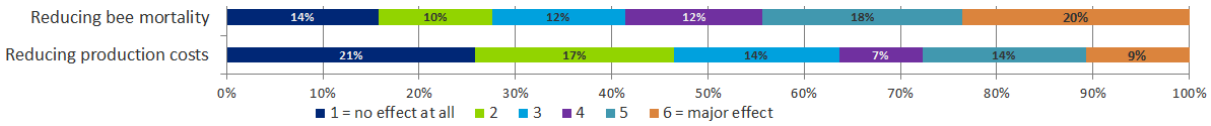
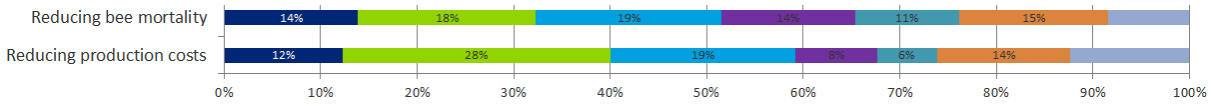


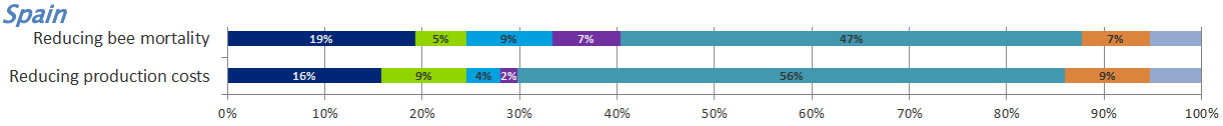
Figure 21 – Effects of the apiculture measures according to beekeepers' opinions

Both in Greece and Spain, the results of the survey point towards a large effect of the measures on both ends. In Germany and Hungary, there appears to be some evidence that the measures contributed to the reduction of bee mortality, but not so much that they contributed to reduce production costs. The data per cases studies country are shown below:

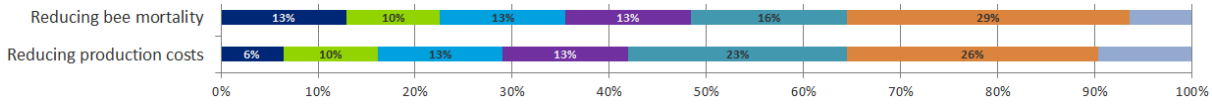
Hungary



Spain



Greece



Germany

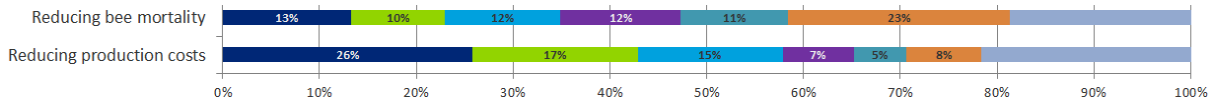


Figure 22 – Effects of the apiculture measures according to beekeepers' opinions (country results)

All in all, the measures are perceived to have had a positive effect on the amount of honey produced. They have contributed to stabilise the levels of production in a context of different factors putting pressure on it.

The consensus view in the interviews carried out in the four case study countries was that it is the overall support provided by the measures that should be valued. While we have tried to individualise and precise the effects of particular measures here, the measures complement

each other. They would not have the same effects if applied in isolation. Beekeepers valued the overall "network" of support provided by the measures

Main findings:

- The support measures have contributed positively to stabilise honey production levels in the EU.
- The measures have tackled different factors threatening production (such as varroasis and losses of bees due to various reasons) and facilitated productivity gains (notably through increasing beekeepers' knowledge and co-funding improvements in equipment).
- Technical assistance and control of varroasis measures have the largest effects on production quantities. The support to the rationalisation of transhumance was highly valued in Greece and Spain.
- The overall support provided by the measures was highly appreciated by the beekeepers. The measures complement each other, and conclusions on the individual effect of each measure on isolation should be drawn carefully.

Effect on the quality of honey

Regarding the quality of the honey produced in the EU, the measures appear to have had a positive contribution to ensuring it.

Two measures were singled out for their effect on the production of quality honey: technical assistance and support to laboratories carrying out analyses of the physico-chemical properties of honey.

1. The **technical assistance** measure has arguably contributed to rising directly or indirectly the level of technical knowledge of beekeepers around the EU (particularly in the main producing countries). Directly, through trainings for beekeepers. Indirectly, through the provision of support via the phone or directly on the ground in certain countries (such as Hungary and Spain). Informational material (leaflets, brochures, etc.) has also been distributed or made available in several countries. This has resulted in an accrued knowledge in several aspects related to the handling, maintenance and treatment of the beehives and honey (for example, on how to apply treatments against pests and diseases to avoid the spread of residues, when and how to harvest the honey, renewing the hive's wax, other aspects related to the hives' hygiene, or good practices in the extraction and storage of honey). This impacts directly the quality of the honey produced (for instance, by ensuring low water and hydroxymethylfurfural (HMF) contents, or by persuading beekeepers to avoid heating up the honey in order to avoid the loss of some natural properties of honey).

2. The **support to laboratories** carrying out the analysis of physico-chemical properties of honey has had strong positive effects on ensuring the quality of honey. While also having a direct impact in marketing and commercialisation, this measure has an immediate impact on the verification and certification of honey quality. The analysis of honey allows for an early detection of any issues pertaining to quality and/or consumer safety. While analyses are still perceived as costly (see Question 1.1.2), accessibility is no longer perceived as major issue, and the view that the efforts on this

end contribute to ensuring the quality of honey was unanimously shared among the stakeholders consulted.

In the survey directed to beekeepers and beekeeping associations, over 40% of the beekeepers judged the contribution of the measures to ensuring or improving the quality of honey produced in the EU to be positive (in which 19% of the respondent deemed the contribution as very positive, and 14% attached to it major positive effects). Results were relatively similar to these in both Hungary and Germany, while perception about the effects of the fourth support measure was much more positive in Greece and Spain. In Greece, a remarkable 48% of the responding beekeepers attached the highest possible value to the contribution of the measures to the quality of honey, with an extra 19% also valuing it as very positive. In Spain, 54% of the beekeepers considered the measure's contribution as very positive, and an additional 11% considered the positive effects as major.

The consolidated and country-specific results are shown in in figure 23 below:

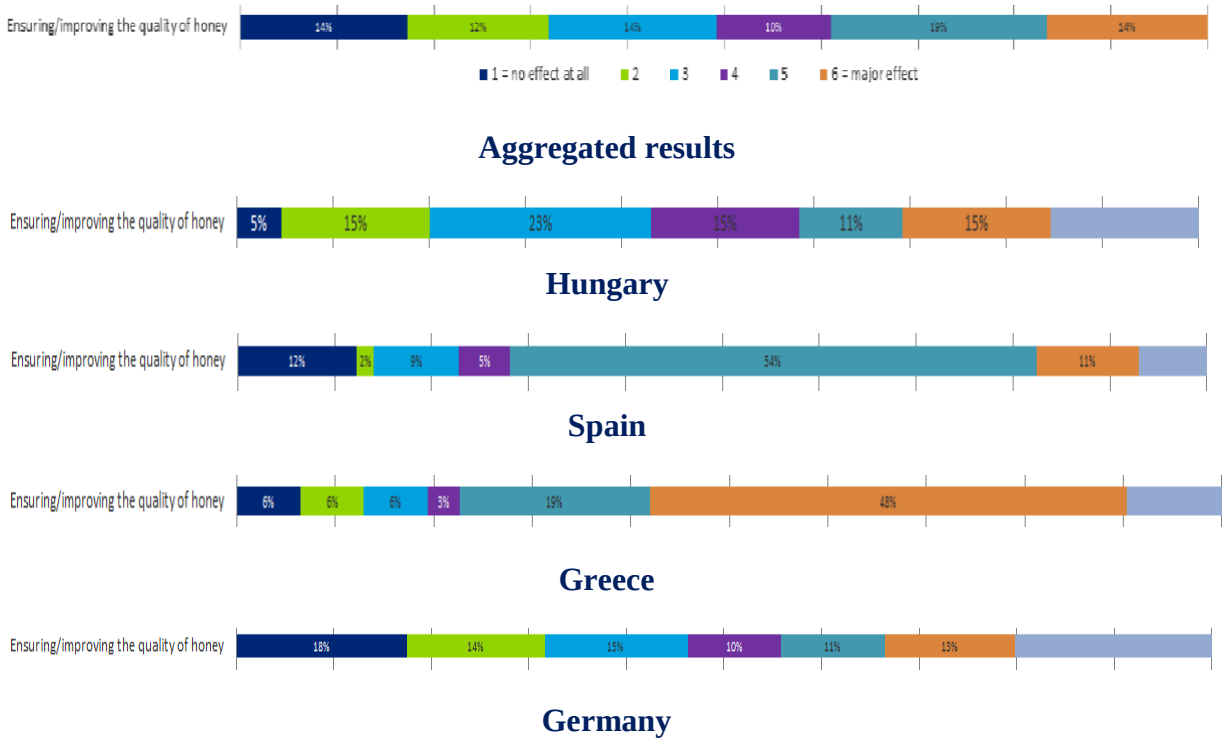


Figure 23 – Effects of the apiculture support measures in ensuring/improving the quality of honey according to beekeepers' opinions

As anecdotal evidence, a past scandal related to honey quality was reported in Greece. Some years ago, problems linked to the feeding of sugar to bees and the mixture of honey of different origins (botanical and, mainly, geographical) would have led to numerous batches of honey missing the regulatory requirements.

In Hungary, honey quality checking receives around €800 000 of support per year. The control appears to be strong, and it is reported that year by year the quality of honey is generally improving and the adulteration of honey becoming negligible. The last investigation was carried out in 2012 by the OMME, the representatives of the bee traders and packers and a local public notary as well as the laboratory Wessling Hungary LLc. Less

than 3% of the 86 samples collected showed a higher HMF content in comparison with the standard and only three samples showed non-nectar originated sugar in the honey.

While beekeepers and industry representatives held opposing views regarding the quality of imported honey, in particular Chinese honey (beekeepers bashed its quality while industry representatives defended it), there was a wide consensus than, on average, EU honey is of higher quality than honey of non-EU origin.

This notion is supported by a comparison of the EU's honey average prices of import and export. In 2009, the average export price exceeded notably the average import price (€4.45/kg vs. €1.93/kg, respectively. From 2000 to 2009, the average annual difference between average export and import prices was €1,98/kg.

Main findings:

- The measures have contributed positively to ensure the quality of the honey produced in the EU
- The support to laboratories carrying out physico-chemical analysis of honey and the technical assistance measure provided the biggest contribution

2. Marketing

The Regulation setting up the support measures is flexible with respect to its specific objectives, stating merely that the objective is "to improve the general conditions for the production and marketing of honey". No further specification of the concrete aspects or the direction in which the marketing of honey should be improved is done. In this context, we focus here on:

- The marketing of honey by beekeepers, that is, the extent to which the measures have helped beekeepers to market their honey in order to get an adequate retribution for it
- Honey consumption, that is, the extent to which the support measures have contributed to promote and increase honey consumption

The marketing of honey

Honey price drivers

The price received by beekeepers for their honey is affected by two main drivers: the type and quality of honey (including the differences between table and industrial honey, and monofloral and polyfloral honey) and the market structure (sales done directly to the consumer vs. sales to packers and distributors). In general, table honey reaches higher prices than industrial honey, and monofloral and honeydew honeys fetch higher prices than polyfloral honeys. As for the sale channel, beekeepers tend to receive a higher price the closer they get to the final consumer (that its, a higher price is obtained by selling directly to the consumer than by selling to packers and distributors).

The answers to the online survey and the evidence gathered through the case studies support those general statements about the differences in prices per type of honey and sale channel.

Figure 24 below shows how, as reported in the online survey, table honey reaches much higher prices than industrial honey. This confirms an intuitive, logical conclusion. Furthermore, the production of table honey clearly exceeds that of industrial honey. According to FAO estimations, about 20% of the honey on the world market is classified as industrial or baker's honey.[74] 92% of the respondents to the online survey for beekeepers declared that they do not produce industrial honey at all.

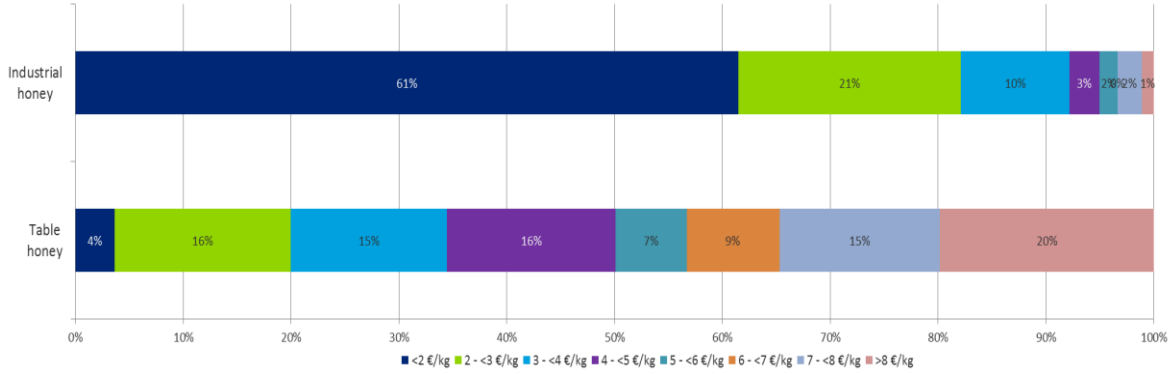


Figure 24 – Average prices of industrial and table honey as reported by beekeepers

It was generally agreed, as a matter of fact, that monofloral honeys reach higher prices in the market than multi-flower honeys. This was confirmed by evidence gathered through the case studies (the online survey compiled data about production per type of honey, prices per sale channel and for high-quality certificated honeys, but not generally about the general price per type of honey due to the disparities across the EU). In Germany, it was reported that the average consumer price for honey is around €8/kg but that honeys of specific botanical origins, such as heather honey, reach prices of about €16/kg. While the differences do not apply directly and proportionally to producer prices, they follow the same trend. In Hungary, acacia honey –the most typical monofloral honey in the country- has consumer prices in the range of €7-7.5/kg (corresponding to a farm gate price of €4-4.3/kg), while multi-flower honeys have consumer prices of around €4.5/kg (farm gate price of about €2.5/kg). In Greece, multi-flower honey is sold at around €8-10/kg, a price similar to that of heather honey. Thymus honey reaches a price of about €12-14/kg. In Spain, where monthly data prices are collected by a dedicated panel chaired by the Ministry of Agriculture, the prices received by producers were between €0.20 and €1 per kilogram higher for polyfloral honeys than for other types of honey, depending on the sale channel (see table 8 below).

Table 8- Honey producer prices (€/kg) in Spain per type honey and sale channel

	Polyfloral honey		Other honeys	
Commercial mode	**2007/2008**	**2008/2009**	**2007/2008**	**2008/2009**
Direct sales to consumers	5	5	6	6
Sales through cooperatives	2.20	2.35	2.60	2.60

[74] "Bees and their role in forest livelihood", Nicola Bradbear, FAO (2009)

Jarred sales to retailers	3.64	3.57	3.89	4.10
Sales to industry or wholesalers	1.98	2.16	2.27	2.53

The results of the online survey and the evidence gathered through the case studies also support the notion that beekeepers receive higher prices for their honey the closer they get to the consumer. Direct sale of honey brings beekeepers the highest revenues (we have not considered here the bottom line impact on net revenue, due to related increases in costs for the processing, storage and distribution of honey).

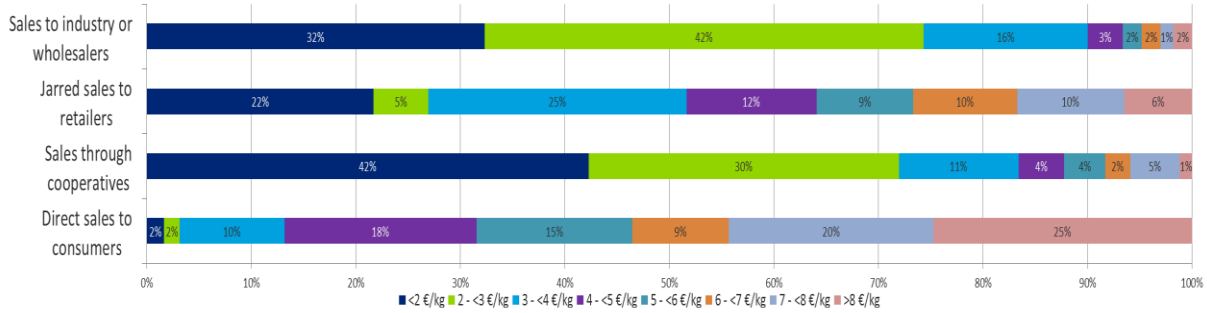


Figure 25 – Honey prices per sale channel

As figure 25 clearly shows, beekeepers receive the highest price when selling directly to consumers. Afterwards, the second-best option in terms of price is selling jarred honey to retailers. On third place come the sales to industry or wholesalers, while the sales through cooperatives produce similar prices. This is explained by cooperatives selling the production of their members to large packers and distributors. These results contradict however some of the evidence obtained in the case studies. The most clear example is provided by Spain, where, as shown before, sales through cooperatives provide beekeepers a higher (albeit not much) price than sales to packers and distributors. Spain provides the prototypical case where cooperatives sell most of their honey to packers and distributors, and yet it is economically more advantageous for beekeepers to sell their honey through cooperatives than directly to wholesalers. By concentrating larger production amounts, the cooperatives gain some bargaining power and are able to obtain better prices, as wholesalers are more dependent on them (they cannot replace so easily the quantity of honey sold by the cooperative or completely do without it, and have to conduct less agreements to acquire the same amount of honey so can afford some slightly higher price). If prices are higher selling through cooperatives in this case, it should be even more the case when the cooperative packs and sells its own honey (according to the regular functioning of cooperatives, members receive an equal share of the profits).

Now that we have presented under which conditions beekeepers receive a higher retribution for their honey, we look into the actual market structure, the main obstacles for improving the marketing of honey, and the effects the support measures have had on them.

Market structure

In terms of sale channels, the results from the survey to beekeepers and beekeeper associations, presented in figure 26 below, indicate a preponderance of direct sales to consumers with 63% of respondents declaring that over 50% of honey sales in their territory are done through this channel. Conversely, sales through cooperatives appear to be quite limited, which also holds to a lesser extent for jarred sales to retailers and sales to industry and wholesalers.

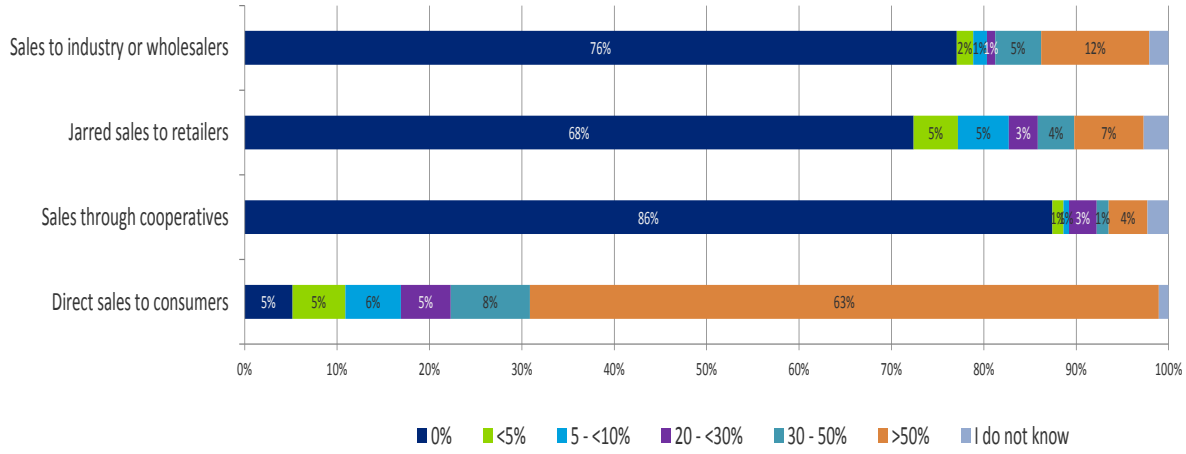


Figure 26 – Share of honey sales per channel, at EU level

These figures are in line with the non-professional nature of beekeeping, but do not accurately reflect the disparity of sale channels across the EU. For instance, the larger part of total production in Spain is sold to the processing sector, which is made feasible by the low production cost due to the highly professional nature of this activity in this country. Indeed, as will be discussed more in detail in Theme 2, the average producer price in Germany is almost triple of that of Spain. According to the data gathered by the Spanish Ministry of Agriculture in conjunction with beekeeping associations, 50% of the honey production in Spain is sold to the industry or wholesalers, while 30% is sold through cooperatives (which in turn sell it mainly to the industry –large packers and distributors-), 10% is sold jarred to retailers and only 10% is sold directly to consumers.

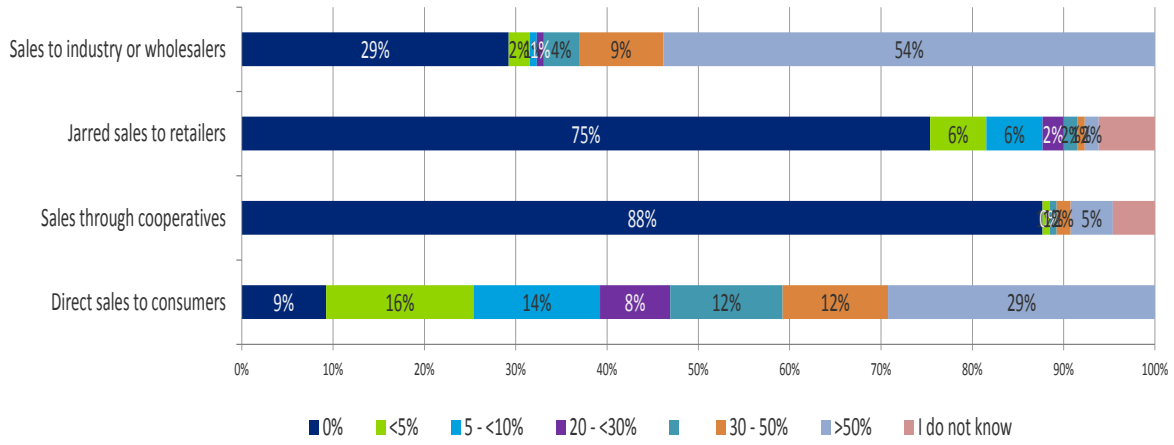
Conversely, in Germany, over 70% of local production is sold directly to consumers, in line with the overwhelmingly non-professional nature of beekeeping in this country. Indeed, non-professional beekeepers have little incentives in selling limited production quantities to the processing industry as they rely on local sales for which prices are more stable. Minimum prices per honey type are actually set by beekeeping associations. Non-professional beekeepers base their prices on them.

In Hungary, according to Bartos and OMME, direct sales represent 13% of total consumption, whereas sales through intermediaries represent 87% of total consumption. Intermediaries then export this honey throughout Europe, but mostly to Germany. Hungary has become a major honey exporter, exporting 2/3^{rds} of its local production. However, although the quality of the Hungarian Acacia honey is very high, it is often mixed with other imported honeys. The mixing of Hungarian honey thus prevents this honey from being sold as high end honey. The roots of this problem seem to stem both from the underinvestment in marketing activities- which could be supported through the CAP measures-, and (as perceived by beekeepers in Hungary) from lack of a comprehensive study on the quality of

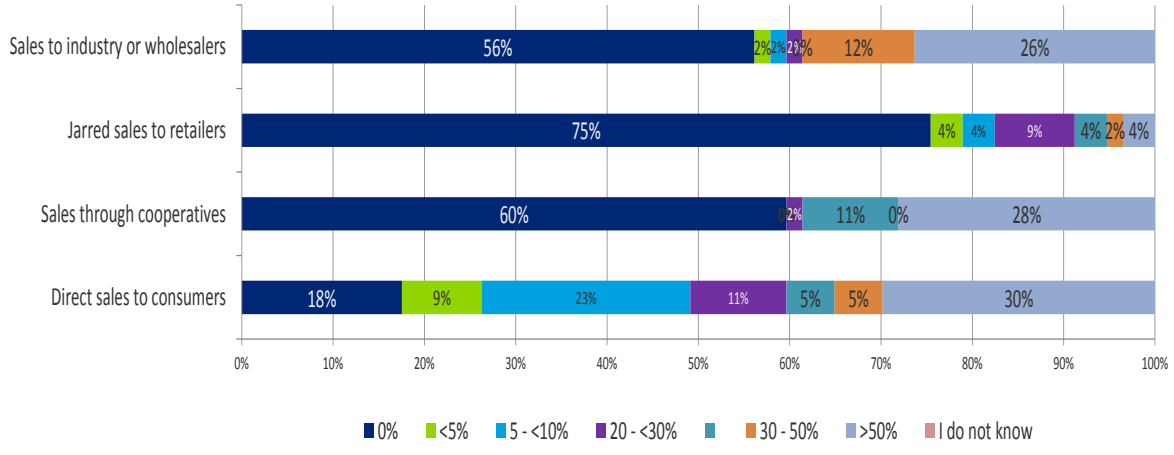
Hungarian honey along well established criteria (e.g. share of fructose and glucose, sugar and pollen content, etc.).

In Greece, there is no official statistical data as regards to the repartition between direct sales to consumers and sales through intermediaries. However, they are estimated to be approximately equitably distributed.

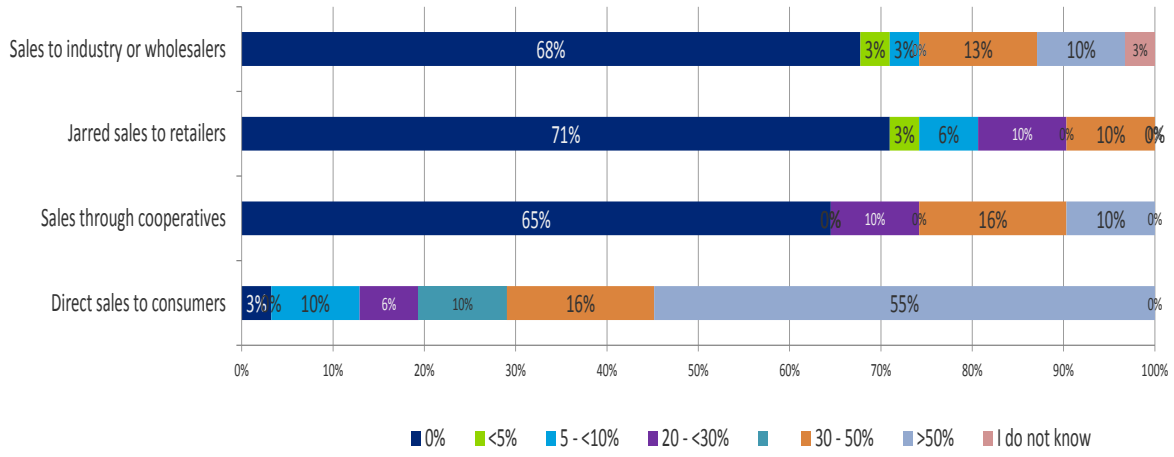
These trends are confirmed in the individual surveys to beekeepers in the case study countries, shown in figure 27 below. Indeed, 81% of German respondents claimed that over 50% of their honey production is sold directly to consumers, whereas the corresponding number drops to 30% for Spain. And conversely, 1% of German respondents asserted that over 50% of their production had been sold to industry or wholesalers, whereas the corresponding number amounts to 26% for Spanish respondents. In Hungary, 54% of respondents answered that over 50% of their production is sold to industry and wholesalers, whereas the corresponding figure for Greece is 10%. Finally, 29% of Hungarian respondents indicated that over 50% of their production had been sold directly to consumers, whereas this was the case for 55% of Greek respondents.



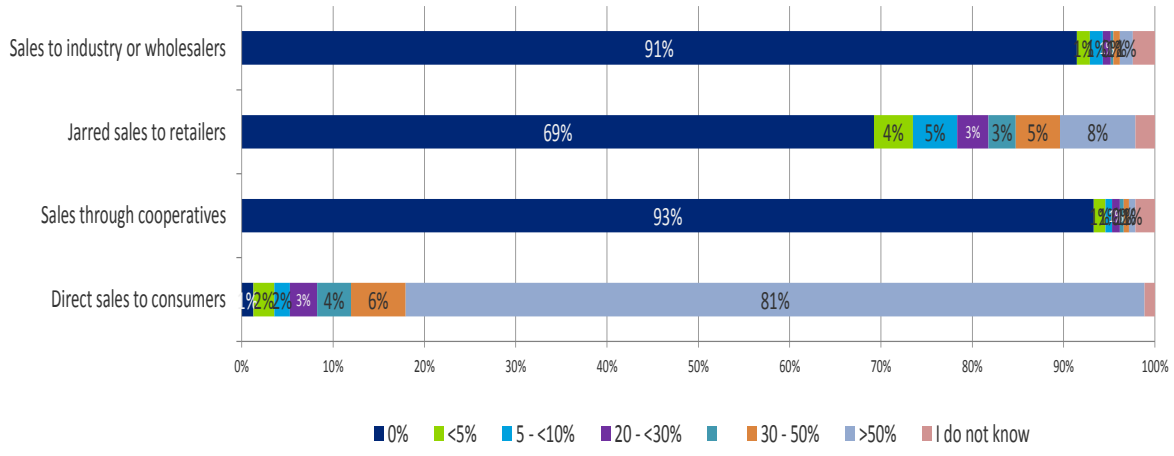
Hungary



Spain



Greece



Germany

Figure 27 – Share of honey sales per channel, for case study countries

Therefore, while direct sales are the norm in a predominantly non-professional market such as Germany, their share is substantially lower in countries with more professional beekeepers such as Greece, Hungary and Spain.

We look now into the factors preventing a higher share of direct sales.

Barriers to direct sale

Barriers to further direct sales to consumers, as highlighted in the results of the online survey to beekeepers and beekeeper associations shown in figure 28 below and in Annex 6, seem to be rather similar across Members. The high degree of leverage/bargaining power of wholesalers, lack of cooperation among beekeepers to enjoy bargaining power and economies of scale, and the high cost of analysis of honey are outlined as the most prevalent major obstacles confronted by beekeepers.

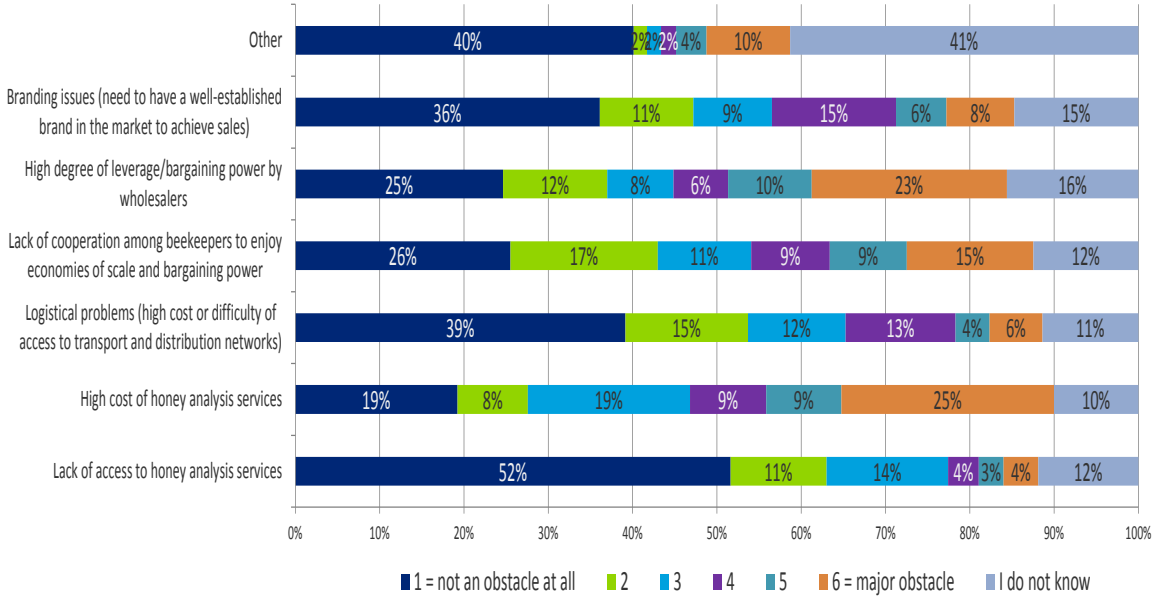


Figure 28 – Obstacles hampering direct sales to consumers

Differences at Member state level lie in the fact that in Hungary 38% of respondents identified the bargaining power of wholesalers as a major obstacle. This is in line with the production profile of this country, in which the overwhelming majority of production is sold to wholesalers, and then exported. In Greece, the high cost of honey analysis was identified as the greatest obstacle to more direct sales. It was also perceived as an obstacle in Spain. In the case of Greece, there are concerns regarding the fact that despite funding, through the support to laboratories measures, the equipment at the disposal of laboratories has not been improved, and therefore that beekeepers tend to have their analyses carried out abroad, and mostly in Germany.

Sending samples for analysis to Germany is also common practice in Spain, but principally for exporting purposes. For the standard analysis required for compliance for direct sale locally, the analysis facilities existing in Spain would be enough, but still expensive. An attempt led by the largest cooperative in the country to create a national reference laboratory where the analyses were concentrated has failed (it was alleged that close to €300000 in equipment are lying idle, due in part to the preference for regional laboratories linked to the co-financing of the analyses by the regions). For more detailed analyses, however, the samples are sent to Germany, particularly as this country is together with France the main destination for Spanish honey exports and German importers seem to have rather specific requirements and prefer to have the analysis carried out in their local laboratories. Other factors are particularly relevant in Spain.

Interviewees stated that in Spain there are two major factors preventing further direct sales to consumers. Firstly, cumbersome administrative and sanitary requirements are strong deterrents to further direct sales to consumers as they notably impede beekeepers from directly assessing consumers in local markets. These requirements have been described by interviewees as excessive and unfair in view of standards imposed in other countries. This was notably confirmed in the online survey to beekeepers and beekeeper associations with

the difficulty in accessing health records repetitively being outlined (in the others category in the survey) as an obstacle to increasing direct sales to consumers (the category "other", where the comments were included, received the largest share of responses as a major limitative factor). Secondly, it was emphasized that even large cooperatives, with greater administrative capacities and with their own honey analysis facilities tend to sell to the downstream sector, and not directly to consumers. This can be partially explained by the fact that, according to a market study on consumer behaviour in Spain realised by Intermiel in 2011, 67% of Spanish consumers purchase their honey in either supermarkets or hypermarkets and are highly price sensitive. As consumers demand honey at a low price, Spanish retailers have not specialised themselves in high-end honey and therefore sell honey which is often mixed with imported honey. Honey used in honey mixes is subject to high international competition, hence the importance of maintaining low production costs is high. It was concluded that, in Spain, there is a need to raise consumer awareness regarding the natural properties of honey in order to enable Spanish beekeepers to move up the value chain and receive more value from specialist honeys (while large quantities of monofloral and high-quality honeys are already produced in the country, it is hard to find these in the shelves of supermarkets and hypermarkets, since it appears that consumers do not value them so strongly). Efforts are carried out by the sector in this direction, taking as a basis a comprehensive market study carried out in 2011 by the recently created inter-professional association of the sector, Intermiel (grouping representatives from beekeepers and the industry).

Therefore, there are three main drivers seeming to prevent larger amounts of direct sale of honey by beekeepers:

- The high bargaining power of wholesalers
- The high cost of honey analyses and
- The lack of cooperation among beekeepers

Underlying these, a common perception that the product could and should be more valorised by consumers emerged.

Overall, it was perceived by beekeepers and beekeeping associations that the effect of the support measures on fostering the marketing of honey was weak.

Among the main obstacles or factors preventing more direct sales, the bargaining power of wholesalers is largely out of reach for the support measures, the high costs of the honey analysis falls within their remit, and the cooperation among beekeepers can be encouraged and indirectly supported by them.

The efforts to support the laboratories carrying out the analysis of physico-chemical properties of honey were perceived positively among beekeepers, but the costs of the analysis, as shown above, are still considered as high. Among the beekeepers reached through the online survey, only 17% considered this measure as not particularly relevant, while 13% considered that changes in its current configuration were necessary to make it relevant to the beekeepers' needs. 21% considered the measure as helpful in its current form, and 24% considered it helpful but advocated for more funds and access to it (22% of beekeepers did not provide an answer).

Cooperation among beekeepers

The degree of cooperation among beekeepers does not only refer to or involve commercial relationships. Beekeepers join associations for informational and support purposes, without this implying that they should sell their honey together through or as in cooperatives. The interviews clarified that the opinions about the negative effects of a lack of cooperation among beekeepers related to the perceived potential benefits forgone by a lack of union. On one hand, it was perceived that a stronger union would favour a higher valorisation and promotion of the product, not in the least vis-à-vis the industry (but also towards the consumer). Bargaining power would be gained. On the other hand, it was gathered that beekeepers envisioned some potential in terms of economies of scale (including, but not limited to, the purchase of medicines against varroa and various equipment elements) and pooling of resources (e.g., access to equipment owned communally and use of common laboratories or other facilities). Beekeeping remains however an essentially individual activity, which harms the possibilities of cooperation. Furthermore, this vision was far from shared unanimously. For instance, it was perceived particularly in Spain that some older beekeepers were more reluctant to accept the potential benefits of cooperation. It was not commonly agreed, then, that this "enhanced cooperation" should take the form of cooperatives. As shown by previously presented price data, sales through cooperatives are not as economically advantageous as direct sales.

The overall support provided to the sector has arguably contributed to the structuration and development of the sector. Due to reasons that can be traced back to the history of the sector, which started to develop and to receive EU support much later than other agriculture and livestock sectors, it appears that the degree of organisation of the sector is still, to some extent, in an infant stage. With the support provided by the EU, and the observed developments the measures have brought about, it appears that the sector has realised its potential and started to develop consequently over the last 10-15 years. In this sense, by making visible the potential gains stemming from, inter alia, investments in equipment to further mechanise the production of honey, the measures have contributed to develop the business culture in the sector. This still refers mainly to countries where beekeeping is a highly professional activity, such as Greece and Spain. In countries where the sector is overwhelmingly non-professional, such as Germany, an increased level of association among beekeepers does not bring about purely commercial benefits, but is still advantageous. In turn, the sharing of informational materials and the facilitation of trainings helps to increase the level of technical knowledge of the sector, making possible, among other, better sanitary practices and reduced bees' losses. This is coherent with the objectives of the German National Apiculture Programme (conserve beekeeping, maintain the bee population to ensure widespread pollination, improve the production and marketing of pure apiculture products which do not contain residues, and increasing the competitiveness of local honey and apiary products against imports from third countries).

Honey's value for consumers

A recurrent topic came up during the interviews carried out an EU and national level: the future of the sector goes through an enhanced valorisation of the product by consumers. Consumers should value honey more and this could be achieved by a better communication of the natural properties of honey (such as its antioxidant and antibacterial properties, or its positive effects on reducing throat irritations). Specific botanic origins entail specific added properties. In order to maintain these beneficial properties, the use of appropriate production, extraction and processing techniques is paramount. Honey changes its composition and loses

some properties if it is warmed up (certain enzymes break and some volatile components elaborate)[75]. This happens, for instance, if honey is warmed up to liquefy it (as allegedly liquid honey tends to be preferred by consumer). In this sense, it would also be beneficial to "educate" consumers. If consumers begin to attach importance to the properties of honey (making sure, to the extent possible, that the honey has been handled properly and therefore valuing guarantees in this respect) and the specific botanical origin (which impacts the flavour, smell, colour and viscosity of honey, but also other natural properties), they would be, in principle, willing to pay a higher price for the honey.

While this seems to be a rather theoretical reasoning, the amount of stakeholders that expressed it *motu propio* and/or agreed to it was remarkable. These not only include beekeepers and representatives of beekeeping associations but also industry players and public authorities.

Similarly, while any discussion of price rises should carefully consider the decline it could originate in demand, it should be noted that honey is not a primary need product. Per European Commission data, the average honey consumption per person is around 0.7 kg/year.[76] At such level of consumption, it appears that an increase in the price of honey would not lead to major impacts on consumers' income, and could therefore be sustainable in the long-run. What is more, once again a remarkable majority of the stakeholders consulted estimated that an increase in consumer could be achieved without hampering market demand.

This leads us to the other suggested metric to assess the improvement in the marketing of honey: average annual honey consumption per capita.

[75] See the study "Value-added products from beekeeping" from the FAO http://www.fao.org/docrep/w0076e/w0076e00.htm#con

[76] Source: Advisory Group for Apiculture, Honey Market Situation, 2010, DG AGRI-C-4

Honey consumption

According to European Commission data, honey consumption per capita in the EU has remained stable around 0.7 kg/year since the establishment of the support measures. Honey consumption per capita was reported to have remained at 0.7 kg/year between 1996 and 2005[77]. In 2008 and 2009, per European Commission data[78], consumption averaged 0.6 kg/year per person, and went back to 0.7 kg/year per person in 2010. Overall, the data point towards a clear stability in the amount of honey consumed per person in the EU.

As the topic of the value consumers attach to honey was discussed during the interviews, stakeholders also agreed to the notion that the consumption of honey could be increased if better communication and promotion efforts were carried out.

While the Regulation explicitly calls for an improvement in the general conditions for the marketing of honey, the general effects of the measures on it are perceived as rather inexistent. Regarding the promotion of the consumption of honey, no significant effect or consumption increase was found. If any, the measures might have contributed indirectly to honey consumption via the support to production (while consumption per capita remained stable, total consumption grew as EU population increased) and moderating beekeeping costs (and therefore, although the correlation is not perfect, consumer prices).Both in Hungary and Spain, beekeeping consultants are made available to beekeepers. Their fields of expertise include marketing, but while the impact of this supporting activity (carried out under the technical assistance measure) on production was valued as positive, its effects on marketing were not considered relevant at all.

For example, in Hungary the marketing activities of beekeepers and beekeeping organisations efforts were perceived as lacking coordination and overall vision. However, certain scandals linked to the discovery of "fake" honey in shops would reportedly have led to a growing trend by consumers to turn directly to beekeepers and look for a more "artisanal" product. In addition, a successful initiative by the sector was quoted: the OMME introduced the "Hungarian Producer's Honey Jar", a jar in two sizes with a dedicated pattern available only for members of OMME. The jars have been distributed for five years, and it appears they have achieved a good level of popularity.

In a similar fashion, the majority of the apiculture experts and stakeholders consulted agreed that it is often not easy for consumers to differentiate the variety and quality of honey, and therefore its properties. Initiatives in this sense, such as the Hungarian Producer's Honey Jar, go hand in hand with any possible increase in the price of honey. Once again, it appears that the effects of the support measures have been negligible here, even though there was a wide consensus (including public authorities) about the need for actions in this field and the existence of significant margin for improvement.

Main findings:

- The support measures have contributed to improve the marketing of honey in certain countries (e.g., actions developed under the support measures such as the quality label

[77] Source: Eurostat, Member States and DG AGRI's estimations, through the report of the Spanish Ministry of Agriculture "El sector de la miel en cifras. Principales indicadores económicos en 2011" (May 2012).
[78] Source: Advisory Group for Apiculture, Honey Market Situation, 2010, DG AGRI-C-4

of the DIB in Germany or the Hungarian Producers' Honey Jar introduced by the OMME in Hungary), but have not provided any noticeable contribution in others – such as Spain-.

- The support to the analysis of the physico-chemical properties of honey was considered positive, but limited, by beekeepers. An indirect link between the measures and the facilitation of honey trade could be established through the contribution to the production of high-quality honey.
- The market structure and more concretely the high bargaining power of wholesalers present major obstacles for beekeepers.
- There was no noticeable effect on the consumption of honey, which has remained stable in the EU over the last 15 years.

3. Trade

We focus here on the extent to which the measures have affected the trade of honey, that is, how the measures have impacted the export-import dynamics of the honey market.

We can distinguish two dimensions of trade: extra-EU trade (trade with non-EU countries) and intra-EU trade (trade between EU countries).

According to EUROSTAT data (see table 9 below), the EU's exports of honey to third countries increased steadily each year from 2006 to 2011, with just a setback in 2009. In 2011, EU exports of honey to third countries almost doubled the level of exports in 2005. Going back further in time, exports in 2003 reached a relative peak, before plummeting in 2004 and decreasing more moderately in 2005.

Table 9 – EU honey exports to third countries (in tonnes)

Extra-EU Honey exports (Tons)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BULGARIA	260,2	179,3	341,8	1309,7	798,7	323,9	388,2	275,5	262,3	172,9	139,8	220,6
CZECH REPUBLIC	6,3	4,6	42	59,5	0,8	0,2	2,3	0,1	-	15	1	0,4
GERMANY	1713,9	1893,2	2217,9	1552,7	1601,6	1674,2	2356,6	2493,6	2850	2893,5	3161,6	3348,9
SPAIN	1566,2	1894,4	2280,4	1859,6	1272,7	1250,5	1520,5	2770,9	2953,8	2659,1	2953,8	2388,1
FRANCE	855,4	1050,2	862,8	783,1	804,8	781,5	832,5	857,3	882,8	761,1	914,9	1053,7
GREECE	60,8	125,6	100,8	102	89,7	125,5	75	90,1	109,4	116,6	188,1	183,5
HUNGARY	669,9	707,2	584,1	627,9	331,3	614,4	584	710,6	737,1	819,9	719,3	1107,7
ITALY	213,5	292,7	250,8	313	232,7	364,4	295,5	323,4	305,4	254,9	344,8	338,3
POLAND	-	-	-	-	119	64,6	113,7	88	41,7	53,1	66	58,2
PORTUGAL	55,4	18,9	26,2	32,3	35,1	40,8	42,2	63,8	75,6	65,1	85	102
EU27	6294,5	7280,2	9604,6	10482,5	7606,9	6684,7	7866	9265,9	10114,2	9522,1	10759	11808,7

Source: EUROSTAT

The imports of honey from third countries, in the meantime, showed relatively stable levels between 2005 and 2009, with a dip in imports in 2007 being the main noticeable development (Table 10). Imports increased substantially from 2009 to 2010 (over 10000 tons), and maintained a similar level in 2011. Going further back in time, the amount of honey imported was almost 15% higher in 2011 than in 2000.

Table 10 – EU honey imports from third countries (in tonnes)

Extra-EU honey imports (Tons)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BULGARIA	13,1	33,6	38,6	408,4	195	17,1	13,2	139,5	768,6	127	41,6	119,7
CZECH REPUBLIC	316,1	372,7	326,1	1334,6	415,2	247	692,8	346,6	439	547,2	732,2	885
GERMANY	75028,9	77121,6	79904,1	72699	71142	74638,7	68313,2	71672,2	72625,5	64258,6	66979	55134,1
SPAIN	10182	12375,7	6416,1	7349,9	9925,6	11734,8	13491,3	8267,9	9245,7	8007,9	12137,3	13472,5
FRANCE	1892,8	1447,5	2435,8	3120,7	4020,4	5955,9	7634	5236,3	7617,5	5991	5078,3	8601,3
GREECE	45,6	26,9	10,5	30,7	259,8	101,2	42,2	0	-	26,1	63,1	19,3
HUNGARY	7,2	49,1	204,5	312,7	237	0	0	260,1	273,4	196,4	96,6	4,7
ITALY	7046,7	7616,3	8227,9	7930	8632,2	9042,1	8050,6	6058,1	7209,7	6573,5	5803,4	6702,8
POLAND	-	-	-	-	3218,8	3204,2	2755,3	1386,6	2925,4	4341,7	3690,7	6289,1
PORTUGAL	390	413,7	159,9	246,9	393,7	109,9	38,1	40,2	1,2	40,2	21,9	63,8
EU27	129651,8	139160,1	134995,3	122268	126413	138485,9	135325,4	127032,5	142305,6	137338,1	148778,4	147325,1

Source: EUROSTAT

Imports from EU countries are hardly significant in terms of volume when compared to imports coming from third countries. The latter were more than 12 times larger than the former in 2011.

Concerning the average import and export prices it can be said that these both increased from 2005 to 2009, with clearly marked rises in both 2008 and 2009 (see table 11 below). The average (sale) export price has historically been significantly higher than the average price for imports into the EU; in 2009, the former stood at €4.45/kg, while the latter stood at €1.93/kg (EUROSTAT data received through the European Commission report to the Council and the EP).

Table 11 EU's honey average import/export price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Avg. import price	1,13	1,24	1,73	2,31	1,96	1,29	1,34	1,38	1,69	1,93
Avg. export price	2,96	2,85	3,03	3,71	4,13	3,63	3,47	3,65	3,93	4,45

Source: EUROSTAT Comext

As far as the link between the support measures and the aforementioned developments is concerned, the findings suggest a weak cause-effect relationship.

There was agreement between the beekeepers' representatives, industry players and national authorities consulted, that honey presents utility-like traits at world level, and therefore the price of honey in the world market is only affected by large shifts in supply or demand.

While the EU is a prominent player in the world honey market, accounting for around 13% of the total honey production (FAO), over a 40% of the world imports of honey and about 6.5% of the exports (EUROSTAT data included in the European Commission report to the Council and the EP), its role in the market dynamics, and in particular in the formation of price, is limited. The EU is not self-sufficient (its ratio of self-provisioning has remained stable for the last few years at around 60%), making it necessary to resort to imports to satisfy the internal demand. The price of such imports is largely dictated by the world market, which also influences EU internal prices.

It is however worth noting the significant gap between the EU's average export price and the import price, with the former being considerably higher. A good part of the gap, according to

industry representatives, is explained by the type of honey produced, as monofloral and natural polyfloral honeys (vis-à-vis highly processed mixes coming from outside the EU), prevalent in the EU, receive higher prices in the market. A link can be found here to the support measures, inasmuch as they have contributed to the general stabilisation of production levels and supported the production of high-quality honey. Technical assistance, rationalisation of transhumance and, particularly, the support to the analysis of the physico-chemical properties of honey, have all contributed to ensuring the quality of EU honey and building an image of quality in the market. Some of the interviewees pointed at the growing appreciation for EU honey in the rest of the world, hence probably explaining in part the increase in exports.

Nevertheless, while the long-term trend in exports is clearly positive, yearly fluctuations of exports and particularly of imports, suggest that the effects of the support measures on overall trade levels (amount and price of exports and imports), is largely out of reach for the measures.

While certain help is provided under the technical assistance measures for aspects of beekeeping outside of production (including marketing), no evidence was found, through interviews or desk research, that the measure had had any direct impact on fostering the export of honey. However, via stimulating production and quality, the export of honey is strengthened by the apiculture measures in an indirect way.

The data for intra-EU trade are presented in table 12 and 13 below.

Table 12 – Intra-EU exports of honey (in tonnes)

Intra-EU Honey Exprts (Tons)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BULGARIA	5016,1	3201,8	3729,2	5143,3	4820,7	3301,5	4292,2	3538,8	3069,3	5942,6	8400,2	6632,4
CZECH REPUBLIC	2264,7	1788,6	1825,1	1964	2974,4	2826	3335,9	4326	2245,3	2036,6	1187,5	2748,8
GERMANY	22110,1	21044	24604,7	19676,9	22801	24462,7	23230,5	24286	26183,4	20058,6	17416,3	15674,7
SPAIN	6739,7	6966,7	13687,3	10766,3	9453,8	8935,4	9615	12293,7	13424,5	13572,8	18746,3	16790,4
FRANCE	2080,1	1975,4	2304,8	1584	1767,7	2271	3212,6	3522,4	4539	2922,3	3031,2	3017,1
GREECE	280,5	449,4	243,4	623,3	567,5	548,5	393,2	446,3	503,2	502,5	648,2	600,7
HUNGARY	12136,5	12017,9	14439,2	15179,2	14864,7	18629,6	18859,3	20262	23441,8	13418,2	13182	11313
ITALY	3225,4	3428,7	3556,6	2248,2	2488,1	3582,4	3371,5	3670,3	3775,3	3197,4	6614,4	6105,4
POLAND	-	-	-	-	705,5	117,8	259	502,4	688,6	1453	2654,8	4631,8
PORTUGAL	592,2	1280,8	2143,1	1713,4	425,1	254	722,4	1658,8	1756,8	991,4	1820,2	1427,8
EU27	74580,3	70808,8	81572,5	76138,8	77904,3	81023,8	87156,6	91397,5	104117,1	96045,5	110306,7	104312

Source: Eurostat

Table 13 – Intra-EU imports of honey (in tonnes)

Intra-EU Honey Imports (Tons)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BULGARIA	7	3,9	1,5	41,5	0,8	1,5	19,2	101,2	85,3	74,5	188,3	168,8
CZECH REPUBLIC	318,1	700	717,6	422,7	684,8	1331,7	1696,9	1377	1564,2	1277,7	1423,8	885,1
GERMANY	20587,7	16753,5	20412,9	20889,8	17597,6	21007,6	20126,7	23647,2	20323,9	19446,2	23622	22901,7
SPAIN	3054,2	2865,7	5350,9	4025,1	3709,6	3088	4007,1	3357,9	7297	7244,3	5613	7181,9
FRANCE	13796,8	14107,5	14538	12702,9	13716	13558,1	14870,6	18425,9	20369,2	17421,4	20376,7	18633,9
GREECE	2249,2	2766,7	2742,2	1637,1	2484,4	2623,7	2408,5	2863,8	2820,5	2331,7	1946,9	2147
HUNGARY	849,4	640,6	753,2	962,5	933,2	0	0	1282	2549,3	190,6	168	88
ITALY	5459,7	4374,1	5858,4	6509,7	7091,3	5114,6	5734,5	4721,8	6374,5	8687,5	8757	8448,3
POLAND	-	-	-	-	378,1	1870,2	2921,2	1795,4	2666,2	3096	7931,3	7442,2
PORTUGAL	1436,9	1578,1	1919,1	1702,1	1003,8	817,8	1011,3	1485	1669,3	1335,7	1294,4	1341,5
EU27	71920,8	68818,4	82850,2	78277,7	77539,9	77125,6	83575,5	92553,6	101158,5	93095	103025,5	105198,9

Source: EUROSTAT

Considering the export and import levels of 2000, the data show a clearly increased level of intra-EU trade over the last decade. Both intra-EU exports and imports have increased around 40% over the decade.

Intra-EU imports have oscillated yearly over the last five years, alternating years with an increase in imports with years with a decrease in exports. Intra-EU exports rose significantly between 2009 and 2010, and increased slightly in 2011.

The amount of intra-EU imports is remarkably similar to the amount of intra-EU exports.

Once again, no direct link between the evolution of intra-EU trade levels and the support measures was found. An indirect link can certainly be established via the overall support the measures provided to the maintenance of production and quality levels in the EU.

Considering the similarity between intra-EU imports and exports, the most notable aspect of honey trade in the EU is the large disparity between extra-EU imports and exports. While exports are pricier, imports clearly outnumber exports (by a factor of more than 10). The massive imports are needed to satisfy EU's demand. The EU's self-sufficiency rate has remained stable around 60% over the past few years.

The main barriers for the trade of honey of EU origin, as reported by beekeepers in the online survey, are the weak requirements or leniency with the quality of imported honeys and the low prices of imported honeys. These concerns were confirmed vehemently in the interviews carried out at national and EU level. In third place as a limiting factor to trade comes the high bargaining power of wholesalers. Other limitative factors related to production costs, discussed in more detail above, were also noted.

The issue of the quality of imported honey is crucial here. In this respect, a strong disagreement was found between the representatives of the downstream sector and those of the production (beekeepers) sector. The former firmly defended the quality of imported honey, expressing their confidence in the different analyses and procedures mandatory for imported honey, which they deemed thorough and reliable.[79] In their opinion, honey imported into the EU is not of worse quality, but simply different. The representatives from the beekeeping sector, however, eloquently expressed their concern about the quality of imported honey, and in particular Chinese honey. According to them, such imports consist mainly of "artificial" mixes of honey, where sugar, syrup and other added compounds are mixed with "real" honey and/or natural constituents of honey to produce a product resembling honey and able to pass the testing analyses carried out, but which has none of the beneficial properties associated with "natural" honey. While such an issue is not perceived on the whole with Argentinian honey (although imports of Argentinian origin have drastically declined in Spain due to quality concerns), the beekeepers' representatives and apiculture experts consulted repeated once and again their concerns over Chinese honey, and also about honey of other origins (such as Turkey and Ukraine). Without entering into a debate about honey analysis procedures, precision and limitations, and the constituents of honey and the tolerable levels of

[79] Currently, only 38 countries, listed in Decision 2011/163/EU, are authorised to export honey to the EU. In order to become listed, these countries had to submit a residues monitoring plan (RMP) offering animal health guarantees equivalent to those in the EU. Such plans were approved by the Commission. Additionally, each batch of imported honey must be accompanied by a health certificate signed and stamped by an authorised veterinary officer from the competent authority of the exporting country. Thirdly, honey intended for human consumption can only be imported through an approved EU Border Inspection Post (BIP), where EU official veterinarians verify and check the honey and the accompanying certificates.

those, the current information at our disposal does not enable us to analyse further the issue of the quality of imported honey. However, the fact that wildly contradicting opinions were formulated by key stakeholders (and firmly defended) on this matter highlights the controversial nature of the matter.

The results of the online survey reveal the concerns of beekeepers and beekeeping associations in this regard. The quality and price of imported honey was perceived as a factor posing major limitations to trade in all four case study countries, and particularly more strongly in Greece and Spain. The aggregated results are presented in figure 29 below, whereas the country-specific results are presented in Annex 6.

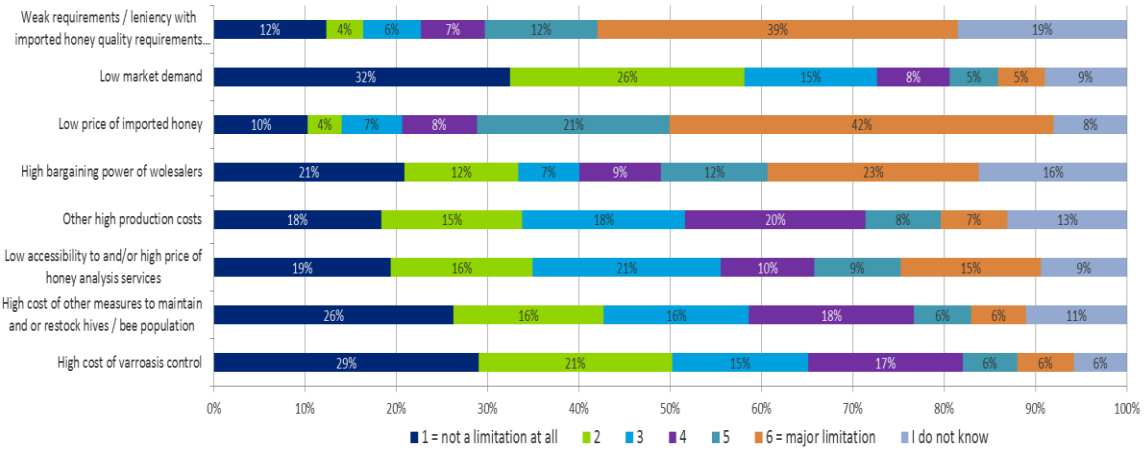


Figure 29 – Factors limiting honey trade opportunities for beekeepers

While certainly an issue of critical importance for the sector, the quality and testing procedures of imported honey are not covered directly by the measures. They are governed by trade and consumer safety rules, hence falling under a different remit. All honeys put on the EU market should meet the requirements of Directive 2001/110.

The bargaining power of wholesalers, also assessed as a relevant limitative factor, also escapes to a large extent to the scope of action of the support measures.

Nevertheless, as previously stated, the support measures are strongly directed towards ensuring the quality of EU honey. Although it does not appear to be the case in these moments, this could potentially be used as a differentiating factor and marketing tool to promote the sales of EU honeys. In addition, specific research projects aim to develop analysis techniques allowing to better identify the composition of honey and to detect "fraudulent" honeys. As an example of the importance conferred to the issue of quality, in the online survey for national and regional administrations "honey quality" was the second-most frequent factor cited by the Member States for deciding the total amount of expenditure allocated to each apiculture support measure.

Main findings:

- The support measures have had a very limited impact on the trade of honey.
- Both intra-EU and external trade of honey have remained stable since 2008.
- EU exports of honey to third countries dwarf in comparison with EU honey imports

from third countries (the latter being more than 10 times larger than the former).
- The EU needs to import large amounts of honey to satisfy internal demand.
- There is a growing trend in the positive gap between EU's honey average export price and the average import price of honey into the EU.
- The measures have contributed to some extent to enlarge this gap by promoting the production of high-quality honey (which reaches higher prices in the market).

4. Keeping and trade of live bees

We intend here to discern the impact of the support measures on the keeping and trade of live bees.

To begin with, there is little evidence suggesting that the intra-EU trade of live bees is a significant activity in the EU. At national level, the keeping and trade of live bees appears to occur in most countries, although through a rather informal market. Acquiring colonies swarms and queen bees mainly for the purposes of compensating for the losses of bees suffered appears to be a common, albeit small-scale practice.

Regarding the intra-EU trade of live bees, both Eurostat and FAOSTAT report very small figures. According to EUROSTAT's Comext, in 2012 France, UK, Hungary, The Netherlands, Portugal and Slovenia imported bees while Sweden imported and exported live bees. FAOSTAT data about intra-EU trade of live bees show an increase of about 9% in the number of traded consignments from 2012 compared to 2006. It is however difficult to distinguish the real effects from changes in compliance in registration. The fact that the figures reported for most EU countries equal zero suggest that the representativeness of the figures reported is only relative.

The following data in table 14 were retrieved from TRACES and provided by the European Commission:

Table 14 – Intra-EU trade of live bees

Year	Count consignments	Total Animal Number
2006	170	41020
2007	758	7619562
2008	929	179530
2009	907	255962
2010	1102	4485793
2011	1298	2283482
2012	1442	4562187

The data presented seem to point, particularly in view of the number of consignments, towards an increase in the trend of live bees. However, it is not clear how these data are influenced by changes in the degree of compliance with notification rules. The big leap

between 2006 and 2007 seems more likely to have been produced by changes in compliance behaviour than by an actual radical change in the amount of bees traded.

Evidence on the keeping and trade of live bees was specifically searched for and asked about during the interviews carried out in the case studies. However, little data could be gathered.

In Germany, it was reported that the import of live bees is likely to be very limited, due on one hand to the highly protective regulations trying to prevent the entrance into the EU of diseases from foreign countries, and, on the other hand, to the overly cautious behaviour of beekeepers, who seem to be in general rather anxious about the possibility of introducing bee disease if importing bee colonies or queen bees from other countries. No hard data were found, while it was pointed that, if existent, the veterinarian services of airports and harbours would probably the only ones placed to provide data on the amount of bee swarms and bee queen imported from abroad.

In Hungary, the level of trade of live bees was reported to be marginal. The Hungarian Bee Breeders National Association (MMOE in the Hungarian abbreviation) is the only organisation responsible for the breeding and trade of live bees in Hungary. The subspecies bred is *Apis mellifera carnica.* The Ministry of Agriculture Development, the National Agricultural Qualifying Institute (OMMI) and the Institute for Small Animals Research and Coordination Centre for Gene Conservation (KÁTKI) supervise the MMOE on the basis of the Law of Hungarian Act of Animal Breeding.

No data on the external or internal trade of live bees was found in Greece either. However, it was reported in the interviews carried out in the country that certain issues would have arisen with the import and hybridisation of honeys. Local beekeepers would reportedly have been importing queen bees from Italy, Germany and neighbouring countries, and these queens and the hybrids subsequently created would have proved their difficulties to survive in the Greek climate. In general, it was perceived that the purchase of live bees within the country is a common practice during periods of colony losses and bad weather. These purchases are meant to compensate the losses of bees suffered.

The internal and rather informal purchase of swarms and colonies with the purpose of compensating bee losses was also reported to be a common practice in Spain. According to the beekeepers and representatives of beekeeping associations and cooperatives consulted, this would however be a small scale activity, and none of the interviewees was able to provide information on prices or amounts. According to the latest data provided by the Ministry of Agriculture, as of April 2012, 37 of the 24 230 beekeeping holdings registered in Spain were dedicated mainly to selection and breeding of bees. In addition, in the economic survey included in the National Apiculture Programme, for a diversified beekeeping holding of 500 beehives focused on the sale of honey, the income coming from the sale of swarms was estimated at €1500 per year (at €30/swarm).

Different support measures have potentially beneficial effects on the keeping and trade of live bees, even if in a rather indirect manner such as the prevention of bees' losses.

Beekeepers signalled the measures supporting the control of varroasis, applied research and technical assistance as those facilitating more the keeping and trade of live bees. The support was however rather moderate.

Per case study country, in Hungary moderate beneficial effects were attached to the control of varroasis and a milder benefit was attached to the rest of the measures. In Spain, the technical assistance, control of varroasis and applied research measures were found to facilitate the keeping and trade of live bees in a significant manner, while no particular positive benefits of the other measures were perceived in this regard. In Greece the impact of all the support measures was valued very positively, and particularly so the impact of the technical assistance measure. The second most favoured measure was the one supporting the rationalisation of transhumance. No single measure was perceived to contribute in a relevant to the keeping and trade of live bees in Germany.

The consolidated results are presented in figure 30, and the country specific results in Annex 6 below:

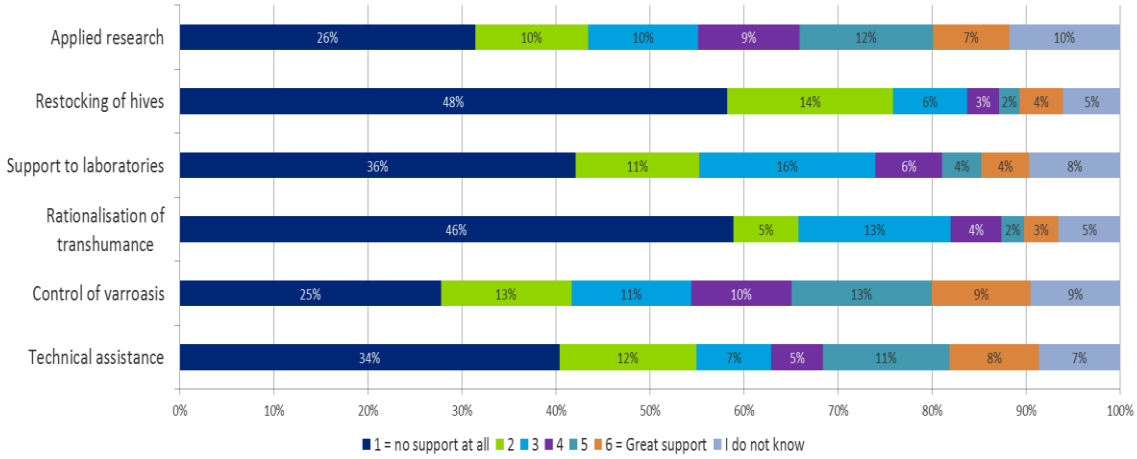


Figure 30 – Support provided by the support measures to the keeping and trade of live bees

It appears that the keeping and trade of live bees is a rather marginal activity in the EU. No reliable quantitative data are available, but it appears that the intra-EU trade of live bees is negligible. The trade of live bees within the Member States seems to be a relatively common practice, albeit rather unstructured and unorganised. Beekeepers consider that the measures supporting the control of varroasis, technical assistance and applied research facilitate the keeping and trade of live bees to a moderate extent. In Greece and Spain, the beneficial effects of the support measures in this field are perceived more positively.

Main findings:

- The trade of live bees between EU countries is a marginal activity.
- Little quantitative evidence is available on the trade of live bees.
- The keeping and trade of live bees within EU countries appears to be a common activity for hives' restocking purposes.
- The measures are perceived to have a very small effect on facilitating the keeping and trade of live bees. Technical assistance, varroasis control and applied research measures are considered by beekeepers to be the largest, albeit quite moderate facilitation effects, particularly in Greece and Spain.

Q1.2 To what extent have the measures contributed to support economic activity and the income of professional beekeepers?

The CAP apiculture measures do not foresee direct income support to beekeepers. Support is however provided in the view of improving the general conditions for the production and marketing of apiculture products, which includes promoting productivity increases through technical progress, and ensuring the stability of apiculture markets. The measures therefore support the overall beekeeping activity, and indirectly the income of professional beekeepers. The section will thus present to which extent the CAP measures supporting the apiculture sector have enabled to support activity and the income of professional beekeepers. This implies analysing to which extent the measures have enabled to limit production costs and ensured the stability of beekeepers' income.

This question has been answered by combining various information sources, such as desk research, interviews carried out at EU level and with local cooperatives in Member States, information collected during the case studies, as well as the results from the online surveys to national and regional Administrations, and beekeepers and beekeeper associations.

The measures have increased economic activity and the income of professional beekeepers by enabling to curb the increase in production costs and encouraging beekeepers to diversify their income sources. These two trends will be further elaborated upon in the following sections.

1. **Curbing the increase in production costs**

The measures do not provide direct income support to beekeepers, however, they provide beekeepers with tools which are necessary to adapt to the evolution of the market. Indeed, in a context of increasing production costs, international competition, as well as varroa threats, the measures could provide valuable support to beekeepers.

As such, to maintain the same level of production, interviewees estimated that costs have increased by 20% to 50%. A number of reasons were outlined be experts interviewed to explain this surge in production costs. Interviewees have emphasized that a very substantial increase in colony prices has been observed. For instance, in Belgium, prices have increased from €20-€30, to more than €150 in recent years according to a renowned expert in this field. In 2008, some regions saw bee mortality rates rise to 30-50%[80], which could partly explain the increase in colony prices. However, due to considerable disparities between regions, the EU reference laboratory has asserted that it would currently be inaccurate to draw conclusions on the evolution of the bee population in the EU, and therefore to generalise this argument. Furthermore, in the case of Spain, recent droughts have forced beekeepers to scale up their transhumance efforts, in order to provide their bees with sufficient food, which has had an impact on the fuel cost which they can incur. Finally, the greater use, and cost, of non-natural feeding sources, such as sugar, was also outlined by experts as one of the contributing factors to the increase in production costs.

[80] Working Party on Honey, COPA COGECA, (2009, "European Beekeeping at a crossroads, Strategic plan proposed by European beekeepers', http://www.biodlarna.se/website1/10.0.1.0/158/Strategisk%20plan%20Copa%20091118.pdf.

Table 15 below illustrates how producer prices[81] have evolved in the EU and reveals that in Germany, producer prices increased by 35% from 2005 to 2007. The increase is much starker in Hungary where production prices have increased by 126% from 2005 to 2010. The corresponding figures for Portugal and Spain are of 97% and 31% respectively.

Table 15- Honey Producer Price (US$/tonne)

Country	Year					
	2005	2006	2007	2008	2009	2010
Austria	7113.3	7433.4	8196.4	9008.7	9027.8	9092.1
Bulgaria	1896.7	1880.1	2323.1	3094.7	3353.6	3257.1
Cyprus	5541.5	5462.9	5897.8	6282.4	6944.4	6578.9
Czech Republic	1769.2	1840.3				
Estonia	4394.1	4693.7	7887.0	8138.7	9024.9	6096.9
Germany	6833.2	8475.6	9251.8			
Greece	6160.1	6353.6	7274.6	8268.7	8280.5	7812.5
Hungary	1621.1	2089.6	2413.5	3000.8	3375.3	3667.2
Italy	2742.5	2867.3	3036.0			
Latvia	3972.9	4681.0	5001.2	4525.6	5228.0	4949.1
Lithuania	2076.4	1641.8	1836.0	2549.7	2413.3	2926.2
Luxembourg	11211.8	11300.8	12335.7	13183.4	13194.4	12500.0
Poland	2391.8	2387.0	2483.7	2959.4	3406.5	3767.4
Portugal	2332.2	2383.0	3439.9	3825.7	4239.2	4595.5
Romania	4252.4	4150.2	4924.8	5256.3	4852.0	5085.2
Slovakia	2644.3	2714.1	3248.3	3777.1		
Slovenia	2735.0	2774.3	2440.4	2899.3	3343.1	4190.0
Spain	3126.8	3162.0	3257.5	3879.4	3792.2	4106.4
Sweden	5803.0	7804.5	6627.7	6768.8	5078.6	7269.2
United Kingdom	9233.3	9245.2	11153.4	13350.1	11078.1	12110.8

Source: FAO

The figures presented in the table above are averages and therefore do not reflect the disparity of production structures, and therefore production costs of individual beekeepers within a Member State. The survey to beekeepers and beekeeper associations provides interesting insights as regards to the production costs of individual beekeepers, thereby by highlighting these different production structures, which will be further elaborated on in Theme 2. Indeed, as shown in the Figure below, 40% of beekeepers responded that their production costs were situated between 1.5€/kg and 2.5€/kg. Interestingly, only 14% of respondents to the Spanish survey indicated that their production costs had been superior to 2.5€/kg. The corresponding

[81] Producer prices are defined, according to the FAO, as: "*prices received by farmers for primary agricultural products as defined in the SNA 93. The **producer's** price is the amount receivable by the **producer** from the purchaser for a unit of a good or service produced as output minus any VAT, or similar deductible tax, invoiced to the purchaser. It excludes any transport charges invoiced separately by the **producer**. Time series refer to the national average prices of individual commodities comprising all grades, kinds and varieties, received by farmers when they participate in their capacity as sellers of their own products at the farm gate or first-point-of-sale.*"

figures for Hungary, Greece and Germany, are respectively 45%, 64% and 58%. These figures do not take into account the size of the exploitations of respondents, which will be presented in Theme 2, and therefore cannot be considered as averages.

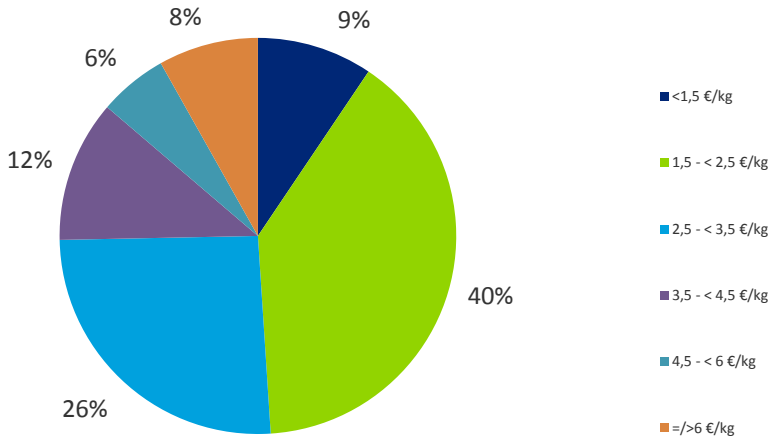


Figure 31 – Average Production cost (2008-2012)

Overall, stakeholders concurred that the measures had proved particularly useful in curbing cost increases. This is notably confirmed by the results of the online survey to beekeepers and beekeepers associations presented in figure 31. As such, 9% of respondents estimated that the measures had a major impact on reducing production costs. Furthermore, 14% of respondents estimated that the measures had a substantial impact (and rated the impact of the measures 5) on reducing costs.

The corresponding figures for the case study countries, which are presented in Annex 6, reveal substantial disparities. Indeed, respectively 14%, 9% and 26% of Hungarian, Spanish and Greek respondents indicated that the measures had a major impact on reducing production costs. The corresponding figure for Germany is only of 8%. Furthermore, 56% of Spanish respondents indicated that the measures had a substantial impact (5) on reducing production costs, whereas only 5% of German respondents answered similarly. The corresponding figures for Hungary and Greece are 6% and 23%. Consequently, according to these surveys, the measures had a greater impact in terms of reducing costs in Hungary, Spain and Greece.

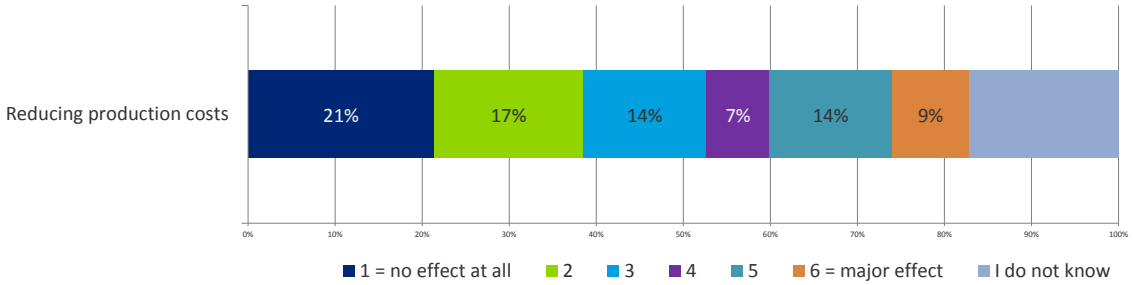
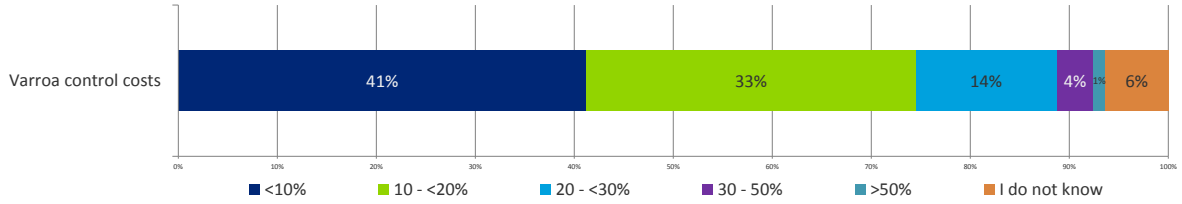


Figure 32 – Impact of the measures on reducing production costs

Several measures address transversally the matter of honey production costs.

The measure supporting **control of varroa** presents a clear example, as it is a widespread practice across the Member States to finance the treatments –which can represent a significant share of production costs. Indeed, varroa remains an essential issue and cost for beekeepers as confirmed by an interviewee mentioning the study, which has still to be published, conducted by the EU national reference laboratory, the *Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail,* which collected results from National Reference Laboratories, beekeeper associations and from a field survey. In this study, varroa was identified as the number one threat to the beekeeping activity, significantly ahead of other potential issues such as pesticides. Varroa control represents substantial costs for beekeepers which, according to experts interviewed, can amount to 15% to 20% of total production costs. This is partially confirmed by the results from the online surveys addressed to beekeepers and beekeeper associations; although it seems that the actual cost is closer to 15% than 20%. Indeed, as shown in figure 33 below, 41% of respondents answered that varroa represented less than 10% of their production cost, whereas 33% indicated that this cost accounts for 10%-20% of total production costs. There are slight disparities across Member States as regards to the cost represented by varroa. In Hungary, varroa control accounts for a superior cost compared to the average, whereas in Spain, this costs seems to be slightly inferior to the average.



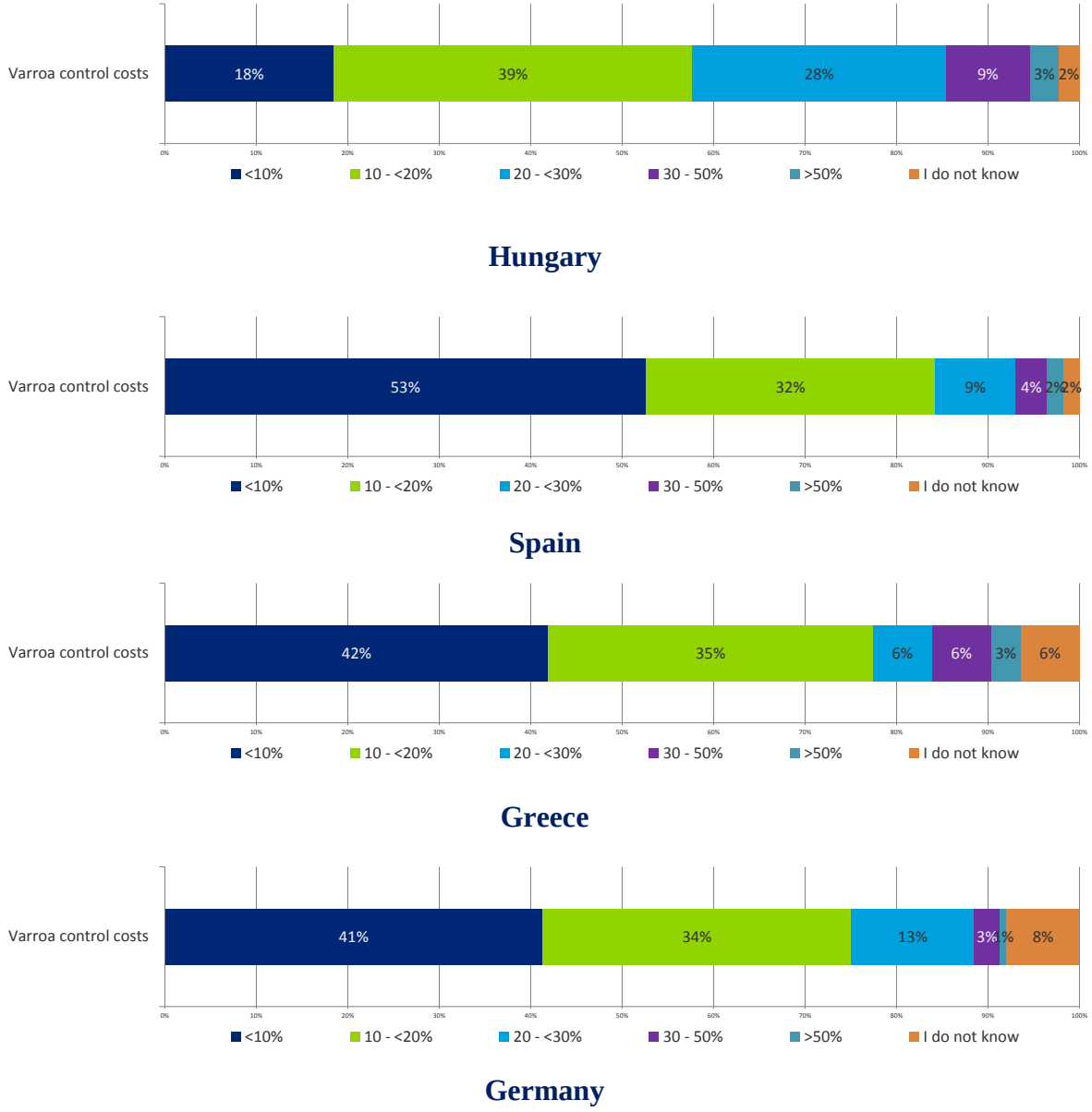


Figure 33 – Varroa control costs

Experts interviewed stated that varroa treatment cost is one that amateurs can bear, as return on investment is not a direct requirement for these stakeholders. However, it is a cost which is much more difficult to bear for professionals. Furthermore, as amateurs tend to have a more limited number of hives, alternative and cheaper non-medicinal treatment options can be used to control varroa. However, as these treatment options require substantial time to treat each hive, they are not a treatment possibility for professionals with large exploitations. Consequently, the control of varroa measure has been described by interviewees as particularly relevant in assisting beekeepers to lower production costs. Member States have made great use of the varroasis prevention measure as it is the most commonly used measure among the CAP support measures to apiculture.

The results from the survey for national Administrations, shown in figure 34 below also confirms the preponderance of the impact on varroa in designing national programmes as 63.8% of respondents pointed out that the effects of varroa on bee population had been a

factor taken into account when deciding on the total amount of expenditure on apiculture support measures. Furthermore, 55.2% of respondents underlined that cost of varroa control measures had been a key factor in their decision.

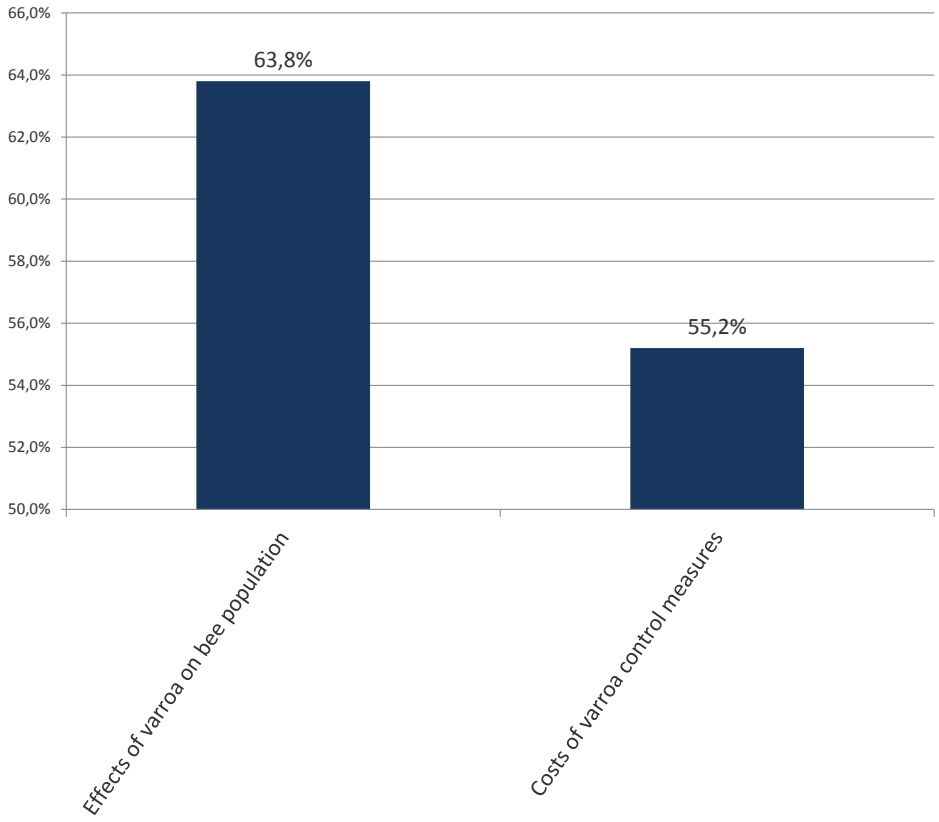


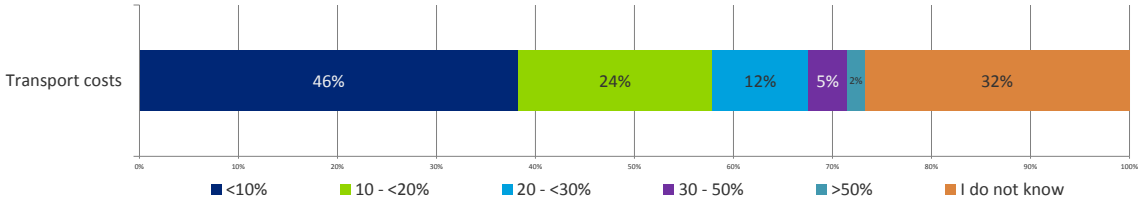
Figure 34 – Share of national and regional Administrations taking varroa control cost into account when deciding the total amount of expenditure on apiculture support measures

There is a general agreement among interviewees that measures such as those supporting the **restocking of hives** have also contributed to limiting the increase of production costs. These measures have therefore indirectly supported beekeeping activity and beekeepers' income. The restocking of hives measure is the most recent measure, which is available for co-financing under the CAP apiculture measures. However, it is gaining in authority with Member States, which are making ever greater use of it. Indeed, it is currently the fourth most used measure, but an increase of five percentage points has been observed between 2007 and 2009 in the usage rate of this measure, which now accounts for 15% of total expenditure.

The fourth measure (**support to laboratories**) also tackles, again in a majority of Member States, the issue of costs by providing co-financing for the analysis of honey. The measure not only supports beekeepers, but impacts other players in the apiculture landscape. Thus, for instance, several countries finance the purchase and maintenance of the equipment necessary to analyse honey. Producers of medicines to treat bee diseases and laboratories carrying out analyses of honey are also part of the honey industry at large.

Additionally, the costs of equipment and elements needed for beekeeping production (equipment for production, extraction, processing and potting of honey; equipment to handle

and move hives –such as trailers, pallets, loading equipment, cranes, covering mesh-; new hives, bee packages, bee swarms, queen bees, etc.) are also financed under other measures (**technical assistance**, **rationalisation of transhumance** and **restocking of hives**). This is particularly relevant as transport costs are quite substantial in countries such as Spain or Greece where transhumance is extensive. Indeed, as shown in figure 35 below, 61% of respondents indicated that transport costs accounted for 10-20% of total production costs in Spain. In Greece, 29% of respondents answered that this cost accounted for 20-30% of total production costs, whereas another 30% estimated that this cost represented between 30-50% of their total production cost. In Hungary, 33% of respondents indicated that transport costs accounted for 10%-20% of production costs, whereas in Germany, 60% of respondents indicated that this cost accounts for less than 10% of total production costs.



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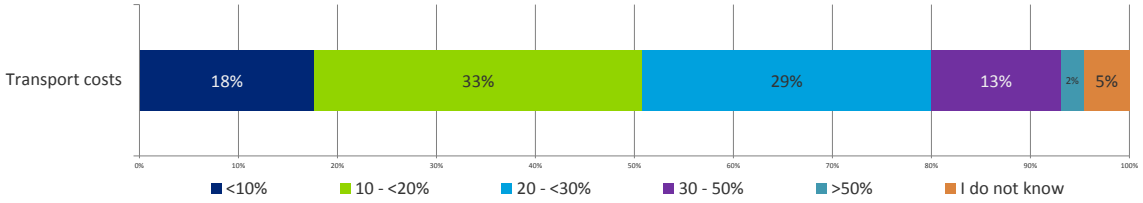
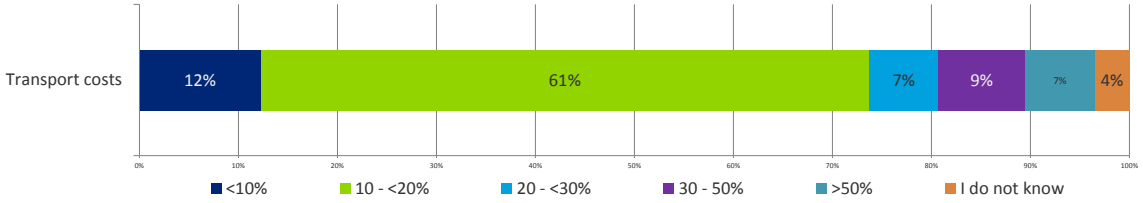
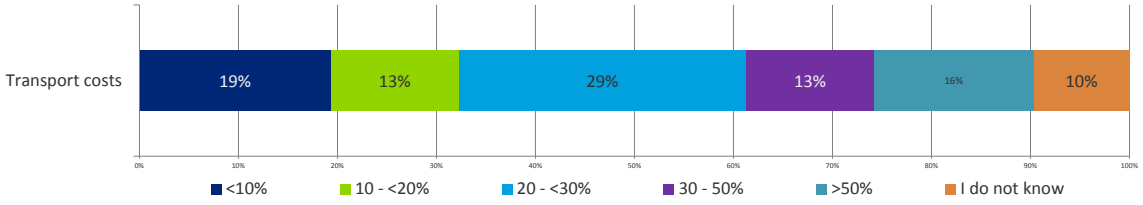


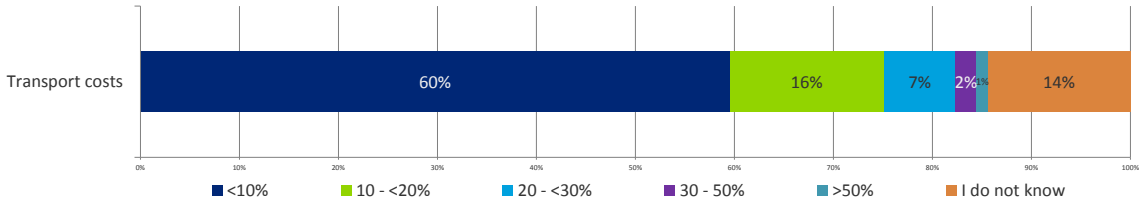
Hungary



Spain



Greece



Germany

Figure 35 – Transport costs

Main findings:

- Production costs have considerably increased over recent years for EU beekeepers.
- In this context, there is a general consensus among interviewees that the CAP apiculture measures have contributed to curbing this cost surge and therefore limited its negative impact on the incomes of beekeepers.

The other notable trend identified is the diversification of beekeeper income sources.

2. Diversification of income sources

Local cooperatives and interviewees have confirmed that there has been an increase in the production of other apiculture products, such as wax or royal jelly. It is however difficult to provide quantified information to illustrate this as these products are not monitored statistically. In 2005, production of beeswax was estimated to be of around four thousand tones[82]. However, this diversification has proven crucial as it enables to stabilise the revenue of beekeepers by providing them to adapt their production according to market conditions. This has been supported by the CAP apiculture measures, and notably in France where **technical assistance** measures have been geared towards royal jelly producers. Furthermore, the **applied research** measure has also funded studies on the nutritive and dietetic of hive products such as royal jelly. Consequently, the number of royal jelly producers has increased in France from 10 to 80 individuals in recent years. In Germany, desk research reveals that the corresponding figure is below 20. Another example of how the measures can be used to spur these types of activities can be found in Italy where the **applied research** measure has enabled to fund 'qualitative and quantitative evaluation of royal jelly components' as well as a 'study of propolis'. Interviewees have declared that the demand for these types of products is in fact very high, and that it is currently insufficiently met. Some interviewees have thus confirmed the need to bring explicitly these products under the scope of the measures, as beekeepers are currently insufficiently aware about the full potential of these markets.

Main finding:

- Experts interviewed asserted that the measures have sporadically encouraged the diversification of beekeepers' income by raising awareness on the potential of other apicultural products such as wax or royal jelly, when included in the national

[82] CBI Market Survey (2009), "The honey and other bee products market in the EU", http://www.fepat.org.ar/files/eventos/759630.pdf

apiculture programmes.

Q1.3 To what extent have the measures supporting apiculture contributed to price stability for honey?

This question deals with the impact the measures have had on honey price levels, and, more precisely, whether the measures have contributed to price stability for honey. In order to provide an answer to the question, we must first analyse the effect the measures have had on the determinants of honey price formation.

First of all, it is important to look at the evolution of the price levels. Then, any possible links with the measures will be analysed.

Regarding the price of honey, we can differentiate on one hand the "*producer price*" (price received by beekeepers at the farm-gate or at the first point of sale), and the "*consumer price*" on the other hand.

FAO data on producer prices have been presented in the previous question. While there are some data gaps[83], the figures point to a steady yet significant increase in producer prices between 2005 and 2010. Focusing on the four case study countries, prices in Germany, Greece and Spain rose around 30%, while consumer prices in Hungary augmented by a startling 126%.

Data on consumer prices, on the other hand, are scattered and not easily available. The figures gathered in the case studies have been presented in Question 1.1.2 (effects of the support measures on the marketing of honey), but do not offer a systematic account on the evolution of consumer prices. Indeed, one of the remarks received during the interviews carried out at EU-level was that there was no clear visibility on the level of prices across countries and per type of honey. In particular, it was gathered that it is difficult for beekeepers to easily gain access to information on market prices.

The National Apiculture Programmes generally contain some information on honey producer prices[84] and, in some cases, on honey consumer prices. However, the disparities are such that the comparison of the information is not possible. The evolution of consumer prices cannot be drawn from the national programmes.

Other valuable data to analyse price evolution are those provided by Eurostat Comext on average prices to export and import, and which were included in the Report from the Commission to the Council and the European Parliament. As presented previously in this report, those figures show again an increase in prices from the beginning of last decade until 2003 (2004 in the case of export prices), followed by a decline and a new increase from 2005 (2006 for export prices). From 2005 to 2009, the average import price rose from €1.29/kg to €1.93/kg; in the same period, the average export price rose from €3.63/kg (in 2006 the price was actually lower, sitting at €3.47/kg) to €4.45/kg.

[83] For 2005-2010, data on producer prices were missing for Belgium, Finland, France and Ireland. The latest data for Germany and Italy date from 2007 while for Slovakia the latest data are from 2008.

[84] As an example of countries with a good level of control or prices, a honey pricing board was established in Spain in 2000 through the creation of a joint price monitoring committee. This committee classified and defined the characteristics of the honey market, and a price monitoring system was devised and implemented with a view to standardising pricing for the different qualities of honey and pollen.

All in all, from 2005 the price of honey seems to have increased consistently, but significant changes from year-to-year (such as those which took place between 2007 and 2008, and 2008 and 2009) were still experienced. This seems to indicate a rather relative degree of stability: while no dramatic changes in prices have been experienced from year-to-year, variations above 10-15% have taken place.

To a certain extent, the use of average prices can be misleading. As stated before, the origin and type of honey, as well as the sale channel, market structure and country all influence the price level of honey. However, average prices can be adequate to measure the overall effects on honey price stability.

No relevant effect of the support measures on honey price levels and stability was found through the case studies and interviews or elicited via desk research. In accordance with the evidence gathered in the case studies and the interviews with stakeholders at EU and national level, the price of honey would be mainly determined by market conditions. Therefore, the effect of the support measures on price stability would be, by definition, limited.

As regards the more standard honeys, all the interviewees, including the representatives from the industry, agreed that the effect of the measures is, at best, negligible: this type of honey is akin a commodity and prices are fixed at world level. Regarding more distinctive, pricier types of honey, seasonal and annual availabilities could produce larger variations in price. In this case, inasmuch as the measures have arguably contributed to stabilise the levels of production in the EU, and supported particularly the production of high quality honeys (which are less price sensitive and can therefore suffer larger price variations), an indirect link with the support measures could be established. This effect was however not generally perceived as significant.

Similarly, at a more macro level, the contribution of the support measures to maintaining stable the amounts of honey produced in the EU could contribute in a certain manner to price stability. While the EU imports large quantities of honey, local production still amounts to around 60% of the honey consumption in the EU. In this context, an eventual collapse of honey production, which would be more likely without the support measures, would probably drive honey prices up (in this case, however, the group most affected by the price rise would be the consumers; producers would be directly hit by the decline in production). None of the interviews or the information gathered through desk research was able to assign a concrete value to this rather macro effects of the measures on price stability.

Furthermore, even though prices seem to have risen consistently in the last few years, other reasons could account for it. The increase in production costs led by other factors (such as the widespread presence of varroa and the cost of treatments), for instance, could very well explain the sustained rise in prices, and, coupled with other relevant uncontrollable factors (such as weather), the resulting effect on the relative stability in prices.

All in all, although honey prices appear to have risen consistently over the past few years, relevant variations in prices still occurred on a yearly basis. Therefore, price stability was only relative. Large disparities in price levels across countries and per type of honey also lead to treat with caution any general statement applying to all the EU. At best, the general contribution of the measures to the stabilisation of production in the EU could have had a trickle-down effect on price stability. However, honey prices are largely out of reach for the support measures. They are decisively determined by world honey market conditions and the

structure of the national markets (including the bargaining power of packers and distributors, and the amount of direct sales carried out by beekeepers). All of it leads to conclude that the effects of the support measures on price stability for honey seem to be weak.

Conclusions

Honey production in the EU appears to be under severe pressures. Varroa and the increase in production costs present, among other factors, substantial obstacles to honey production. The apiculture measures have contributed positively to tackle these obstacles, and have additionally provided benefits in productivity through an increase in beekeepers' knowledge and improvements in their equipment. The result has been a stabilisation of the levels of production of honey in the EU over the last few years. The contribution of the measures to the production of honey is therefore valued positively.

Also the marketing and trade of honey were found to be positively, although marginally, by the apiculture measures. Market conditions, including the degree of bargaining power of wholesalers and the honey price fixed in the world market (the price of imported honey being significantly lower than that of EU-produced honey) are major drivers of the marketing and trade of honey, and present serious obstacles for EU beekeepers. The support to the production of high-quality honey, notably through the support to honey analysis, seems to have the largest, albeit limited, effects. The marketing of honey was pointed out as an area with a major upside potential. Efforts to increase consumers' perception of the value of honey were widely suggested by stakeholders in the sector.

The support measures have not exerted any noticeable influence on hone price stability. Honey producer prices, however, are generally on the rise, and the measures have sporadically encouraged the diversification of beekeepers' income by raising awareness about the potential of other apicultural products such as wax or royal jelly.

5 PART III: Theme 2: Effects on the structures of production

Introduction

One of the instruments to improve the production and marketing of apiculture products is the structures of production of the beekeeping activity. Indeed, the adoption of new infrastructural and technological means, as well as organisational structures, can have momentous impacts on productivity, product valorisation and cost efficiency. Assessing if the CAP funding has enabled to upgrade and modernise production techniques is therefore the central question which will be answered in this section. The CAP measures supporting the apiculture sector foresee support in such a way. Indeed, the **technical assistance** measure was designed in order to '*enhance the efficiency of production and marketing by introducing better techniques'* whereas the **rationalisation of transhumance** is '*intended to assist with managing the movement of hives in the Community and with providing locations for the strong concentration of beekeepers during the flowering season*[85]*'*.This section will thus present to what extent the CAP measures supporting the apiculture sector, and notably the two enumerated here-above, have induced structural improvements in the sector. The following axes will therefore be elaborated:

- Professionalization (level, evolution, impacts) including evolution of size of exploitations;
- Evolution of production techniques

This question has been answered by combining various information sources, such as desk research, interviews carried out at EU level and with local cooperatives in Member States, as well as with results from the online surveys, to national and regional Administrations, as well as beekeepers and beekeeper associations.

Findings

The second theme relates to the effects on the structures of production, which entails answering the following question:

Q.2.1: To what extent have the measures supporting apiculture induced structural improvements in the sector?

Structures of production firstly refer to the stakeholders who are involved in the beekeeping activity. The professionalization of the beekeeping activity is therefore a key variable, which will be further elaborated upon in this section. Furthermore, structures of production refer to the way in which beekeepers carry out their activity. The evolution of production techniques

[85] European Commission (2010), 'Report from the Commission to the Council and the European Parliament on the implementation of Articles 105 et seq. of Council Regulation (EC) No 1234/2007 on measures improving the general conditions for the production and marketing of apiculture products'

is therefore a preponderant element to take into consideration, and which will consequently be assessed in this section.

1. **Professionalization**

Apiculture remains an overwhelmingly non-professional activity, with professionals accounting for only 3.2% of beekeepers and 33% of hives[86] in the EU. This is notably reflected in the results of the survey to national and regional Administrations, presented in the figure below, in which 51.7% of respondents indicated that professional beekeepers accounted for less than 5% in their country or region. Furthermore, 55.2% of respondents answered that professional beekeepers owned 25% of hives or less. Therefore although they are less numerous than hobbyists, they proportionally own a greater number of beehives.

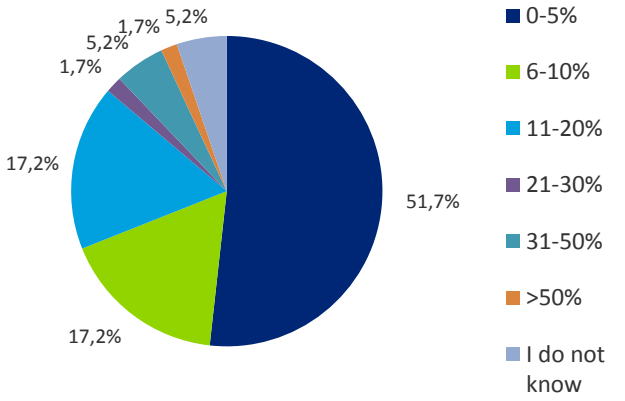


Figure 36 – Share of professional beekeepers at national and regional level

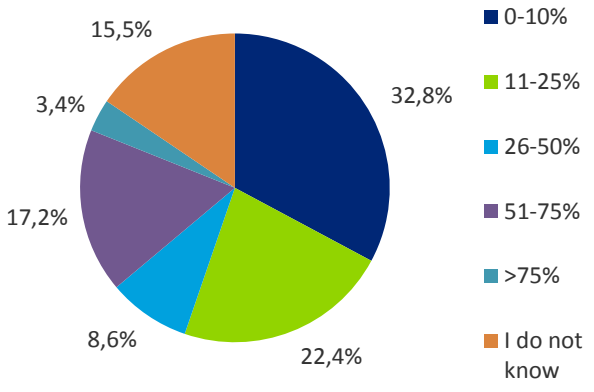


Figure 37 – Share of beehives belonging to professionals

As a result, apiculture is often qualified as a mix activity in the sense that it is not a primary source of income for the stakeholders of this sector, but often a complementary one, such as in the case of farmers or non-professionals. For instance, in Germany, although less than 1% of beekeepers are professionals, 5% of beekeepers can be considered as part-time beekeepers, which implies that they derive over 50% of their income from beekeeping activities. In the other case study countries, the level of professionalization amounts to respectively 5-7% in Hungary, 22% in Spain and 39% in Greece. The results of the online survey to beekeepers and beekeeper associations, shown in the figure below, confirm this disparity across Member States with respectively 30%, 69%, 40% and 2% in Hungarian, Spanish, Greek and German respondents indicating that they are professionals.

[86] European Commission (2010) 'Document de travail des services de la Commission - Document accompagnant le rapport de la Commission au Conseil et au Parlement européen sur l'application des articles 105 et suivants du règlement (CE) n° 1234/2007 du Conseil relatif aux actions visant à améliorer les conditions de la production et de la commercialisation des produits de l'apiculture COM(2010)267'

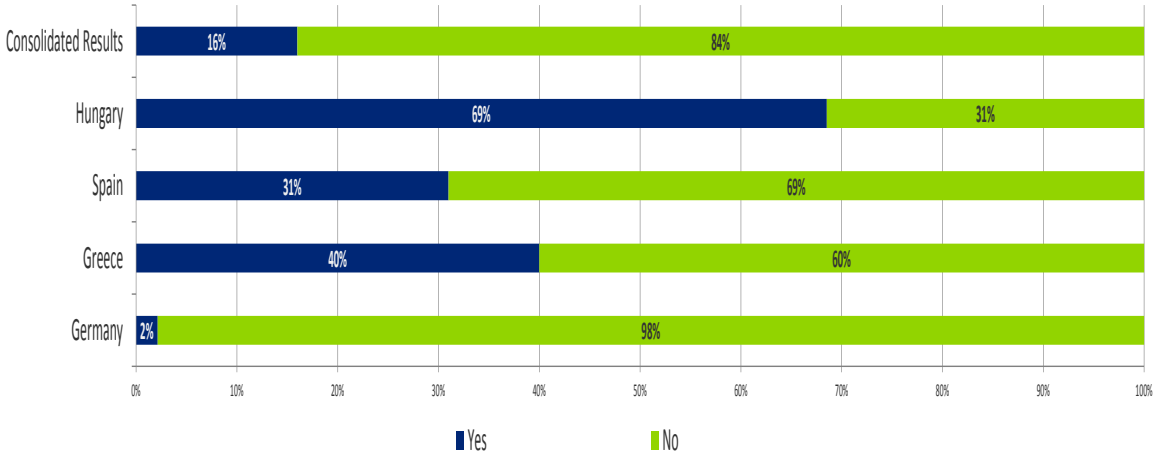


Figure 38 – Share of respondents to the beekeeper and beekeeper's association survey indicating that they are professionals

Therefore, the types of stakeholders involved in beekeeping differ considerably across Member States, which has implications on production costs, and supply channels. Indeed, as can be noted from the following figure, 58% of respondents to the beekeeper and beekeeper associations' survey indicated that their annual production was inferior to 500 kg. However, the comparison of the case study countries reveals vast discrepancies as 50% of respondents to the Spanish survey answered that they produced over 6000 kg per annum, whereas only 2% of German respondents pointed out that they sold such amounts.

Therefore, a highly professionalised beekeeping sector such as the Spanish or Greek ones will tend to be characterised by large exploitations, which produce honey in great quantity. Conversely, a highly non-professional beekeeping sector, such as the German one, will be characterised by a limited number of hives per beekeeper, and therefore a limited production per beekeeper.

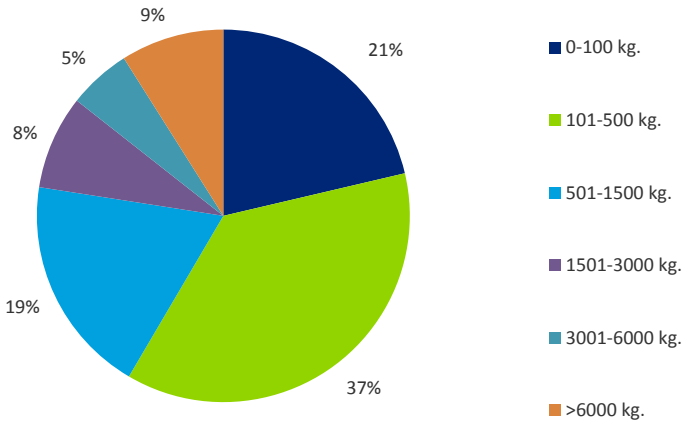
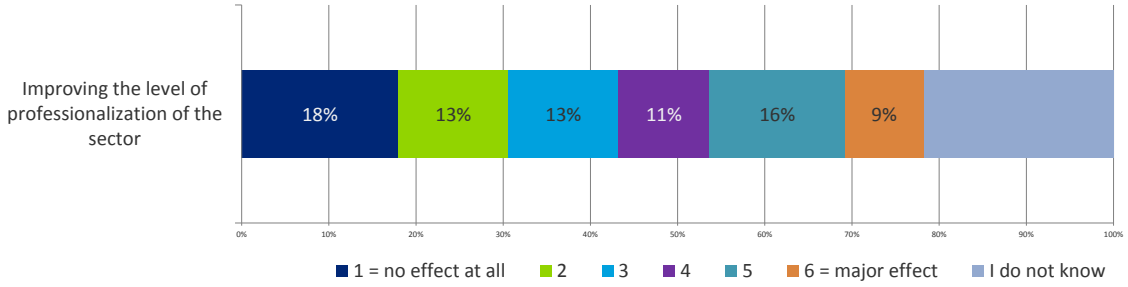


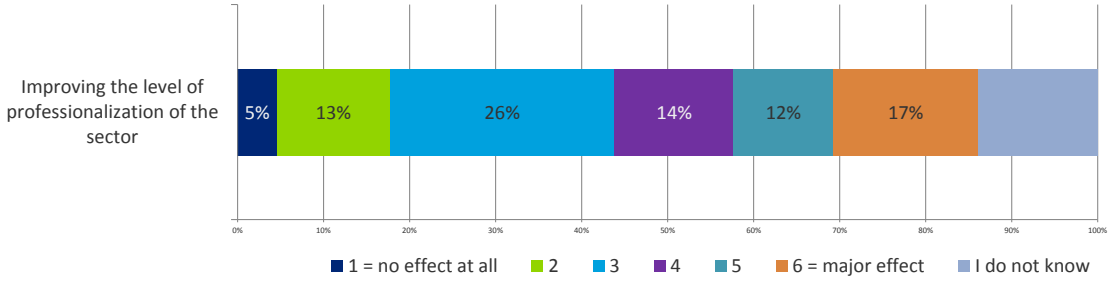
Figure 39 – Size of exploitation (in terms of honey production)

A comparison of the number of professionals between the periods 2005-2007 and 2008-2010 shows an increase of 0.2 percentage points in the EU, compared with amateurs[87]. These figures take into account the EU enlargement. However, the comparison, over the same period, of the corresponding figure for just EU25 countries (so EU 27 – RO and BG) reveals an increase of 0.4%. Although the increase is greater at EU25 level than at EU27 level, it remains quite marginal. However, professionals play a crucial role in the sense that their impact on total production is substantial. For instance, in France, although professional beekeepers only account for 4% of total beekeepers, they account for 63% of total honey production, according to the 'Audit Economique de la Filière Apicole 2012".The extent to which the CAP measures have contributed to this professionalization of the beekeeping sector is unclear. However, 9% of respondents to the beekeeper and beekeeper associations' survey, as shown in figure 40 below, highlighted that the measures had a major effect on improving the professionalization of the sector. This could be explained by the fact that in numerous Member States, such as Greece, Spain or France, only professional beekeepers are entitled to benefit from the measures. Indeed, in Greece, 39% of respondents to the survey indicated that the measures had a major effect on professionalising the activity, whereas in Spain, 53% of respondents responded that the effect of the measures had been substantial. Experts interviewed for the Greek case study indicated that by defining minimum thresholds, in terms of hives, incentives would thereby be created to encourage hobbyists to become professionals, by expanding their exploitations, registering under a cooperative, and consequently benefiting from the measures. This could therefore partly explain how the measures have encouraged the professionalization of the beekeeping activity in these Member States.



Consolidated Results

[87] European Commission (2010) 'Document de travail des services de la Commission - Document accompagnant le rapport de la Commission au Conseil et au Parlement européen sur l'application des articles 105 et suivants du règlement (CE) n° 1234/2007 du Conseil relatif aux actions visant à améliorer les conditions de la production et de la commercialisation des produits de l'apiculture COM(2010)267'



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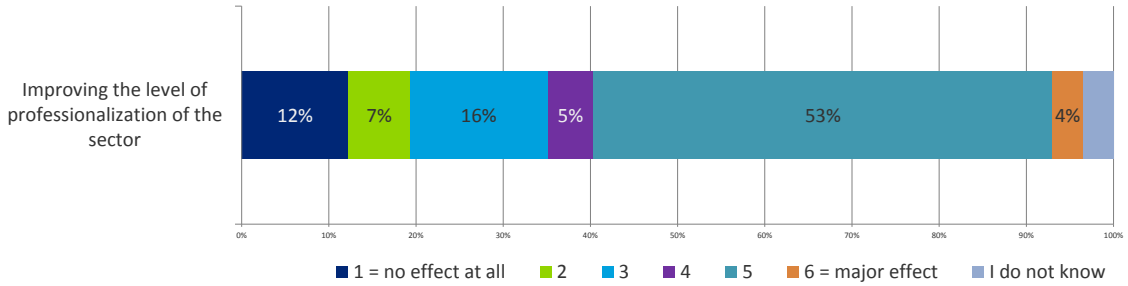
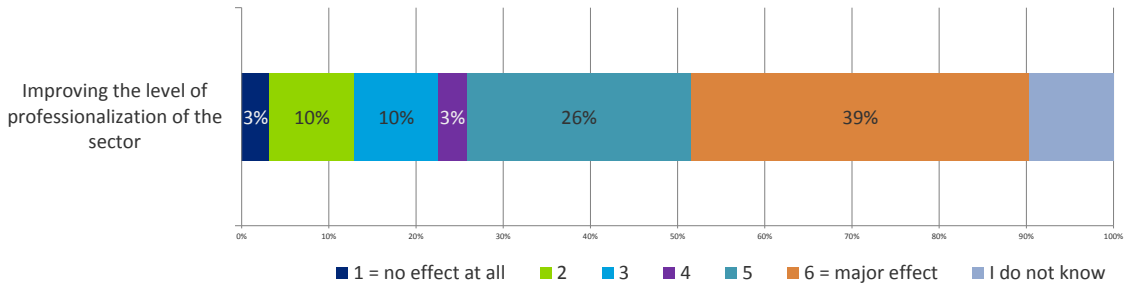


Spain



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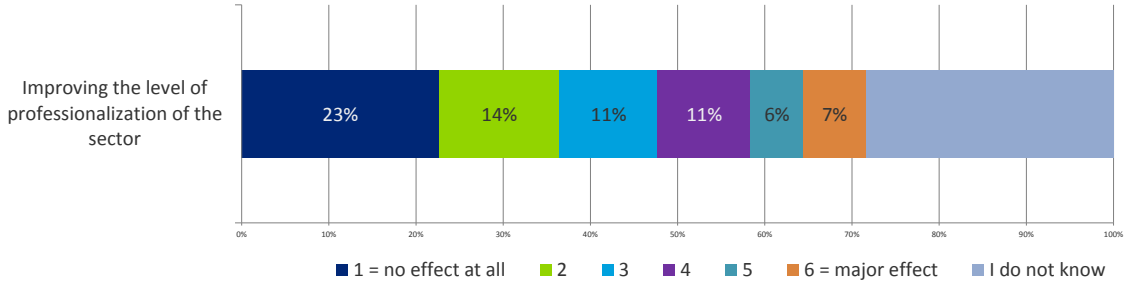


Germany

Figure 40 – Impact of the measures on improving the level of professionalization of the sector

Main finding:

- The limited evidence available points at the fact that the measures have encouraged a professionalization of the beekeeping activity. There are however disparities at Member State level. Indeed, some Member States are creating incentives to encourage the professionalization of the activity by setting discriminatory thresholds, such as a minimum number of hives, in order to benefit from the measures.

2. Evolution of production techniques

Although limited evidence points to the fact that the CAP apiculture measures encouraged more hobbyists to become professional beekeepers, the measures have induced structural improvements enabling beekeepers to carry out their activity in a more efficient way.

It is useful here to introduce the notion of collective and individual measures. The former refer to measures that affect groups of beekeepers, for instance through trainings, newsletters, research results and more broadly other sources of information or support which are available to collective entities. Conversely, individual measures refer to measures that directly support an individual beekeeper, through notably the co-financing of production related tools. It is relevant to introduce this distinction as their impact differs substantially.

Interviewees have asserted that individual measures have contributed to assisting beekeepers in maintaining their level of activity and induced productivity increases. For instance, in Spain, from 2007 to 2010, productivity increased from an annual average of 12.5 kg/hive to 13.95 kg/hive. In a context of rising production costs and international competition, it is essential that the EU apiculture sector remains competitive. The **technical assistance** and **rationalisation of transhumance** measures were described as having contributed to enhancing productivity levels in the sector by increasing production efficiency, through the co-financing of production related tools, for the former, and by supporting the acquisition of new material facilitating transhumance, for the latter. These measures have therefore contributed to enhancing the mechanisation of the beekeeping activity, as well as improving extraction and transhumance techniques. In the case of transhumance, interviewees confirmed that the use of new infrastructural means had enabled to reduce the workforce required to transport a given number of hives. In Spain, this holds particularly true for professional beekeepers. Although the number of non-professional beekeepers rose by 10.8% from 2008 to 2012, the number of professional beekeepers decreased by 6.6% during the same period. However, despite a decrease in their number, the proportion of hives owned by professional beekeepers, compared to hobbyists, has increased from 80% in 2007 to 86-87% in 2012 according to the Ministry of Agriculture. Their share in total production has also consequently increased. This enhanced production capacity stems from an increase, by 42 between 2007 and 2010, in the number of hives per beekeeper, therefore productivity and cost effectiveness.

The measures have therefore facilitated the expansion of exploitations. Indeed, although the number of beekeepers has decreased by 34,193 from 2004 to 2010, at the EU25 level, the number of hives has actually increased in these countries, implying that the average size of exploitation is expanding. This is particularly key as overhead has been identified as one of the most substantial costs incurred by beekeepers. Indeed, as shown in the following figure, over 13% of respondents to the beekeeper and beekeeper associations replied that overhead

costs represented over 50% of total production costs. In Spain, the corresponding figure amounts to 56%.

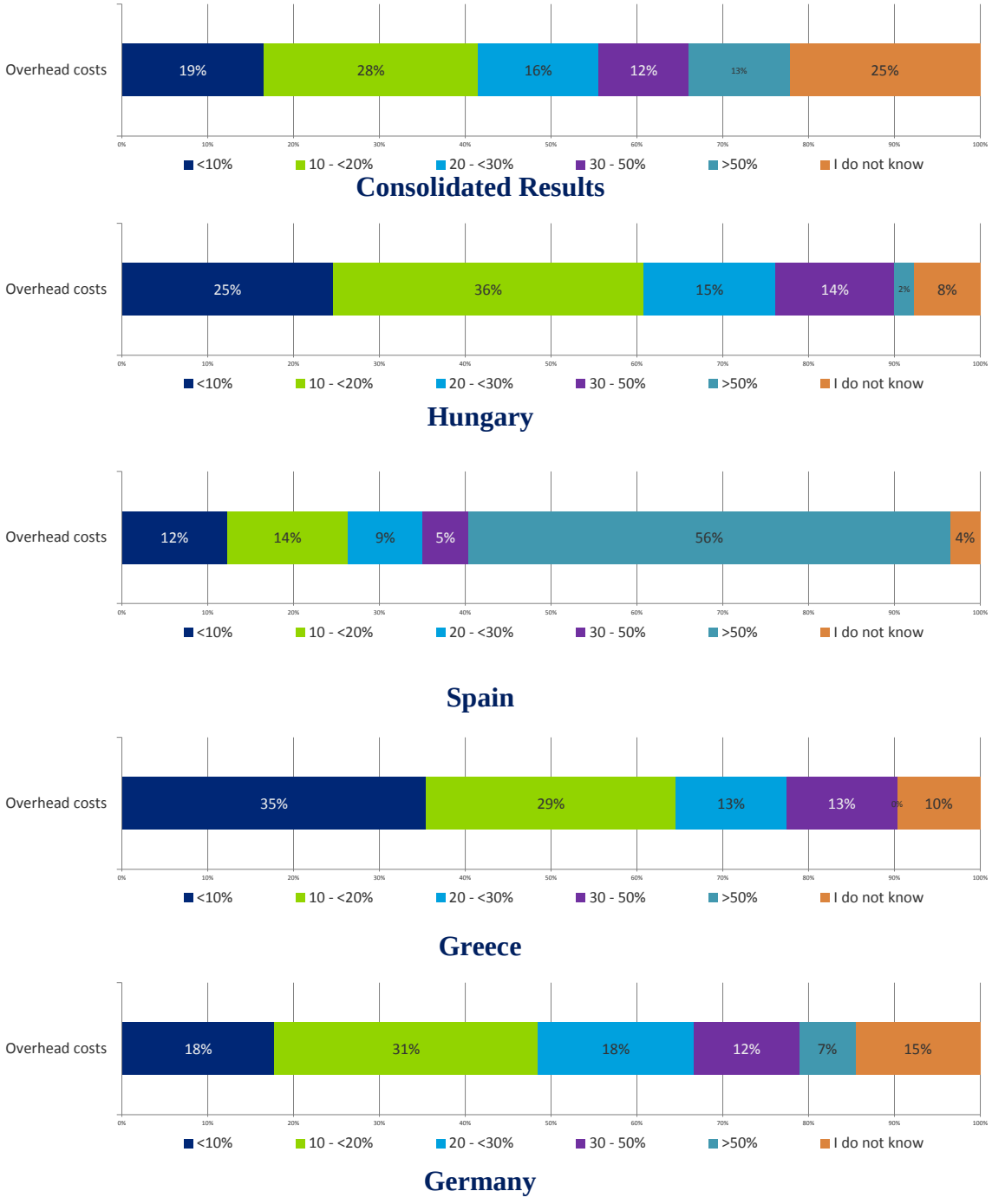


Figure 41 – Share of overhead costs in total production costs

The measures have therefore proved particularly useful in enabling professional beekeepers, which are the primary beneficiaries of the individual measures, to produce more efficiently.

Examples of such individual support measures, under the rationalisation of transhumance measure, can notably be found in the Hungarian National Programme which highlights the support for the 'modernisation of infrastructure, facilitating honey production'. This includes support for the 'Investment in new tools and equipment (loading and transport equipment and

tools required for establishing the infrastructure necessary for the establishment of migration sites)'. Another good example can be found in the Italian programme, with the 'purchase of hives, machinery, equipment and various materials for the practice of transhumance'. France also provides 'support to beekeepers with the view of acquiring specific equipment for the mechanisation of the transport of hives and to maintain hives'.

The Czech National Programme provides a clear example of an individual measure, under the technical assistance measure, with 'subsidies for purchasing equipment for production conditions, honey extraction, honey processing, honey potting for consumer sales, harvesting and processing of other apiarian products.

Further to improving productivity, investing in modern equipment can also have an impact on the efficiency of varroa treatment. Indeed, vertically arranged hives, such as Langstroth and Dadant type beehives, facilitate the treatment of hives against diseases without risking that the products employed also affect the honey. They also tend to produce higher yields. An example of such an application of the measures can be found in the Italian National Apiculture Programme, which under the **control of varroa** measure, funds the "purchase of beehives with mesh bases or modification of existing hives". Experts interviewed for the Greek case study asserted that beekeepers are equipped with Langstroth hives, and that traditional hives are therefore only sporadically sued in Macedonia for reproduction purposes. Consequently, Greece decided not to finance, under the **restocking of hives** measure, the replacement of hives as most beekeepers had already benefited from this. Conversely, 80% of Spanish beekeepers own Layens type beehives, which are horizontally arranged. It was therefore observed, during the Spanish case study, that a certain modernisation is appreciated in this regard, with highly professional beekeepers gradually shifting from Layens hives to Dadant or Langstroth hives. However, given the substantial cost of this investment, the transition to modern beehives will not be immediate. Furthermore, a change in the types of beehives used implies a change in all the related equipment, such as cranes and transhumance equipment. Several experts interviewed therefore argued that it is critical to see the measures as complementary. In this case, modernisation of beehives will have to be foreseen with the modernisation of the rest of the production apparatus.

Collective measures have also had a considerable impact on production structures. In fact, several interviewees have concurred that these measures are the most efficient and enable to limit externalities. For instance, it was mentioned by experts interviewed that supporting the **restocking of hives** has inflationary effects on the price of swarms. Information, provided through the **technical assistance** and **rationalisation of transhumance**, can take the form of market information regarding the pollination potential of an area, price trends and efficiency in terms of varroa treatment. These have been described as having a very positive impact on encouraging productivity growth. Hobbyists considerably benefit from collective measures, as it is through these measures that they receive information and trainings on beekeeping techniques.

The Italian Programme, under the rationalisation of transhumance measure, provides a good illustration of such an effective measure, with the 'mapping of nectariferous areas; cartography, collection of data on flowering or honeydew flows; expenditure for distribution of data collected using various methods.

Although collective measures have been described as very useful, interviewees have declared that their effect is maximised when beekeepers are organised into collective entities. Beekeeper organisation is therefore a key factor when analysing production structures.

Several interviewees stated that the EU apiculture sector remains highly atomised rather than becoming cooperative, and that organisation structures differ greatly depending on the Member State. Indeed, there are some well-known cooperatives in France and Spain, but it is difficult to draw conclusions regarding the rest of the EU. In Germany, the Deutscher Imkerbund (D.I.B) regroups 80000 members, whereas the professional beekeeper association, DBIB, has around 500 members. It is thus estimated that 5000 beekeepers in Germany are not organised within collective entities. Although it is difficult to draw conclusions at the EU level in terms of organisation trends, it seems that organisation within collective entities, such as cooperatives, tends to be more the exception than the rule. This is a result of the very requirements of the apiculture sector. Indeed, interviewees have suggested that hives must be sufficiently dispersed geographically to ensure that bees have access to food in appropriate quantities. Apiculture is therefore by nature an individual activity, which has impacts in terms of structures of production. Experts interviewed for the Hungarian case study highlighted that the beekeeper community is a closed one, partly due to the ever-present danger of theft of hives. Bartos [88] conducted a comprehensive analysis of the willingness to cooperate in Hungary and concluded that half of beekeepers strongly support cooperation, whereas other, and to a greater extent hobbyists and elderly beekeepers, are opposed to such collaboration.

However, some interviewees have highlighted the importance of further encouraging beekeeper organisation as it would generate greater synergies through enhanced cooperation, reduced costs due to the sharing of production equipment and a more efficient implementation of the CAP measures. Indeed, it is easier to disseminate information when beekeepers are already regrouped within collective entities. Furthermore, organisation would enable to boost further beekeepers' marketing capacities by leveraging the positive image of local production. However, it seems that measures and particularly the **technical assistance** measure have not been used to facilitate the formation of organisations. Evidence was however provided in the Hungarian case study that the measure had been used to organise events, fairs and 'honey days'. Although some experts asserted that these events enabled the Hungarian National Association of Beekeepers (OMME), which organised the events, to become a stronger organisation as it increased its visibility, others questions whether these events actually contributed to better self-organisation which would allow for an improvement of the promotion of beekeepers' interests.

It has however been noted by interviewees that there has been a gradual increase of microstructures. These perform very well and notably benefit from the product valorisation measures, and most notably **laboratory support**. This has implications in terms of supply channels.

Indeed, the formation of microstructures enables to further leverage on the local production image, which is highly valued, notably outside the EU. As a result, the EU is increasingly positioning itself as a producer of specialist high-end honey on world markets, which explains why EU honey is priced sensitively higher compared with world prices. Indeed, the difference between the average export and import price is of €2.52/Kg[89]. Although the EU remains a very marginal player in terms of exports, accounting for only 3.3% of world

[88] Bartos Szabolcs (2008), Evaluation of beekeepers of South-Transdanubia region with special regard to opportunities of economic integration. PhD dissertation. University of Kaposvár

[89] European Commission (2010) 'Document de travail des services de la Commission - Document accompagnant le rapport de la Commission au Conseil et au Parlement européen sur l'application des articles 105 et suivants du règlement (CE) n° 1234/2007 du Conseil relatif aux actions visant à améliorer les conditions de la production et de la commercialisation des produits de l'apiculture COM(2010)267'

exports[90], these are sold at a considerably higher price to countries with high purchasing powers. A new trend has thus been observed in recent years, according to interviewees, with the rise of high-end exports to China.

Main findings:

- The measures have induced structural improvements in terms of production techniques, particularly for professional beekeepers.
- Measures targeting individual beekeepers have enabled a further mechanisation of the beekeeping activity.
- Collective measures have also spurred productivity increases through the dissemination of information helping beekeepers to produce more efficiently.
- The limited available evidence showed that the apiculture measures have been used to increase collaboration among beekeepers, which would enhance the impact of the measures, except for the marginal formation of microstructures.

Conclusions

It can be concluded that the CAP apiculture measures have induced structural improvements in the sector. The extent of these improvements differs for each of the two axes which were developed in this evaluation theme.

Research results show that there is limited evidence pointing out that the measures have encouraged a professionalization of the beekeeping activity, although disparities have been observed at Member State level. Indeed, setting discriminatory thresholds, such as a minimum number of hives in order to benefit from the measures, can have an impact on spurring professionalization.

Furthermore, research results show that the apiculture measures have induced structural improvements in terms of production techniques, particularly for professional beekeepers. Indeed, measures targeting individual beekeepers have enabled a further mechanisation of the beekeeping activity, which contributed to raising productivity levels in the sector. This is notably reflected by the fact that the average size of exploitations has increased at EU level. Individual measures have also enabled to render varroa control more efficient by enabling beekeepers to acquire more adequate hives. Collective measures have also spurred productivity increases through the dissemination of information helping beekeepers to produce more efficiently. The impact of these measures could however be enhanced if beekeepers would collaborate more in cooperatives. The evidence collected does not point out that the apiculture measures have been used to increase collaboration among beekeepers which should have contributed to their effectiveness.

The combination of these findings enables to conclude that the measures have induced structural improvements in the sector, by notably encouraging and enabling beekeepers to produce more efficiently.

[90] European Commission (2010), 'Report from the Commission to the Council and the European Parliament on the implementation of Articles 105 et seq. of Council Regulation (EC) No 1234/2007 on measures improving the general conditions for the production and marketing of apiculture products'

6 PART III: Theme 3: Effects on downstream sectors

Introduction

The processing sector is a major stakeholder in the apiculture sector due to its important role in the honey value chain. The processing sector regroups honey packers, industry and wholesalers, and retailers. Indeed, although it has been observed that there is a trend towards more direct sales of apiculture products, this is particularly true for beekeepers producing small quantities of apiculture products. However, beekeepers very often lack the infrastructure to reach consumers directly when they produce larger quantities and when there is a need to cover a broader number of regions. Going through packers and distributors is here vital. These will then in turn sell the apicultural products directly to consumers, or use honey in the confectioning of other products. In the latter case, honey is classified as industrial honey, as opposed to table honey which is used for household consumption, and is mostly used in the confectioning of products such as beer or cereals. Around 20% of world production of honey can be classified as industrial honey[91]. In the EU, industry consumption amounts to 15% of honey production[92]. The section will thus analyse whether the CAP measures supporting the apiculture sector have contributed to ensuring sufficient levels of production with respect to the needs of such stakeholders. A three-step approach will be used to carry out this analysis. It consists of:

- Assessing the needs of the downstream sector;
- Assessing the *AS IS* situation;
- Assessing if the *AS IS* meets the needs of the downstream sector.

This evaluation question will be answered by combining various informational sources, such as desk research, interviews carried out at EU level with stakeholders from the processing industry and with local cooperatives in Member States, as well as results from the online surveys.

Findings

The third theme deals with the effects on downstream sectors, for which the following question will be answered:

Q.3.1: To what extent have the measures supporting apiculture contributed to ensuring sufficient levels of production (quality and quantity) with respect to the needs of the processing sector?

The processing sector is confronted with various needs, which range from providing products, which respond to local demand, to price competiveness.

[91] FAO (2009), "Bees and their role in forest livelihoods", Chapter on "Definition and uses of honey", : ftp://ftp.**fao**.org/docrep/**fao**/012/i0842e/i0842e10.pdf

[92] CBI Market Survey (2009), "The honey and other bee products market in the EU", http://www.fepat.org.ar/files/eventos/759630.pdf

The honey market is an international one, in which the EU will inevitably have to maintain its presence given its low self-sufficiency in honey. Forty per cent of products consumed in the EU are imported. The EU is therefore currently not in a position to produce sufficiently in order to meet the needs of the processing industry, in terms of quantity. This point was notably highlighted in the German case study, with experts indicating that the downstream sector relies heavily on honey imports to safeguard its production, as local production is insufficient in quantity. Experts interviewed indicated that there was a need to encourage the professionalization of the German beekeeping activity to insure sufficient levels of production at competitive costs. As shown in the previous section, there is a positive correlation between the production levels and the number of professionals in a given country. Indeed, professionals tend to have greater exploitations and produce honey in greater quantities.

Therefore satisfying the growing EU demand in terms of quantity is the first requirement of the processing sector. Interviewees estimated that demand is currently increasing by 1.5-2% per year in the EU, which can be attributed to factors such as consumers' increased perception of honey as a natural product with medicinal properties due to promotion efforts. An illustrative example of honey promotion is an initiative in Greece to inform and encourage dieticians to promote the daily consumption of honey. Consequently, consumers tend to substitute sugar with honey in their cooking practices. Imports are therefore essential in order to satisfy the EU's growing demand for honey. Imported products are either high-end specialist products, such as Manuka honey from New Zealand, honey which will be used in honey mixes, such as Chinese honey, or industrial honey. High-end honey can be either monofloral or polyfloral, and is sold directly to consumers at a higher price because of superior quality or of its medicinal properties. Honey used for mixes is polyfloral and is much more price sensitive and substitutable. Finally, industrial honey is of lower quality than table honey and is therefore the most price sensitive. Standards, quality and price for these types of honey are therefore different.

The needs of the processing sector are however product specific as consumers have a different willingness to pay according to the type of product they wish to purchase, and therefore of honey quality. As such, specialist honey is highly valued by local consumers. Interviewees have emphasised the industry's interest in specialist honey, such as lavender orange blossom honey, produced in the EU as there is high demand from consumers for this, and the return for this type of honey is greater than for mixed honey. Indeed, the processing sector can charge a higher price for this type of honey. Experts interviewed for the German case study indicated that the CAP apiculture measures, and notably the **varroa control** and the **technical assistance** measures, were therefore particularly useful in enabling to maintain the high quality of this local EU honey, for which they could then charge higher prices. Furthermore, interviewees indicated that product valorisation, resulting notably from the **support to laboratories** measure, had enabled prices to increase by 30 cents/kg per annum for the past 10 years in Belgium. The CAP apiculture measures have therefore enabled some Member State to move up the value chain and specialise in higher-end honey. As customers value local products, and high quality honey, industry strongly supports the increase of production and valorisation of this type of local specialised honey. This is notably the case in Germany where the totality of locally produced honey is also consumed locally. Production is therefore structurally insufficient in this country to meet demand. In countries as the UK, renowned experts have also indicated that local production has been insufficient to meet consumers' demand, due to cyclical conditions. Indeed, inappropriate weather conditions over the last two years in the UK have severely affected local production.

However, although consumers are less price sensitive for these types of honey, if prices increase excessively due to reduced production, experts interviewed estimated that consumers will probably stop buying these products. This was notably the case when the price of Manuka honey increased substantially.

Whereas the processing industry can tolerate a slight increase of price for specialist honey, is to a much lesser extent true for honey which will be mixed. Although the absence of contamination is an essential requirement for all types of honey, there is also a strong focus on homogeneity and appearance for honey used in mixes, and not on quality *per se* compared with high-end honey. Therefore, several interviewees have pointed out that if the price of honey produced in a specific region, and which is destined to be mixed, increases excessively, then the processing industry will substitute this honey for one that is produced at a lower cost in another region in Europe, or in the world. Non-specialist honey is highly price sensitive. Interviewees from the processing sector have emphasised that the quality of imported products, in terms of meeting sanitary standards, of both imported and local EU honey are quite similar. Consequently, similar types of problems, notably in terms of residues, can be found in both types.

By supporting production, as was described in Theme 1, and therefore maintaining prices at a relatively low level, the CAP apiculture measures enable to secure and stabilise the market and ensure the competitiveness of EU honey used in mixes by the processing industry. A general consensus among interviewees was found that having access to a stable local production is key for the processing industry, as it notably reduces currency risks. World prices are defined in dollars, and there are risks related to import bans, such as the ones imposed to China in 2002, Brazil in 2007 and India in 2010[93]. By supporting production the apiculture measures contributed to securing the local market and curbing local and international price pressures.

Finally, industrial honey is used in the confectioning of other products in the bakery, canning or cosmetics industry. Industrial consumption is largely inferior to household consumption, which covers both specialist honeys and honey mixes. For instance, household demand accounts for 90% of total demand in Hungary, and 80% in Germany. This is notably confirmed by the results of the online survey to beekeepers, shown in figure 42 below, in which 90% of respondents indicated that over 50% of their production was table honey.

[93] Ministry of Foreign Affairs of the Netherlands (2011), "Promising EU export markets for honey", ***cbi.nl/?pag=85&doc=5813&typ=mid_document*** .

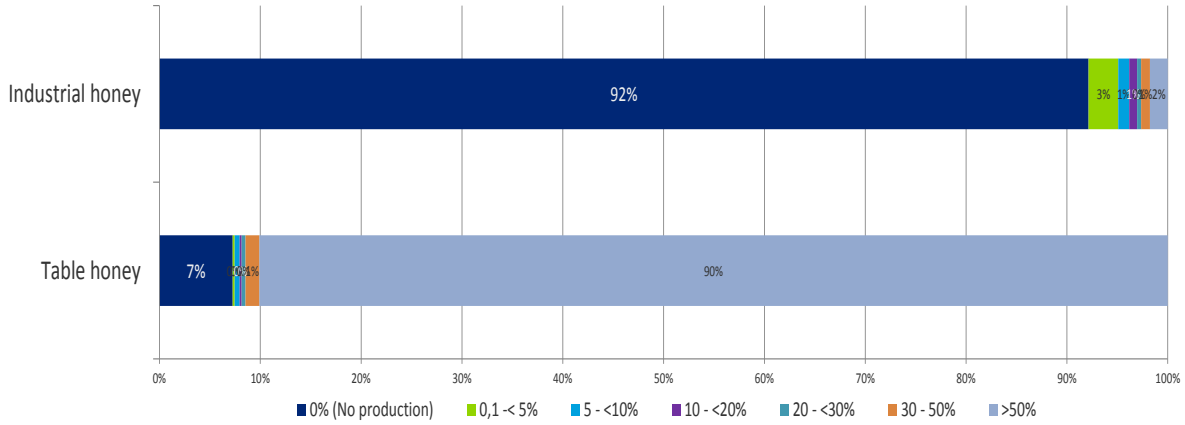


Figure 42 – Share of industrial honey and table honey

Overall, our data collection reveals that knowledge of the measures by industry is quite limited, as their main focus is on the production output and price levels, and not the actual honey production process. Indeed, the measures do not have a direct impact on the processing sector, which is much more dependent on price developments related to climate events or regional crisis, such as the Spanish Monsanto GMO crisis.

However, it has been claimed that the **support to laboratories** measure is highly relevant as it enables beekeepers to internalise this cost, which is then not transferred to industry. This is particularly true for price sensitive honey. Spain, whose production is very much orientated towards the processing sector, is the country which makes the greatest use of honey analysis. In Germany, experts interviewed however claimed that suppliers did not make sufficient use of these measures. Consequently, the two major Germany honey processing companies, need to substantially invest (€1 million per company) in order to carry out physico-chemical analyses of the honey supplied by beekeepers.

Conclusions

It can be concluded that the apiculture measures have contributed to meeting the needs of the processing sector, in particular ensuring sufficient levels of production (quantity and quality). However, research results reveal that production levels, in terms of quantity, remain insufficient to fully meet these needs, rendering imports inevitable.

It has been shown that the needs of the processing sector are in fact product specific, in line with the different willingness to pay of consumers for a given type of honey. Indeed, EU consumers value specialist honey, and particularly local specialist honey, and are consequently willing to pay a higher price for it. The downstream sector can therefore generate a greater profit margin for these types of honey. By supporting production, the apiculture measures have contributed to maintaining the production of high-end EU honey, in line with the needs of the downstream sector.

Competition is however severe for mixed honey, or industrial honey, as consumers are much more price sensitive for this type of honey. By supporting production, and therefore maintaining prices relatively low, the CAP apiculture measures contribute to securing and stabilising the market and ensure the competitiveness of EU honey used in mixes by the processing industry. The support to laboratories measure is therefore particularly appreciated by the downstream sector as it enables beekeepers to internalise this cost. Having access to a

stable local production is key for the processing industry, as it notably reduces currency risks and risks related to import bans.

The combination of these findings enables to conclude that the measures have contributed to ensuring that the downstream sector has access to high-end EU honey, as well as lower-end quality honey at a competitive price. In both cases, quantities however remain insufficient. In the case of honey used in honey mixes, which is highly substitutable, having access to sufficient quantities is not a need per se for the processing sector as it can easily offset an increase in price by importing equivalent honey from abroad. Having access to local production limits currency risks and risks of import bans.

7 PART III: Theme 4: Effects on rural areas and the environment

Introduction

The CAP supports three interconnected dimensions relating to agriculture: producer prices, producers' income and rural development[94]. Through reforms, and notably the Agenda 2000[95] and the June 2003 agreements introducing 'decoupling', 'cross-compliance' and 'modulation', the CAP has progressively evolved from supporting the former, producer prices, to supporting the two latter, producers' income and rural development.

Agenda 2000 establishes rural development as the 2nd pillar of the CAP, complementing the 1st pillar which supports producer prices and income. The two pillars are however closely interlinked as the support to producer income enables the provision of environmental public goods. The distinction between the two pillars has its roots in the different financial instruments used to fund them. The measures falling under the 1st pillar of the CAP are thus funded through the European Agricultural Guarantee Fund (EAGF), whereas the measures under the 2nd pillar are financed through the European Agricultural Fund for Rural Development (EAFRD).

Consequently, the Council Regulation (EC) No 1234/2007 explicitly mentions that "measures financed from the EAFRD in accordance with Council Regulation (EC) No 1698/2005 shall be excluded from the apiculture programme". Given the close interrelation between the two pillars, it is therefore relevant to assess the impact of the measures supporting the apiculture industry on rural development and the environment. However, this evaluation is limited to the apiculture measures funded through the EAGF, and not the Rural Development measures, funded through the EAFRD.

The importance of rural development and the environment in agricultural policy, and in this case through the apiculture measures, is notably reflected in the survey addressed to national Administrations. Indeed, as can be observed in the figure below, 43.1% of the national Administrations confirmed that the effects on the rural environment and the environment were taken into account when deciding the total amount of expenditure on apiculture support measures.

[94] European Commission (2011), "Agricultural Policy Perspectives Briefs - The CAP in perspective: from market intervention to policy innovation", http://ec.europa.eu/agriculture/publi/app-briefs/01_en.pdf.
[95] Council Regulation No 1257/1999 of 17 May 1999 (OJ L 160, 26.06.1999).

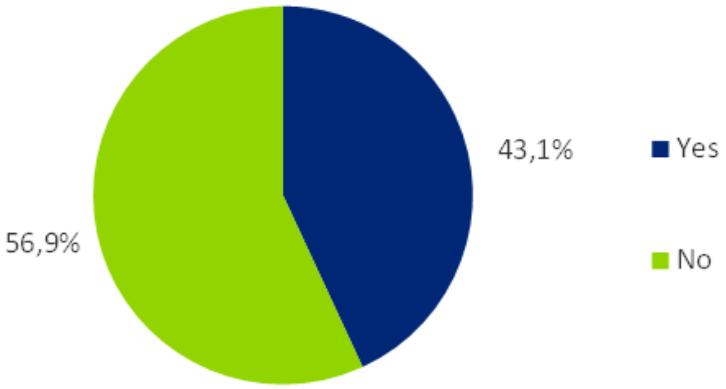


Figure 43- Share of national and regional administrations taking rural environment and the environment into account for the CAP apiculture measures

This theme is subdivided in two evaluation questions:

- To what extent have the CAP measures supporting apiculture promoted rural development?
- To what extent have the CAP measures supporting apiculture affected the environment (e.g. through fostering adequate pollination) or interacted with it?

For the first question, the extent to which the CAP measures have contributed to improvements in the Rural Development main objectives ("Thematic axes" of the Rural Development Policy 2007-2013) was assessed. These are:

- Improving the competitiveness of the agricultural and forestry sector;
- Improving the environment and the countryside;
- Improving the quality of life in rural areas and encouraging diversification in the rural economy.

The objectives are not analysed as such, as the Rural Development measures are not analysed in this section, but they provide relevant benchmarks for analysis.

For the second question, the extent to which the measures have affected the environment was assessed. Three environmental impact indicators, which were estimated to be the most relevant, were selected from the Impact Assessment Guidelines[96].

- Biodiversity, flora, fauna and landscapes;
- The environmental consequences of firms and consumers;
- Animal welfare.

The assessment was done by combining the results from desk research, strategic interviews at EU level, studies and the two web based surveys (national Administrations, and beekeepers and beekeeper associations).

[96] European Commission (2009), "Impact Assessment Guidelines", http://ec.europa.eu/governance/impact/commission_guidelines/docs/iag_2009_en.pdf

Findings

The fourth evaluation theme relates to the effects on rural areas and the environment, for which we will answer the following two questions:

Q4.1 To what extent have the CAP measures supporting apiculture promoted rural development?

Rural areas are vital for the EU, as they account for 90% of its territory, and over half of its inhabitants[97].

The framework used to assess the impact of the measures on rural developments is the "Thematic axes" of the Rural Development Policy 2007-2013. These are:

- Improving the competitiveness of the agricultural and forestry sector;
- Improving the environment and the countryside;
- Improving the quality of life in rural areas and encouraging diversification in the rural economy.

As was described in section 2, the measures, and particularly the **technical assistance** and the **rationalisation of transhumance measure** have spurred productivity gains through enhanced mechanisation of the beekeeping activity, increased awareness of adequate beekeeping techniques and through the provision of market information. It was thus concluded that the measures have contributed to improving the competiveness of the apicultural sector, which is this first "Thematic axe" of the Rural Development Policy. The technical assistance measure is in fact, according to results from the national and regional Administrations survey presented in the figure below, estimated to be the measures with the greatest impact on rural development with 26% of respondents indicating that it had a major impact.

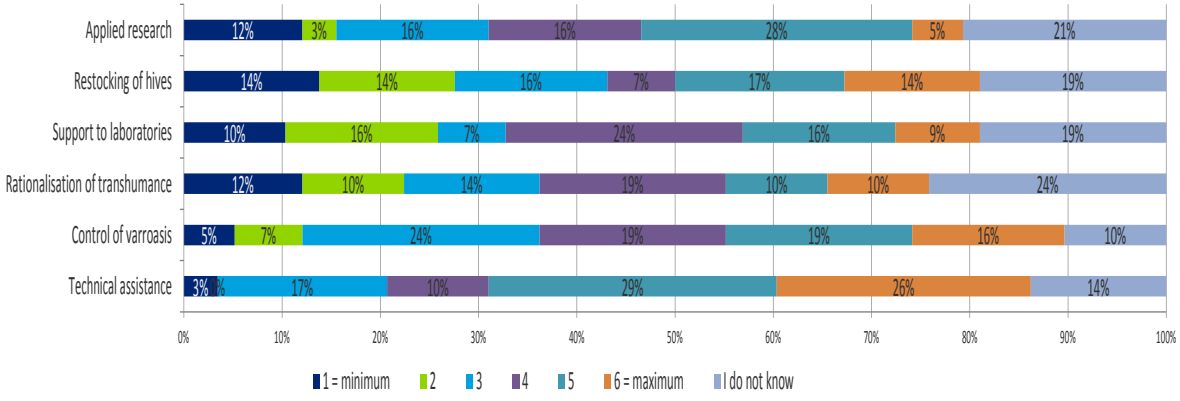


Figure 44 – Effect of the measures on rural development

The second axe, improving the environment and the countryside, will be dealt with in the second question of this evaluation theme.

The third axe refers to improving the quality of life in rural areas and encouraging diversification in the rural economy.

[97] European Commission (2008), "Fact Sheet, EU Rural Development Policy", http://ec.europa.eu/agriculture/publi/fact/rurdev2007/2007_en.pdf.

In the second question of the first evaluation theme (Q1.2), it has been argued that the measures have contributed to reducing production costs, and notably through the **varroasis prevention**, **restocking of hives** and **support to laboratories** measures. Varroa control has been identified by national and regional Administrations as the measure with the second greatest impact, after technical assistance, on rural development, with 16% of respondents answering that it had a major impact. The measures have also enabled beekeepers to diversify their income by producing other apicultural products such as royal jelly or wax, and notably through the **technical assistance** and the **applied research** measures. Therefore, by contributing to enhancing the economic viability of the sector, the measures have contributed to maintaining the beekeeping activity, which remains an overwhelmingly rural activity. The Hungarian case study reveals that the highest concentration of colonies per beekeeper, a relevant indictor to measure the prevalence of the beekeeping activity in a region, can be found in the least developed regions of the country (Fejér, Somogy, Szabolcs and Bács-Kiskun, with the exception of Fejér). In Spain, according to the *Coordinadora de Organizaciones de Agricultores y Ganaderos* (COAGs), around 75-80% of professional beekeepers in Spain are from impoverished regions or the high-mountain regions. It was thus concluded that by supporting the beekeeping activity, the measures contributed to increasing the welfare of rural families in relatively undeveloped regions. Furthermore, in some regions, beekeeping is a veritable economic engine. Examples include Fuenlabrada de los Montes, a village of around 2 000 inhabitants in Badajoz (Extremadura), where there are round 300 beekeepers, or Ayora (Valencia), a village of 5 500 inhabitants in which the cooperative ANAE generates a turnover of over €20 million per year and employs 17 people. Finally, in Extremadura, the cooperative Euromiel has an annual turnover of over €10 million.

The dependence of beekeepers on the apiculture measures, and therefore on their impact on maintaining the beekeeping activity, is highlighted in the figure below, for the aggregated results, and in Annex 6 for the country specific results. The results of the consolidated beekeepers and beekeeper associations' survey reveal that 11% of respondents are majorly dependent on the apiculture measures. Almost a third (29%) of respondents is greatly (respondents either rated their dependence to be of 5 or 6, out of 6) dependent on the measures. However, the individual surveys to the case study countries reveal stark contrasts among Member States. Indeed, although only 8% of German respondents claimed that they were majorly dependent on the measures, respectively 16%, 19% and 42% of respondents in Hungary, Spain and Greece were identified as majorly dependent on the measures. This is in line with the structures of production of these countries, as described in Theme 2. Indeed, in numerous Member States, non-professional beekeepers are either not informed about the CAP apiculture measures, or not direct beneficiaries. In Greece and Spain for instance, only professional beekeepers, and therefore beekeepers which own over 150 hives, are entitled to support through the CAP measures. However, evidence of the contrary has been highlighted for certain Member States, such as the UK, with one respondent from the beekeepers and beekeeper associations survey indicating that the “most serious help in the UK seems focussed only on the amateur sector”.

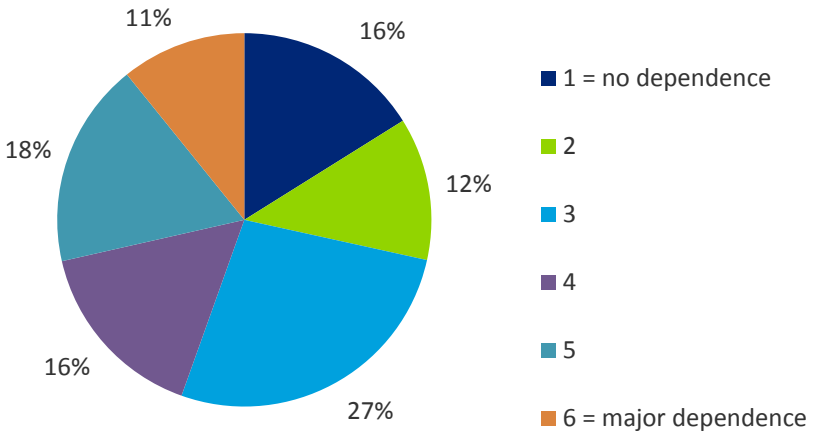


Figure 45 – Dependence of honey production on the CAP measures supporting apiculture

However, it is important to keep in mind that the direct impact of the measures on rural development is relative to the size of beekeeping as an activity. For instance, in Spain, beekeeping activity as a whole accounts for approximately 0.44% of Final Livestock Production and 0.17% of Final Agricultural Production. Apiculture there only represents a very limited part of total agricultural production, and therefore has rather marginal impacts in terms of rural development compared to other agricultural activities.

Further to maintaining current beekeepers in activity, evidence from the case studies shows that the measures have contributed to attracting newcomers in some of these countries. Indeed, the Hungarian case study emphasizes the fact that in recent years, numerous people having lost their jobs turned to beekeeping as small-scale beekeeping activity can ensure a modest livelihood, notably due to the CAP support measures.

In Germany, interviewees asserted that the combination of the measures seems to have a positive impact on raising awareness of beekeeping activities among the general public. Indeed, it was reported that in Germany, the measures have enabled to facilitate access to this activity, for which barriers to entry have been described as low. Providing training to new beekeepers is in fact one of main targets of measures in Germany, as outlined by the German Apiculture Programme. The measures, and notably **technical assistance** measure, have enabled to increase awareness of the existence of trainings at local and regional level, which has spurred interest in the activity. These trainings enable to enhance new beekeepers apiculture knowledge, and particularly on issues such as varroasis control, marketing, physico-chemical properties of honey, rationalisation and labelling.

Consequently, German beekeeping associations reported an increase in the number of non-professional beekeepers. This increase was particularly observed among the young and women. Furthermore, increased media attention after the screening of the movie "More than Honey", as well as issues associated with urbanisation, such as pressures on natural habitats, climate change and air pollution, were also identified as substantial factors to which the increased public awareness could be ascribed. It was also noted in the Greek case study that the beekeeping activity attracts younger generations.

However, disparities are vast across Member States, and it would be inappropriate to infer from these examples that younger generations are increasingly interested by beekeeping. Several apiculture experts interviewed commented on the declining interest in beekeeping

from younger generations. At the EU25 level, the number of beekeepers has increased by 19% from 2003 to the period 2008-2010, but declined by 6% from the period 2004-2006 to the period 2008-2010. Furthermore, in countries such as France, the number of beekeepers has declined by over 30% from 2003 to the period 2008-2010.

The results of the survey of beekeepers and beekeeper associations, shown in the figure below, show that 6% of beekeepers had taken up the activity in the last two years, and that 29% of beekeepers have less than 5 years of experience, whereas 53% of beekeepers have over ten years of experience. The individual surveys confirm the disparities between Member States, and the fact there seem to be comparatively more new entrants in Germany, where 35% of respondents have less than 5 years of experience. In Hungary, Spain and Greece, the corresponding figures are of 20%, 18% and 20%. Furthermore, although 48% of both Greek and German beekeepers have over 10 years of experience, this figures amounts to 60% and 70% for Hungary and Spain respectively.

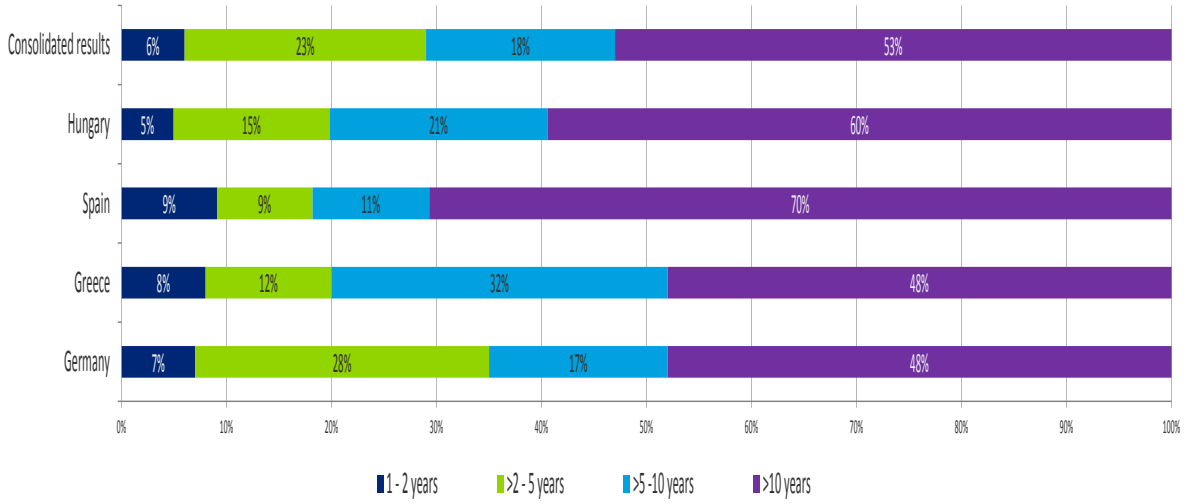


Figure 46 – Years of experience in beekeeping

Maintaining beekeepers in activity generates broader impacts in terms of rural development than just securing an income for beekeepers. Indeed, positive externalities, in terms of local employment and activity, are produced for the entire honey production value chain. The German case study highlights the fact that the measures have an impact on other segments of the value chain, and notably retail for technical equipment, the sugar industry, the glass industry and SMEs. The Spanish case study provides the example of the ANAE which not only employs 17 people, but creates indirect jobs, such as carpenters producing or repairing hive frames. To some extent, the combination of the measures therefore contributes to maintaining an overall ecosystem around beekeepers in rural areas.

Although this contributes to maintaining jobs in rural areas, the apicultural sector's most substantial contribution to local employment, supported through the CAP measures, possibly lies in the externalities created through pollination. Indeed, numerous crop and plant producers could not carry out their activity without pollination, 70-80% of which is provided by honeybees according to the literature study carried out in this evaluation and according to the information collected during the Greek case study. The activity of the honeybees is thus directly dependent on that of beekeepers. Apiculture therefore plays a crucial role in

European agriculture by contributing its part to the total amount of at least €22 billion that is delivered by pollinators to European agriculture through pollination[98]. The case of Almeria, in Andalusia, is quite illustrative, as this province concentrates the greatest number of greenhouses in the world, which is therefore a veritable pillar of its economy, contributing to approximately 100 000 direct and indirect jobs. As greenhouse farmers produce under controlled conditions, within a closed building, they are extremely dependent on non-wild pollination, and are now hiring the majority of the 11 000 hives in this province in order to deliver "sheltered" pollination services.

This issue will be further developed in the following section, which deals with the effects of the CAP measures on the environment.

Main finding:

- The combination of the CAP apiculture measures seems to have had an indirect positive impact on rural development by maintaining beekeepers in activity, as well as those dedicated to other economic activities developed around beekeeping, which not only includes suppliers but also farmers. It is however extremely difficult to quantify this impact, and would require further research.

Q4.2 To what extent have the CAP measures supporting apiculture affected the environment (e.g. through fostering adequate pollination) or interacted with it?

The extent to which the measures have affected the environment is assessed by referring to three environmental impact indicators from the Impact Assessment Guidelines[99]. These are:

- Biodiversity, flora, fauna and landscapes;
- The environmental consequences of firms and consumers;
- Animal welfare.

The first assessment indicator is therefore biodiversity, flora, fauna and landscapes. According to work carried out in part by Status and Trends of European Pollinators (STEP), and EU-funded Framework program Seven (FP7) project, two thirds of the crops used for food production and the majority of wild plant species are dependent on pollination by insects such as bees and hoverflies[100]. It is estimated by the Food and Agriculture Organisation (FAO) of the United Nations that 100 000 species of insects, birds and mammals are involved in pollination activities. However, pollination populations are in decline with "most wild bee colonies hav(ing) been lost" and "many European butterflies (…) under serious threat owing to changing land-use and agriculture intensification"[101]. Furthermore, the FAO estimated that out of the 100 crop species which accounts for 90% of food worldwide, 71 of these are pollinated by bees[102]. Honeybees therefore have a momentous impact on impact on crop production in the EU and consequently food security. Furthermore, it has been mentioned in

[98] See for references on the pollination effect of beekeeping e.g. http://ec.europa.eu/food/animal/liveanimals/bees/index_en.htm and http://www.efsa.europa.eu/en/topics/topic/beehealth.htm.
[99] European Commission (2009), "Impact Assessment Guidelines", http://ec.europa.eu/governance/impact/commission_guidelines/docs/iag_2009_en.pdf
[100] More information can be found on http://www.sciencedaily.com/releases/2012/09/120904101128.htm
[101] FAO (2005), 'Protecting the pollinators', http://www.fao.org/ag/magazine/0512sp1.htm.
[102] FAO (2005), "Protecting the pollinators", http://www.fao.org/ag/magazine/0512sp1.htm.

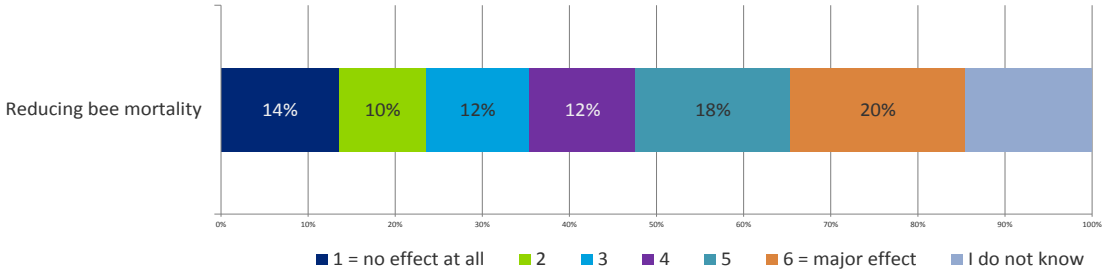
the Spanish case study that varroa has killed almost all wild bees, thereby increasing the importance of managed honeybees in ensuring pollination.

In the EU, pollination remains more of a positive externality delivered by honeybees, than an activity in itself. Indeed, pollination services are highly uncommon in Greece, Hungary and Spain, except for Andalucía, as described in the previous section. In highly transhumant countries, such as Spain or Greece, pollination is based on mutual advantages. Therefore, as highlighted in the Spanish case study, farmers allow beekeepers to leave their hives in their lands, as a result of which the beekeepers benefit as their bees have plants and crops to feed from, and farmers benefit from the pollination bees provide. Consequently, according to the latest data published by the Spanish Ministry of Agriculture, in April 2012, pollination was the main activity of only 1.3% of registered beekeeping holdings.

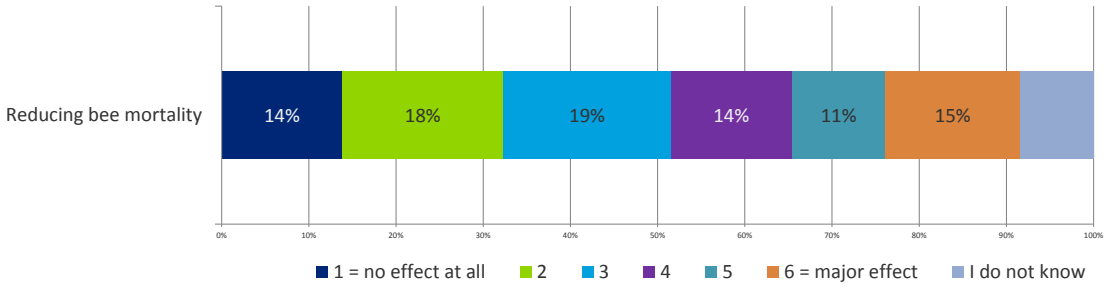
Pollination services are however an increasing trend in Germany. Charging for orchard pollination has been commonplace for the past 50 years, with prices reaching €50/colony. However, in the past decade, this trend has expanded to encompass seed breeders (e.g. oilseed rape, clover, and herbs), with prices nearing €20/colony. The difference in prices stems from the fact that charging for the rape is a relatively new trend, and time is therefore required for farmers to accept paying this fee and for the market to develop itself. However, as beekeeping is predominantly a non-professional activity, pollination is also very often provided without a fee, on the basis of mutual advantages.

Conversely, in the United States, pollination is an essential activity from which beekeepers derive substantial revenues ($150 per colony), with honey being more of a by-product.

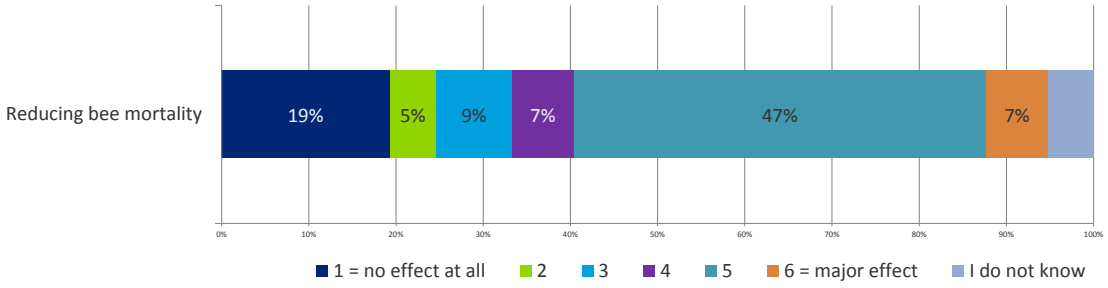
As pollination is to a much greater extent a positive externality than a service, the impacts of the measure lie in their influence on the bee population. According to the results from the survey to beekeepers and beekeeper associations presented in the following figure, 20% of respondents report that the measures had a major impact on reducing bee mortality.



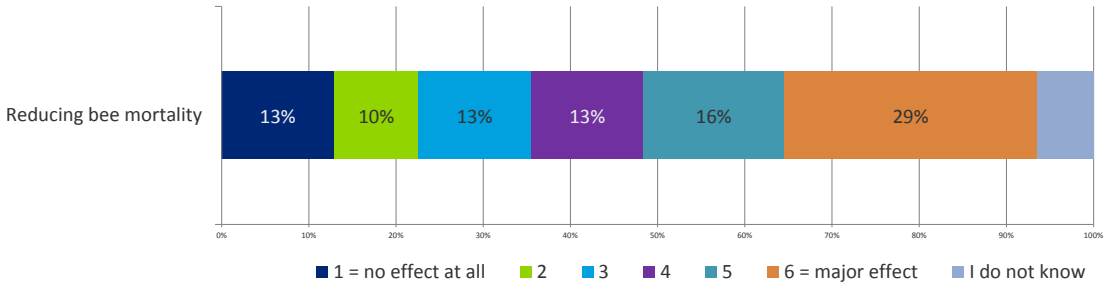
Consolidated Results



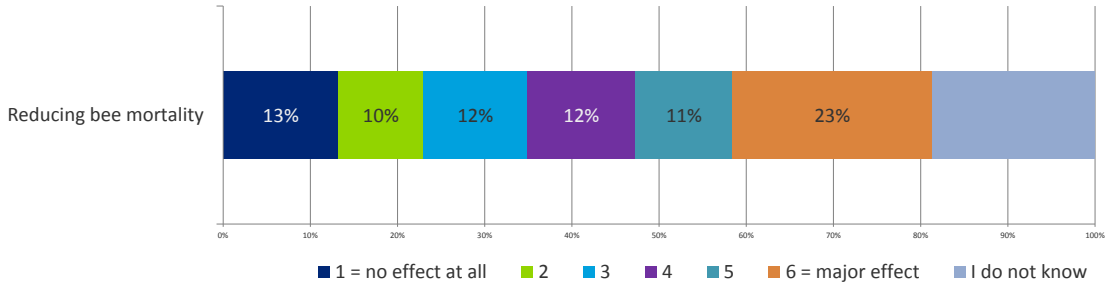
Hungary



Spain



Greece



Germany

Figure 47: Perceived impact of the measures on reducing bee mortality

In Greece, the number of hives has increased by 9.9% between 2003 and 2011. The corresponding figures for Hungary and Spain are respectively 3.1% and 2.6%[103]. In Germany, the number of hives has decreased by 21% in this period, although there has been a slight increase in recent years, as shown by the following figure.

[103] European Commission (2010), "Apiculture programmes – Advisory Group" presentation

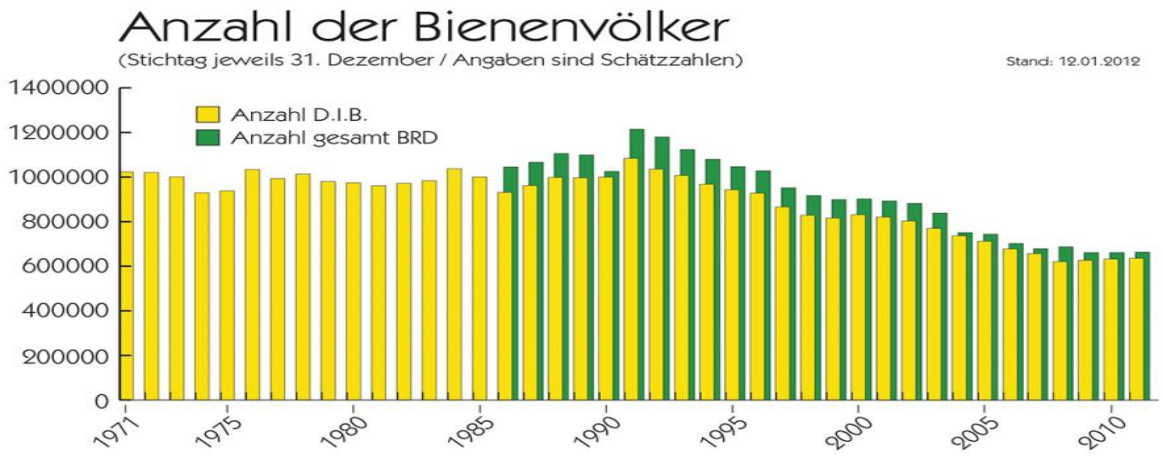


Figure 48 – Bee population evolution in Germany (DIB and BRD)

Source: Deutscher Imkerbund E.V.

Experts interviewed for the German case study asserted that the combined effect of the measures (via **technical assistance** (trainings), **varroasis control**, and the **restocking of hives**) have enabled to stabilise the bee population, which therefore positively affects pollination, and consequently the environment. These three measures were rated by national Administrations as the most effective, with respectively 17%, 24% and 19% of respondents indicating that they provide maximum support to the environment, as shown in the following figure. Furthermore, although only 14% of respondents answered that the **applied research** measure had provided maximum support to the environment, 29% indicated that it had a substantial impact (5).

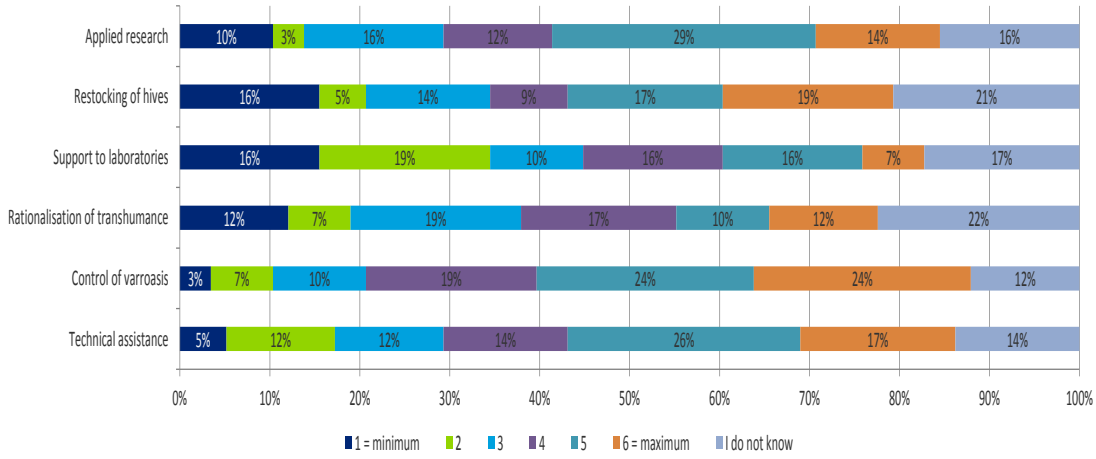


Figure 49 – Level of potential impact each support measure can have in supporting the environment

Furthermore, a direct link between pollination and the **rationalisation of transhumance** is established in the German National Apiculture Programme, highlighting the potential impact of this measure on the environment. As such, the German National Apiculture Programme mentions that "transhumance is supported because of the importance of pollination by bees in Germany".

The second indicator is environmental consequences of firms and consumers. This therefore refers to the impact of the apiculture measures on encouraging sustainable, and

environmentally friendly, production techniques. This aspect is indeed foreseen under the measures, and notably through the ones which enable to fight against varroa.

Several measures tackle the issue of varroa. Support from the **varroa control** measure is twofold in the sense that it covers both the subsidisation of adequate medicines, as well the provision of information regarding the disease and adequate treatment techniques. Varroa cannot be completely eradicated; however, it can be controlled through the use of adequate medicines or "biological" products, such as of mineral oils or the use of covering meshes. Although biological methods can be adopted by beekeepers who own a limited number of hives, this is not the case for beekeepers who own hives in greater quantities, as applying these types of methods requires a great deal of time. For these beekeepers, using medicines is therefore the only viable treatment option. Subsidisation of medicines should thus incentivise, through lower prices, beekeepers to privilege recognised products, over other potentially harmful ones. Regarding awareness raising activities financed through the varroa control measure, an example is "periodic meetings with beekeepers, practical demonstrations and operations in hives for the application of control methods by beekeeping experts", as highlighted in the Italian National Programme.

Experts interviewed asserted that the subsidisation of medicine has enabled to render them more affordable and increased their used. However, some evidence points to the contrary and to the inflationary effects of such a policy. Indeed, in the latest three-year budget, Greece has chosen not to allocate any co-financing to the control of varroa as it was concluded that the continuous subsidisation of the varroa medication had led to a substantial increase of the price of such medication. The price of such medicine is currently of approximately €15 on average per box.

Further to the varroa control measure, information and awareness rising is more commonly provided through the **technical assistance** measure. Interviewees have asserted that this is particularly critical as a wrong application of varroa treatment can have devastating effects on the entire bee population. Consequently, interviewees, and particularly during the German case study, have stressed the fact that the informational aspect and the medication aspect of varroa treatment are intrinsically complementary.

Although experts interviewed have concurred that practices have improved as regards to varroa treatment, there remains room for improvement. Indeed, several experts interviewed concurred that the use of inadequate varroa treatment techniques by non-professional remained a commonplace practice. Evidence reported from the Hungarian and Spanish case studies shows that beekeepers, and particularly elderly beekeepers which are more resistant to change, may still be using inadequate, and potentially dangerous, treatment options. Furthermore, experts interviewed for the Greek case study highlighted the fact that as varroa treatment is no longer subsidised in this country, local beekeepers purchase such products from abroad at a low price, but of an unknown and dubious quality.

One of the factors which have been enumerated by experts to explain the fact that some beekeepers still use an inadequate treatment options is that in numerous countries, only professional beekeepers, or beekeepers with a relatively high number of hives, are entitled to the measures. Therefore, non-professional beekeepers often do not attend relevant varroa related trainings, supported through the measures.

This is confirmed by the results of survey addressed to beekeepers and beekeeper associations, presented in the following figure. Indeed, in Germany, where 0.25% of beekeepers are professionals, 74% of respondents answered that they did not benefit from the measures, including training to treat varroa. In Hungary, Spain, and Greece, where

professionals account for respectively 5-7%, 22% and 39% of beekeepers, the corresponding figures amount to respectively 15%, 21% and 19%.

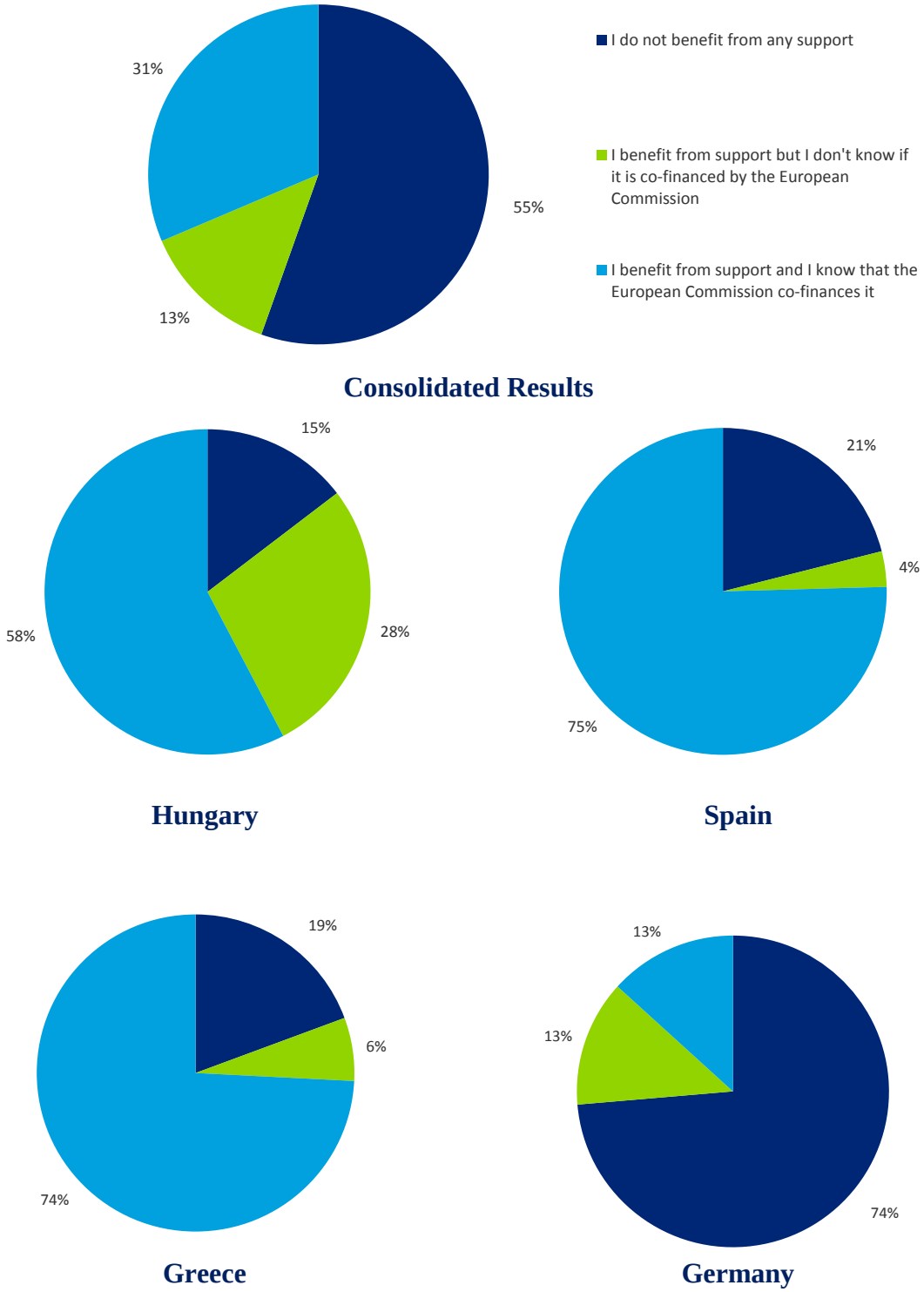


Figure 50 – Share of beekeepers benefiting from the measures

Interviewees have pointed out that the fact that non-professional beekeepers do not benefit from the support measures presents an acute risk for the beekeeping sector as a whole as fighting varroa requires a collective effort, as there are high externalities to non-treatment. Indeed, varroa can spread from one hive to another if not controlled. The consequences of the

inadequate behaviour of beekeeper will therefore be borne by surrounding beekeepers. Spain has taken action on this point and obliges all Spanish beekeepers to treat hives for varroasis at least once a year in order to qualify for the National Apiculture Programme aid.

Another argument which was brought forth, in all case studies, refers to the cumbersome nature of the application process for EU support in controlling varroa. This point will be further developed in the Theme 5.

In view of making production more sustainable, and environmentally friendly, it must also be ensured that the most adequate and effective type of medication is encouraged and supported through the measures. Indeed, some interviewees have expressed concerns about the effects on bee health, and on the environment, of chemical treatment, subsidised through the measures. The fact that the medication was perceived as having become inefficient was one of reason, along with the increased price and the residues which affect production, which led Greece to forego support through the control of varroa measure. The efficiency of varroa products is therefore controlled by certain Member States, such as France under its **varroa control** measure, in order to ensure that beekeepers apply the most adequate treatment options available. Alternative varroa treatments are also investigated. Although France finances this research through the control of varroa measure, numerous other Member States finance this through the **applied research** measure. An example can be found in the Hungarian National Programme with the "protection of bee colonies against Varroa using new alternative (without chemicals) protection methods, forms". The effects of these research efforts need to be further investigated. Several interviewees have however commented that the results of this type of research are insufficiently communicated to beekeepers and therefore have limited impact.

Bee health therefore leads us to the third assessment indicator, which is animal welfare. Animal health refers to the influence of other diseases or phenomena, other than varroa, which influence the productive capacity of a bee. Bee health is not directly supported through the CAP apiculture measures, as this falls under the responsibility of DG SANCO. However the measures, and notably the **applied research** measure, have been used to fund research projects which investigate ways to improve bee health and therefore have fundamental research components. One can find examples notably in the Bulgarian National Programme where research was carried out to "establish a line of bees with higher resistance to some factorial (quasi pathogenic) diseases", as well as research to carry out "estimation of genetic and morpho-ethologic markers for resistance of bee swarms to diseases in order to create a system of activities for selection and for conservation of the national genetic resources and for bee prevention from diseases and disappearing". Examples can also be found in the French National Programme, where studies on the interactions and synergies between different pressure factors, such as pesticides, biocides, pollution, and feeding, and their possible negative cumulative effects on bees were financed. Other studies financed include investigating the impacts of agricultural and apicultural practices and the environment on bees, investigating the impact of cultures (potential or effective) using new technologies (GMO, nanotechnologies) on bees, investigating effects of phytosanitary and medical products on bees. These points are interesting as several interviewees have notably emphasized the dangers for bee health associated with pesticides[104]. The results of the French research projects on the sublethal effects of neonicotinoids have notably enabled the EFSA to

[104] The issue of pesticides is topical, although out of scope of this study. Indeed, the Council decided in April 2013, following a report the European Food Safety Authority and on a proposal of the European Commission, to suspend the use of three neonicotinoid pesticides on any agricultural crops that attract bees due to risks they pose for bees .

reassess the situation on neonicotinoids. Therefore, although these research initiatives have limited direct benefits for beekeepers, they have longer term impacts.

Main findings:

- The CAP apiculture measures have an indirect impact on the environment, and notably by limiting the decline of the bee population. Indeed, bees provide an invaluable positive externality to the environment through pollination. Measures such as technical assistance, varroa control, and the restocking of hives have been identified as particularly relevant in this respect.
- The measures have to some extent rendered beekeeping practices more sustainable, by encouraging more adequate varroa treatment, although there are large discrepancies between the practices of professional and non-professional beekeepers.
- Applied research has fundamental research components. The results of these research initiatives have been described as limited in the short term for beekeepers but may have a greater impact in the long term.

Conclusions

The combination of the CAP apiculture measures has had a direct and indirect positive impact on both rural development and the environment. It remains however extremely difficult to quantify this impact.

The measures have notably directly helped to foster the sustainability of the beekeeping activity, as well as the other economic activities developed around it, which not only includes suppliers but also, indirectly through pollination, farmers. Furthermore, the measures have contributed to limiting the decline of the bee population, in particular through the technical assistance, varroa control, and the restocking of hives measures. The measures enabling to control varroa have notably induced more adequate varroa treatment practices, although large discrepancies remain between professional and non-professional beekeepers. Controlling varroa requires a collective effort and all beekeepers should thus be made aware of adequate treatment options. Finally, applied research funds often involve fundamental research components, the results of which are insufficiently communicated across Member States and to beekeepers and thereby do not provide them with sufficiently tangible benefits. These research initiatives may however have longer term positive impacts.

8 PART III: Theme 5: Efficiency, management and administration

Introduction

In order to maximise their impact, it must be ensured that the apiculturemeasures are implemented in the most cost efficient way. The fifth theme therefore deals with the efficiency, management and administration of the measures. This theme is subdivided in two questions. These are:

- Have the CAP measures applicable to apiculture been implemented at the lowest possible cost?
- Can the CAP measures supporting apiculture be simplified and the management made more effective?

For the first question, we will assess the extent to which the apiculture measures have been implemented at the lowest cost possible in order to achieve the desired outcome. This implies determining the administrative burden associated with the implementation of the measures. For the second, we will evaluate the extent to which there is room for simplification and for improvements in the management of the measures. This implies assessing the actual management of the measures and determining if there is room for optimisation.

The assessment was done by combining the results from desk research, strategic interviews at EU level, and the two web based surveys (national Administrations, and beekeepers and beekeeper associations).

Findings

The fifth theme deals with efficiency, management and administration, and we answer the following two questions:

Q.5.1: Have the CAP measures applicable to apiculture been implemented at the lowest possible cost?

This section deals with the administrative burden associated with the implementation of the measures.

As stated in Article 107 of the Council Regulation (EC) No 1234/2007, in order to be eligible for co-financing, “Member States shall carry out a study of the production and marketing structure in the beekeeping sector in their territory”. For every three year period, Member States must therefore prepare a national programme detailing the production and marketing structures of their beekeeping sectors, as well as the specific actions foreseen under each of the six measures. Based on these foreseen actions, for each of which a budget must be allocated, Member State apply for co-financing to the European Commission.

According to experts interviewed, the procedures associated with the implementation of the CAP measures at the European level are not particularly cumbersome, and requirements are not excessive. This is however not the case for the structures set up at national levels. These

structures are Member State specific, implying that it is difficult to draw general conclusions. However, several experts interviewed identified bureaucracy as a major concern.

Problems related to bureaucracy are twofold. Firstly, according to experts interviewed during the German case study, the administration of the measures is extremely burdensome and costly for national and regional Authorities. Indeed, for the state of Lower Saxony, this represents an annual cost of €90 000, for a total co-financing of €1.2 million per three year period. An improved know-how (of the procedures) could therefore lead to a reduction of costs at Länder level.

Secondly, application for specific measures has been described as very bureaucratic, particularly in the case of the **control of varroa** measure. It has been reported, most notably in Germany, that beekeepers face a high administrative burden in the management and application for control of varroa measures. The excessively bureaucratic nature of this process is a strong deterrent to application. National authorities therefore stressed the importance of simplifying the control of varroa measures. More generally, in Spain, interviewees stressed that excessive bureaucracy impeded non-professional beekeepers from applying for the measures. A solution which was used by certain beekeepers in order to access CAP apiculture funding was to go through unions or cooperatives, but this represented an additional cost for beekeepers. Specialists, paid through the **technical assistance** measure, have however been made available to beekeepers in order to guide them through the application process in order to overcome this issue.

The administrative burden, and therefore the costs incurred by beneficiaries of the measures in complying with the apiculture measures obligations, is an adequate indicator to evaluate the need for simplification. The two following figures present the results of the survey to national and regional Authorities on the matter of administrative burden. As shown in figure 51 below, the administrative burden related to the CAP apiculture measures is determined, for 45.5% of respondents, at least once annually. However, 27.3% of respondents indicated that this measurement was only conducted once every five years, or more. Furthermore, as shown in figure below, 20.7% of respondents answered that they made use of measurement indicators (e.g., the Standard Cost Model) to have an approximate idea of the administrative burden and costs induced by the measures. There is therefore room for optimisation of the measurement of the administrative burden of the CAP apiculture measure on beneficiaries.

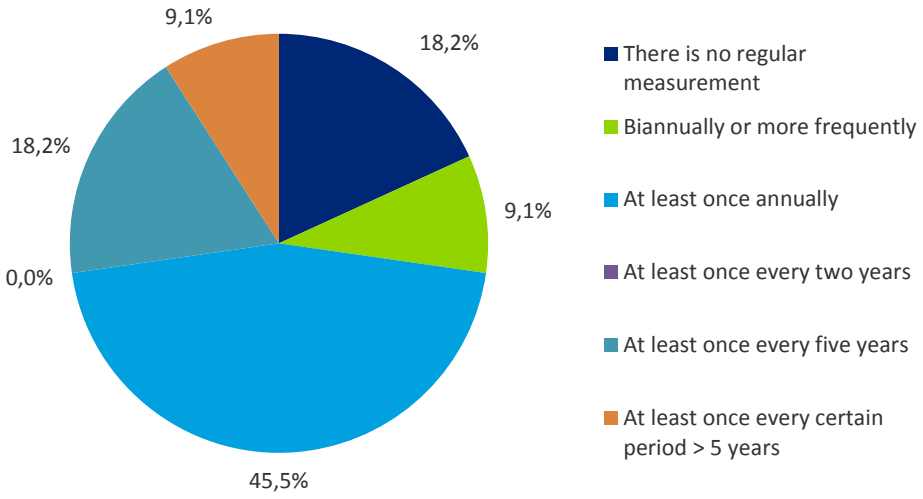


Figure 51 – Frequency of administrative burden measurement

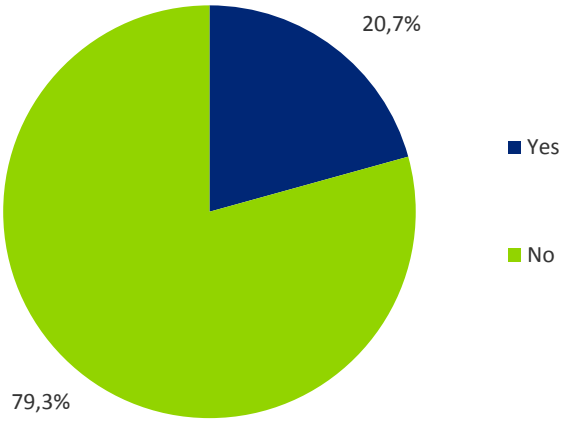


Figure 52 – Share of national and regional Administrations which use measurement indicators (e.g., the Standard Cost Model) to have an approximate idea of the administrative burden and costs induced by the measures

The administrative burden associated with the measures at national level is therefore Member State specific. This also depends on the level of financial monitoring associated with the implementation of the measures in each Member States. As beekeeping is very often a mixed activity, concerns were expressed regarding the fact that the measures enabled the purchase of equipment which was not only used for apiculture, but also other agricultural activities. This is a major concern as these individual measures should be used to upgrade apiculture production equipment. Indeed, experts interviewed for the case studies in Greece and Spain highlighted the risks related to double payment for individual measures due to insufficient controls. Spain has taken action on this front and requires beekeepers to present invoices to justify their purchases and have created an official list of equipment which can be purchased. However, this is not the case in other Member States, such as Germany, where approval for

specific equipment is granted by national authorities, upon examination of the request. In Hungary, control is ensured through a verification of price/capacity of mowers bought for transhumance purposes and the number of colonies of applications. This ensures that equipment purchased is directly linked with apiculture.

Regarding reporting requirements from other Member States, national and regional Authorities indicated, through the survey addressed to them that over 70% of beneficiaries of the measure (beekeepers, laboratories, and research institutions) had such reporting obligations, as shown in the figure below. This figure mirrors that of the share of national and regional Administrations which have specific monitoring systems. Examples of monitoring systems outlined in the survey include inspections of a random sample of beneficiaries, or checking at least 5% of invoices per each application, per month. Although the figures outlined in the survey are relatively high, there is room for further optimisation to reduce risks of fraud. Indeed, the occurrence of such events would imply that the funds have not been used for the adequate purpose, and that the measures have therefore not been implemented at the lowest cost possible.

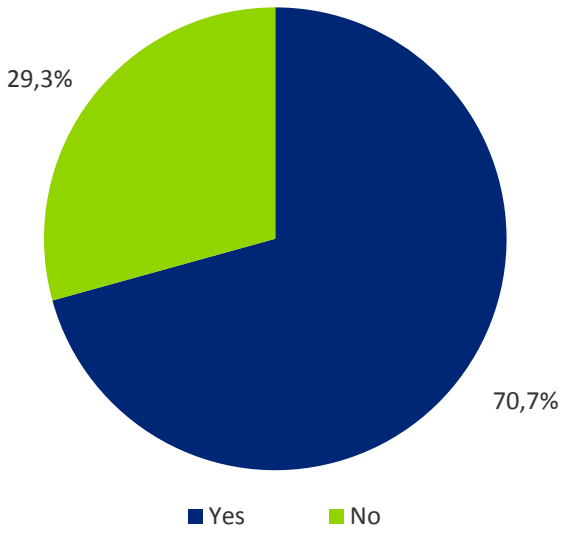


Figure 53 – Share of beneficiaries (beekeepers, associations of beekeepers, laboratories, research institutions, etc.) which have reporting requirements

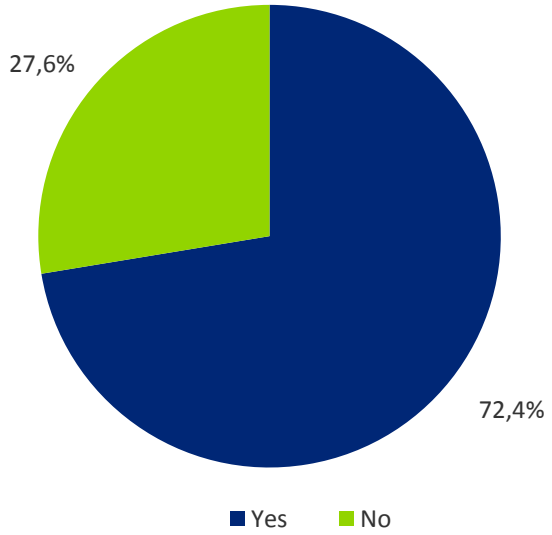


Figure 54 – Share of national or regional Administrations with monitoring systems

Main findings:

- The implementation of the apiculture measures at the EU level has not been excessively cumbersome.
- At Member State level, the implementation of the measures is often quite bureaucratic. This also depends on the level of control implemented by each national administration to avoid risks of double payments from other CAP support programmes.

Q.5.2: Can the CAP measures supporting apiculture be simplified and the management made more effective?

This section deals with the extent to which there is room for simplification and for improvements in the management of the measures.

According to national and regional Administrations, the measures could be rendered less bureaucratic by increasing the online availability of procedures. Indeed, 33% of national and regional Administrations indicated that there is either a substantial (5) or great (6) room for improvement in this domain.

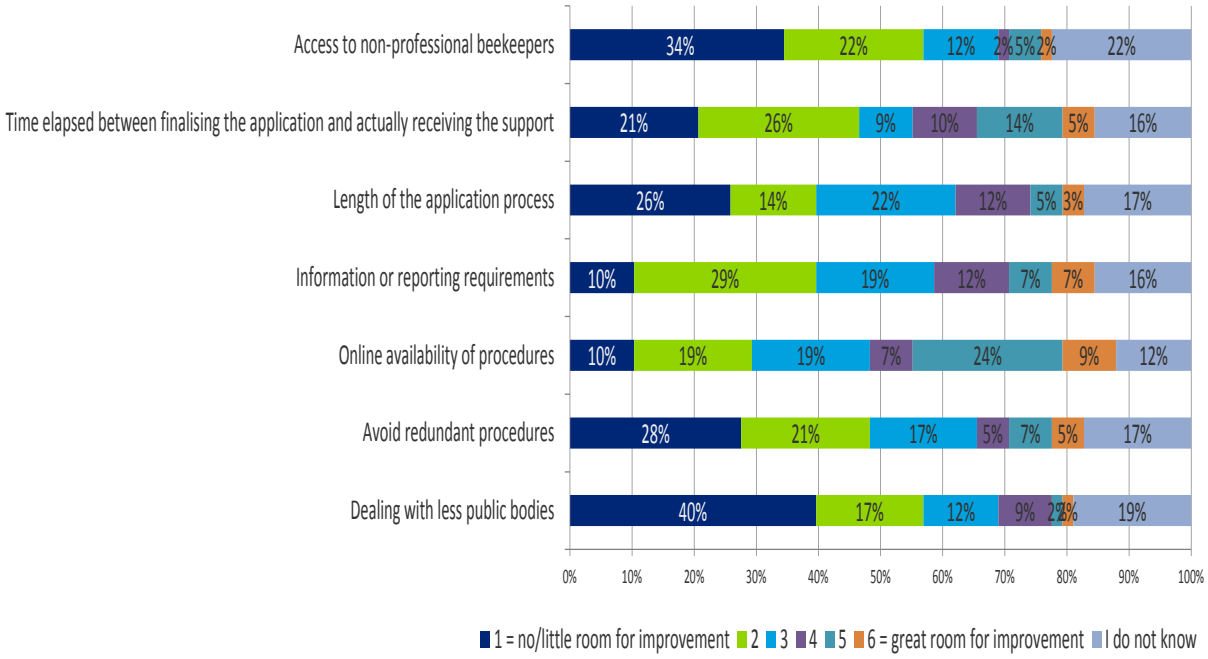


Figure 55 – Extent to which there is room for improvement for the following factors related to the set-up and application process of the measures for beneficiaries

Reducing the time elapsed between finalising the application and actually receiving the support was outlined as the second area where progress should be achieved. Indeed, 19% of respondents identified that there is either a substantial (5) or great (6) room for improvement in this domain. This concern was also reflected in the case studies. For instance, in Germany, the associations which coordinate and implement the **technical assistance** measures need to pre-finance the costs associated with these activities. Pre-financing was identified as a problem as these entities have limited financial reserves. The discrepancy between the starting date of the national programme and the real starting dates of its actions was also

identified in both Spain and Greece as a major issue. In Spain, interviewees have asserted that delays in the reimbursement of costs incurred, which use to be of a few months, have now increased to one or two years. These delays, and the uncertainty as to whether these costs will ever be reimbursed, are becoming deterrents to further investment.

Finally, it was emphasised that the decentralised management of the measures can particular complicate the efficient implementation of the measures. Indeed, the Spanish case study reveals that there are significant complaints from beekeepers regarding the comparative disadvantages and obstacles created by the Autonomous communities. As they provide 25% of co-financing, they have a significant influence on the implementation of the measures. Concretely, this implies that the Autonomous Communities decide which products are covered under the **control of varroa** measure, which differs per Autonomous Community. This therefore reduces the profitability of these products for laboratories, and therefore increases their cost for beekeepers. For individual measures such as **technical assistance** or **restocking of hives**, the equipment which is eligible for co-financing also differs per Autonomous Community which can therefore lead to comparative advantages or disadvantages for beekeepers in different regions. Finally, retroactive changes of eligibility criteria, per Autonomous criteria, can seriously disrupt the effective implementation of the measures. Interviewees asserted that whenever people in charge in regional governments change, they tend to apply retroactively changes to the eligibility conditions. This can imply that a potential beneficiary will not be reimbursed for his cost, even though he was previously eligible according to the criteria in place at the time when he/she incurred the cost, if these criteria come to evolve. Experts have therefore emphasized the need for common criteria at the national level. This issue is not only limited to Spain. Indeed, 74.1% of national and regional Administrations, which responded to the survey addressed to them, indicated that regional administrations were involved in the management of the measures, as shown in the following figure. The extent to which they are involved evidently differs per Member State.

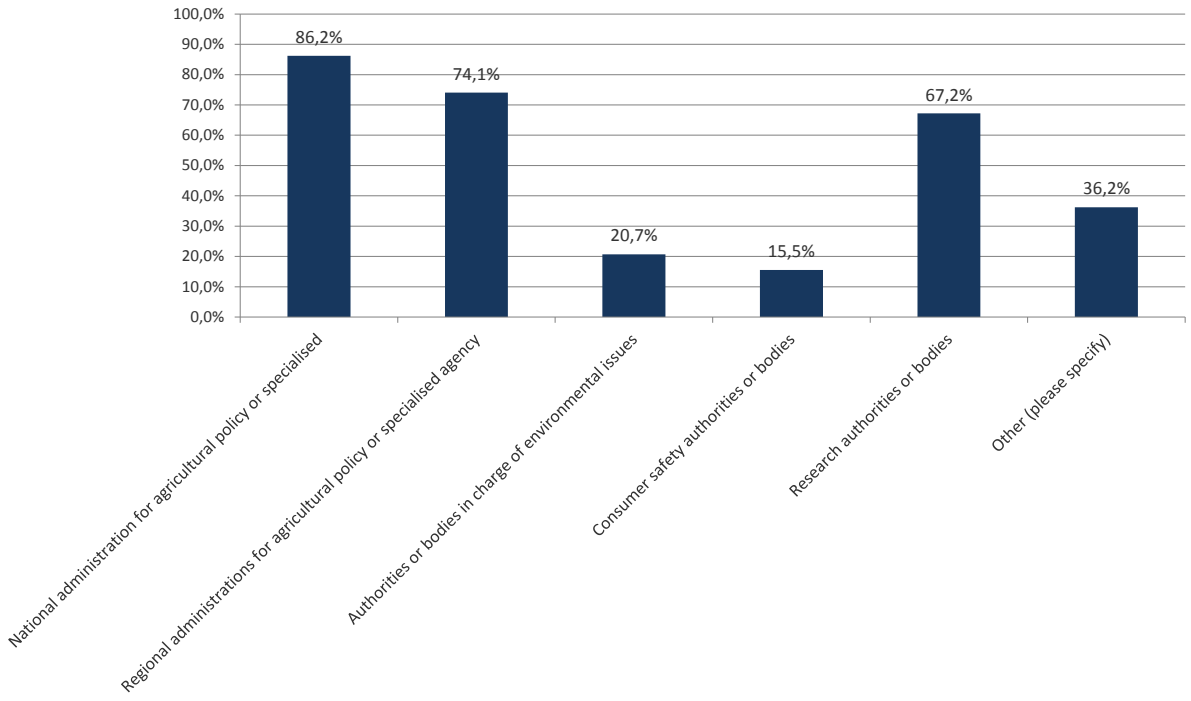


Figure 56 – Public authorities or bodies involved in the development of programmes and measures to support apiculture

As can be seen from the figure above, numerous other types of institutions are involved in the development and management of the measures, such as research authorities, authorities in charge of environmental issues or beekeeper associations and universities (in 'other' category in the figure here above). This in line with the Article 109 of the Council Regulation (EC) No 1234/2007 which requires the apiculture programmes to be drawn up in close collaboration with representative organisations and beekeeping cooperatives.

Main findings:

- National and regional Administrations have, through our survey, outlined the need to increase the online availability of procedures, as well as reduce the time elapsed between finalising the application and actually receiving the support.
- Finally, the decentralised management of the measures can create severe inefficiencies in the implementation of the measures. Experts have therefore emphasized the need for common criteria at the national level.

Conclusions

At EU level, research results have shown that the implementation of the apiculture measures is not excessively cumbersome. This is however not the case at Member State level, where the measures have been described by experts as bureaucratic. There are disparities at Member State level, and these depend on the level of control which Member State associate with monitor spending. Increasing the online availability of procedures, as well as reducing the time elapsed between finalising the application and actually receiving the support have

therefore been identified by national and regional Administrations as two priority areas to improve the efficiency of the measures. Finally, the decentralised management of the apiculture measures can create inefficiencies in the implementation of the measures.

9 PART III: Theme 6: Overall coherence with CAP objectives and other measures

Introduction

Council Regulation (EC) No 1221/1997 first established the measures to support the apiculture sector. Five of the current six support measures were introduced back then, with the measure supporting the restocking of hives being added later. After some regulatory changes, the CAP measures supporting apiculture are currently enshrined in Articles 105 to 110 of Council Regulation (EC) No 1234/2007, which establishes a common organisation of agricultural markets as well as specific provisions for certain agricultural products.

The apiculture support measures have been integrated in the CAP since their conception. As such, while belonging to the so-called 1st CAP pillar, the measures are part of a wider range of policy actions aiming inter alia to ensure a fair standard of living for farmers, improve the competitiveness of the EU agriculture and the development of rural areas, to preserve the environment and ensure food safety and supply to EU citizens. In other words, the seemingly limited in scope apiculture measures are a link in a large network of policy actions. These include the actions carried out under the 2nd CAP pillar. As such a link, the apiculture support measures must respect and contribute to achieving the overall policy objectives.

In addition, other measures related to beekeeping have been developed at EU level outside of the framework of the CAP. European Commission Directorates General other than DG AGRI have developed programmes related to beekeeping, such as initiatives on bee health.

Besides the measures adopted at EU level, Member States have also developed national policies related to bees.

This section aims to unravel the complex fabric of policies related to beekeeping, in order to assess their coherence.

Therefore, the main objective of the section is to assess the overall coherence of the CAP measures supporting apiculture with the CAP objectives and other measures. In addition, the relevance of the measures given the needs as formulated in the Regulation will also be analysed.

The section is divided in two questions:

- To what extent are the CAP measures supporting the apiculture sector coherent with the CAP as a whole, the agri-environmental measures in particular, the EU programmes on research and initiatives on bee health, as well as with the national policies related to bees and private actions?
- To what extent are the objectives of the CAP measures supporting the apiculture sector relevant given the needs as formulated in the Regulation?

The assessment was largely driven by desk research, undertaking a careful analysis of the objectives of the CAP measures supporting apiculture and the different relevant measures and initiatives at EU and national level. This analysis was complemented with the information

collected during the interviews carried at EU and national level, other relevant information gathered through the case studies, and the online survey to public administrations.

Findings

Q.6.1: *To what extent are the CAP measures supporting the apiculture sector coherent with the CAP as a whole, the agri-environmental measures in particular, the EU programmes on research and initiatives on bee health, as well as with the national policies related to bees and private actions?*

This question covers several topics. We look into each of the different topics separately.

1. Coherence of CAP measures supporting apiculture with the CAP as a whole

The CAP objectives are enshrined in Article 39 of the Treaty on the Functioning of the European Union (TFEU). They are the following:

a) To increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;

b) Thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture

c) To stabilise markets

d) To assure the availability of supplies

e) To ensure that supplies reach consumers at reasonable prices.

The CAP measures supporting apiculture which constitute the object of this evaluation belong to the 1st CAP pillar.

In accordance with Article 105 of Council Regulation 1234/2007, the objective of the (1st pillar) CAP measures supporting apiculture is to "improve the general conditions for the production and marketing of apiculture products". This is a general objective that allows for different orientations of the measures in each Member State. The six support measures outlined in the Regulation allow for the development of different concrete actions in each Member State. However, they entail a higher degree of concretion than that of the measures objectives.

A matching exercise between the apiculture support measures and the CAP objectives reveals that, overall, the former are coherent with the latter.

Technical assistance measures aim to improve knowledge and technical capabilities of beekeepers around Europe, therefore to promote technical progress and contribute to an optimum utilisation of the factors of production. The co-financing of the purchase of brand-new equipment, carried out under the technical assistance measure or the measure supporting the rationalisation of transhumance depending on the country, also contributes to these ends. The acquisition of equipment enables productivity gains, and frees up labour resources (less man hours are required to produce similar outputs). The higher mechanisation of the beekeeping activities is positive in this regard, whilst having positive side effects such as the decrease in occupational diseases and health issues related to beekeeping. The contribution to the development of applied research projects also has potentially beneficial effects of the

sector's level of productivity, the development of production and the utilisation of production factors.[105]

The support measures contribute to the reduction of certain production costs and provide assistance in activities enabling beekeepers to capture a higher share of the added value generated by apiculture products. In this manner, they contribute to ensuring a fair standard of living for beekeepers and to increasing their earnings.

The subsidisation of varroa treatments serves the double purpose of stabilising honey production (by reducing the harmful effects of a threatening factor) and tackling a significant factor in beekeepers' production costs.

By supporting the laboratories carrying out analyses of the physico-chemical properties of honey the measures increase the availability for beekeepers of a necessary link in the commercialisation chain of honey. Indications are that the availability and cost of the honey analysis could effectively prevent certain beekeepers from carrying them out[106], and subsequently deter them from selling directly their honey. Therefore, by supporting the analyses the measures effectively support individual beekeeping earnings. The support reduces beekeepers' costs and at the same time enables them to capture a higher share of the product's added value. Price data show that beekeepers receive higher prices for their honey when selling it directly to consumers or jarred to retailers than when selling it to packers or distributors, or even to cooperatives (prices of sales to cooperatives are however higher than sale prices to packers and distributors)[107]. Since the measures also support in some countries the acquisition by cooperatives of analysis' equipment and/or the salaries of technicians carrying out the analyses, beekeepers' earnings are also supported through support to cooperatives.

Overall, the support measures are directed at improving the production of honey. This implies a quantitative and a qualitative improvement. On the quantitative side, the measures aim to create productivity gains and tackle production costs and other direct threats to production (such as varroa). The support measures can contribute to counter the effects of external factors damaging the level and viability of production, such as weather conditions (low levels of rainfalls and droughts) or the rises in oil prices (damaging for transhumant beekeepers) or sugar prices (when supplementing the feeding of bees with sugar becomes a need due to lack of availability of flora). All in all, by supporting production, the support measures contribute to stabilise the markets and to assure the availability of supplies.

[105] While the actual results of the measure supporting applied research projects in the field of beekeeping have been mixed, this presents no obstacle when assessing the coherence of the measure and the CAP objectives. The measure is well aligned with the CAP objectives, regardless of the better or worse actual results it has brought about. Actually, the insistence on the "applied" character of the research projects is well aligned with the outlined CAP objectives (research aims at producing tangible results contributing, inter alia, to create productivity gains and ultimately to improve beekeepers' situation and earnings).

[106] 43% of the respondents to the online survey for beekeepers considered the high cost of analysis services an obstacle hampering the direct sale of honey. 25% considered it a major obstacle, while 9% deemed it an important obstacle and 9% a moderate obstacle. Similarly, 34% of the beekeepers rated the low availability to and/or high price of honey analysis services as a factor limiting honey trade opportunities. For 10% it entailed a moderate limitation, while for 9% it supposed a high limitation and 15% considered it a major limitation.

[107] A distinction should be made in the way different cooperatives work. When cooperatives are mainly dedicated to collecting the honey from all the members of the cooperatives, analysing and processing it as necessary in order to sell it to large packers and distributors (and then pay beekeepers proportionally depending on the price of the deal reached with the packers), the price beekeepers receive is not much higher than the price received when selling directly to the packers and distributors. This is the case in Spain. When the cooperative sells the honey directly under its own brand, or allows beekeepers to use common equipment so that they can then sell their honey by themselves, the price beekeepers obtain for their honey is much higher. In both cases, although to different extents, the support to cooperatives through the measure supporting the physico-chemical analyses of honey has a positive effect on beekeepers' earnings.

Therefore, in terms of design, the support measures are coherent with the CAP objectives in this regard. Data show an actual stabilisation in the level of honey production in Europe over the last few years (per FAO data, EU-27[108] honey production in 2010 equalled approximately 2004 levels, reaching 204,000 tons). As elaborated in detail during this report, such continuity in production levels can be broadly linked to the support measures.

A word of caution should however be introduced here. The EU has a relevant but limited role in the world market for honey. In 2010, EU production accounted for 13.2% of world honey production (source: FAO). Therefore, variations in EU honey production can only have a limited effect on the world market.

On the other hand, the self-sufficiency rate of the EU in terms of honey consumption is around 60%[109]. This implies that, although substantial amounts of imports are necessary to satisfy internal demand, a significant part of the honey consumed in the EU is still produced in the EU. EU production matters. In this sense, measures aimed to foster honey production in the EU, as the CAP measures supporting apiculture do, have a positive effect in assuring the availability of supplies and (although to a lesser extent) in stabilising the markets.

As regards the CAP objective of ensuring reasonable prices for consumers, the CAP measures do not play a substantial role, yet are coherent with market conditions.

Honey price in the EU is heavily influenced by import prices. Particularly in Spain, the availability of relatively cheap honey coming from non-UE countries drives honey prices down. In these cases, honey consumer prices are not a concern. In countries where larger shares of the honey production are sold directly (such as Germany and Greece), consumer prices are significantly higher. However, honey is not a primary need product. Average consumption per year in the EU amounts to 0.7 kg. Consequently, yearly spending on honey per capita is low. A higher price could probably be sustained by consumers without originating any major issue or demand slump. In addition, the honeys reaching a higher price in the market are monofloral or "specialty" honeys. In these cases, it is the consumers' demand for a specific type of product that allows beekeepers or retailers to charge higher prices. On the other side, profitability margins for beekeepers appear to be slim. All things considered, this results in a seemingly lack of need for the CAP measures supporting apiculture to contribute to reduce honey consumer prices.

Main finding:

- The CAP measures supporting apiculture are coherent with the CAP as a whole in as much as the measures, and the concrete actions developed under them, are consistent with the overall CAP objectives.

[108] Data of accession countries (Bulgaria and Romania in 2007) were added in the years prior to their accession to create a homogeneous measurement

[109] According to data of the European Commission's Advisory Group on Beekeeping, the EU self-sufficiency rate reached 60.2% in 2008, 61.3% in 2009 and 62% in 2010.

2. Coherence of CAP measures supporting apiculture with the agri-environmental measures in particular

Another CAP instrument whose coherence with the CAP measures supporting apiculture is worth analysing are the agri-environmental measures.

Agri-environmental measures help to integrate environmental concerns into the CAP. They are designed "to encourage farmers to protect and enhance the environment on their farmland by paying them for the provision of environmental services"[110]. Farmers subscribe to them voluntarily, receiving payments linked to environmentally-friendly farming techniques that go beyond the legal obligations with an aim to preserve the environment and maintain the countryside. Farmers must commit themselves for a period of at least five years.

Agri-environmental measures are a key tool in the rural development axis of the CAP, accounting for 22% (nearly €20 billion) of the expenditure for this purpose in the period 2007-2013.

As part of the rural development axis, agri-environmental are in principle not in conflict with other 1st pillar measures, particularly in the field of apiculture. The rural development objectives of improving the competitiveness of the agricultural and forestry sector, improving the environment and the countryside, improving the quality of life in rural areas and encouraging diversification in the rural economy are perfectly coherent and compatible with the CAP measures supporting apiculture. It is actually possible to think immediately about how the 1st pillar apiculture measures can contribute to these 2nd pillar objectives (while 2nd pillar measures can lay the ground for the achievement of 1st pillar measures by ensuring the conservation of healthy habitats). An improvement in the knowledge and technical skills of beekeepers, as well as improvements in equipment and technology resulting in productivity gains would result in an improvement of the competitiveness of the agricultural sector. In addition, an expansion in beekeeping activities would have positive effects in agricultural production through increased pollination. Through pollination, an uptake of beekeeping would also generate gains in the environment and the countryside. The reproduction of different botanic species would be facilitated. Finally, as an eminently rural activity, a development of beekeeping would boost economic activity in rural areas, providing benefits in terms of diversification and in terms of quality of life (led by economic improvements).

However, the concrete design of certain agri-environmental measures can generate conflicts with the objectives of the 1st pillar measures. The 1st pillar measures have an eminently productive orientation. Certain agri-environmental (2nd pillar) measures, meanwhile, have a non-productive orientation. This should not come as a surprise, as it is embedded in the own design of agri-environmental measures. Subscription to them is voluntary, which makes agri-environmental contracts compete economically with the most profitable land (or livestock) use. Therefore, payment levels need to be set at a sufficiently high level to attract farmers to join these schemes. At the same time, over-compensation should be avoided. Farmers are always free to avoid subscribing to agri-environmental measures if they believe they can give an alternative, more profitable use to their lands (or livestock).

On certain occasions, however, conflicting measures can be balanced to strike an equilibrium in which the benefits of both types of measures can be, for the most, obtained.

[110] http://ec.europa.eu/agriculture/envir/measures/index_en.htm

In this context, a particular case worthy of mention came up during the fieldwork visit to Spain. Many beekeepers in Spain receive agri-environmental measures for the promotion of biodiversity. These measures require beekeepers to leave their hives for a period of six consecutive months in the same area. In this manner, pollination is ensured and consequently the preservation of biodiversity. To try and ensure the largest possible reach of the benefits, the measures establish limits in terms of hives per Hectare, and set out minimum distances between apiaries (benefitting apiaries must be at least 1km apart). The beekeepers and beekeeping associations interviewed complained, in the first place, about the fact that the requirements for perceiving the support from agri-environmental measures were irreconcilable with the characteristics of the sector in Spain. Professional beekeeping in Spain is highly professional and transhumant. Beekeeping holdings are generally large (in 2010, professional beekeepers kept an average of 367 beehives), and the requirements would make it impossible for the majority of the beekeepers to receive the aid in full. Support would only cover a minority of the beehives. The main problems, however, would come from the obligation to maintain the beehives for six consecutive months in the same location. According to beekeepers, this implies large mortality rate amongst bees because they run out of food. Furthermore, the negative effects on bee population would concentrate in the later period, when no relevant additional pollination and biodiversity benefits (taking also into account the floration periods of plants) would be provided. Beekeepers would have been facing the dilemma of leaving their hives (and therefore perceive the aid from the agri-environmental measures) or removing them from the site (therefore losing the rights to perceive the agri-environmental measures' aid but conserving their main resource of production –bees-). While agri-environmental measures intend indeed to compensate for alternative uses of the concerned resources, this was perceived as a major issue in view of the importance of the economic support provided by these aids (estimated at 22% for a 500-beehives operation in the economic survey of the National Apiculture Programme). Besides, bees provide pollination services, beneficial for biodiversity, regardless of their location.

All in all, while no similar evidence was gathered in other countries, it appears that a better balance could be found between the interests of beekeepers and the promotion of biodiversity.

Backing up the results of the desk research analysis plus the anecdotal case study example, no other issue in terms of coherence was highlighted during the interviews conducted in the Member States visited. No issue was raised in the responses to the survey to national administrations either.

Main finding:

- The CAP measures supporting apiculture are generally coherent with the agri-environmental measures. The apiculture support measures generally contribute to the achievement of 2nd CAP pillar objectives.

3. Coherence of the CAP measures supporting apiculture with the EU programmes on research and initiatives on bee health

Several EU programmes related to bees were carried out at least partially during the period covered by this evaluation. Some of them are on-going. They include the BEE DOC project, STEP, ALARM, CLEANHIVE and the efforts undertaken by the COLOSS network.

Those projects are described in more detail in the Overview part of this study.

In addition, the European Commission designated on 2 February 2011 the EU reference laboratory in the field of bee health, for a period of five years from 1 April 2011. The laboratory selected is the *Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail* (ANSES), located in Sophia-Antipolis, France. One of the main responsibilities of the laboratory is to coordinate, in consultation with the Commission, the methods employed in the Member States for diagnosing the relevant bee diseases. It also shall, inter alia, develop monitoring activities and whenever possible coordinate activities directed towards an improvement of the bee health status in the Union, as well as perform experiments and field trials directed towards an improved control of specific bee diseases.[111]

Based on the technical document "Basis for a pilot surveillance project on honey bee colony losses" prepared by the EU Reference Laboratory, surveillance studies have been launched in 17 Member States. They started on 1 April 2012 and will finish on 30 June 2013. The studies will be co-financed by the Commission at the rate of 70% of eligible costs, adding up to a maximum of €3.3 million. Maximum amounts have been established per country.

Another key player at EU level in the domain of bee health is DG SANCO. In December 2010, the European Commission issued a communication on Honeybee health[112]. The communication was developed under the lead of DG SANCO. The Directorate General for Health and Consumers does not however deal with all the pests and disease affecting honeybees. In particular, it does not deal with varroa, since varroasis is an ineradicable disease given the spread and characteristics of the parasite *varroa mite*. In this sense, there is adequate coherence and complementarity with the CAP measures.

The European Food Safety Authority (EFSA) also has competencies linked to bee health. Given its mandate to improve EU food safety and animal health and to ensure a high level of consumer protection, EFSA has an important role to play in ensuring that healthy bee stocks are maintained in Europe.[113] A number of its Scientific Panels and Units contribute to this work[114], mainly in the areas of pesticides, animal health and welfare and plant health, genetically modified organisms (GMOs), data collection and scientific assessment. In 2009, EFSA published the external study "Bee Mortality and Bee Surveillance in Europe", which

[111] The entire remit of responsibilities and tasks of the EU Reference Laboratory for Bee Health can be consulted here: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:029:0001:0004:EN:PDF

[112] http://ec.europa.eu/food/animal/liveanimals/bees/docs/honeybee_health_communication_en.pdf

[113] As an example, on 16 January 2013 EFSA issued the results of its assessment (demanded by the European Commission) of the risks for honeybees associated with the use of three neonicotinoid insecticides (clothianidin, imidacloprid and thiamethoxam) as seed treatment or as granules. It concluded that the use of these pesticides has certain negative effects on bee survival and development. Although the study was not able to complete all the planned assessment due to shortcomings in the available data, the European Commission proposed on 31 January 2013 a set of measures to limit the use of neonicotinoids on crops attractive to honeybees -such as cotton, maize, rapeseed and sunflowers-.

[114] EFSA's main Scientific Panels and Units concerned include: the Pesticides Unit; the Panel on Plant Protection Products and their Residues; the GMO Panel; the Panel on Plant Health; the Panel on Animal Health and Welfare; the Dietary and Chemical Monitoring Unit.

concluded that the surveillance system in the EU are, in general, weak and that there is a lack of data at Member States level and a lack of comparable data at EU level.[115]

On top of the large research projects, private sector actions can also receive EU funding, notably through the "Research for SMEs Associations" projects. This is the case of the CLEANHIVE project. Overall, a general lack of awareness was perceived about these projects. No particular account of them was gathered either during the case studies, with the exception of a large cooperative in Spain (involved in the CLEANHIVE project). These projects appear however to have potential for immediate applicability and tangible improvements in the apiculture sector. As an example, another project is trying to develop a method to liquefy honey without needing to warm it up. As honey loses properties when it is heated (certain enzymes break and volatile components evaporate), but consumers' demand favours more liquid honeys, this could address marketing issues while ensuring the healthy benefits of honey.

Overall, on top of DG AGRI, three other DGs (DG RTD, DG ENV and DG SANCO) have competencies related to bees and honey. In addition, these various competencies belong to several Units within these DGs (e.g., competencies are shared between units for animal health, plant protection, residues in food, veterinary medicines and GMO issues in DG SANCO). An EU Agency (EFSA) also has responsibilities in the field.

The diversity of bodies involved in the design and funding of research programmes appears to complicate the coherence and complementarity between the projects. While the topics of certain research projects overlap to some extent, major issues have not been appreciated in this sense. The Commission services also run an inter-service group under the chairmanship of DG SANCO on bee issues. The group meets regularly to discuss all relevant issues and initiatives and to seek a common approach.[116]

The ALARM project investigated several causes of biodiversity loss, including the possible decline of pollinators as bees. The STEP project, launched afterwards, concentrated on pollinators and adopted a much broader scope. The project intended to lay the groundwork for future pollinator monitoring programmes.

The objectives of the COLOSS Network (created in 2008 with EU financial support via a COST action) and the BEE DOC seem, at a general level, to overlap to a good extent. While COLOSS intends to better understand honeybee health and to prevent colony deaths (analysing the "colony collapse disorder" among other tasks), the BEE DOC also tackles honeybee health issues (trying to fill knowledge gaps in honeybee pests and diseases, including the "colony collapse disorder") and tries to quantify the impact of interactions between parasites, pathogens and pesticides on honeybee mortality. COLOSS has also conducted projects to try to quantify bee losses.

However, it appears that the overlap has not been problematic in practice. Several BEE DOC partners participate actively in COLOSS, ensuring a smooth collaboration between the two networks. COLOSS' Chairman, Dr. Peter Neumann, from the Swiss Bee Research Centre, is also a BEE DOC partner. Furthermore, the BEE DOC project ended in 2012. The COLOSS network, in the meantime, continues working. COLOSS is no longer financed by the EU, but

[115] http://www.efsa.europa.eu/en/supporting/doc/27e.pdf
[116] A thematic page, updated regularly, is also maintained: http://ec.europa.eu/food/animal/liveanimals/bees/index_en.htm

was born out of a COST Action. The community of researchers thus created continues to work now, receiving financial support from other sources.

A large scale surveillance project has been launched under the steer of the EU Reference Laboratory for Bee Health in 17 Member States. This project covers the glaring need for reliable data on the evolution of bee population. It appears that these data could have certainly been useful for the BEE DOC and COLOSS efforts, but the laboratory had not been appointed then. Rather, it seems that some of the shortcomings in the available data pointed out by these two initiatives contributed, if any, to the appointment of the laboratory and the launch of the study. In this sense, the intention to address a need for further research can be valued positively.

All in all, the EU programmes on research and initiatives on bee health carried out to date do not present major practical issues in terms of lack of coherence. They complement each other to a certain extent and in the particular case where more risks of overlap were observed, cooperative between both projects was effective.

However, the disparity of authorities involved in the design, funding and implementation of research projects related to beekeeping appears to present a constant, pervasive risk for the coherence and complementarity of research efforts in the EU. Positive efforts have been carried out in terms of internal coordination within the European Commission to try and ensure a comprehensive, holistic approach which guarantees that the main issued related to apiculture (including honeybee health) are coherently researched, and allocating funds in an efficient manner. At national and sub-national level, the responsibility lies within the public administrations and programme beneficiaries to develop measures consistent with the EU framework.

Main findings:

- A wide range of EU bodies (including four European Commission Directorates General, an EU Agency and an appointed national institution) have competencies linked to beekeeping and participate in research projects and bee health initiatives
- No major issues in terms of coherence were found after an analysis of the major research projects.
- The Commission works internally to ensure proper coordination between DGs and the coherence and complementarity of their different actions.
- The number and diversity of authorities involved in research projects related to beekeeping seems to present a potential risk for the long-term effectiveness and coherence of the efforts carried out

4. Coherence of the CAP measures supporting apiculture and the national policies related to bees and private actions

The main instrument at national level to support the apiculture sector in each Member State is the National Apiculture Programme elaborated to concretise the CAP measures supporting apiculture in each country. The elaboration of these programmes is a requirement for the reception of the 50% co-financing provided by the European Commission. The measures utilised and the concrete actions adopted under each of them vary largely across countries. Some of the varying factors across countries include the overall amount of beekeepers, the

share of professional beekeepers, the weather conditions, the spread of transhumance, the knowledge of individual beekeepers about production techniques and the treatment of diseases, and the prevalent marketing and sale channels.

Overall, the measures and actions developed under the National Apiculture Programme were found to be coherent with the CAP measures supporting apiculture as stated in the Regulation.

In the survey directed to National Administrations, the results reported a positive degree of coherence, as well as compatibility and complementarity of objectives, between the national programmes and the EU support measures. The results are showed in the figure below. While the potential for synergies between EU and national actions was still valued as positive by 44% of the respondents, this is the aspect where room for improvement was perceived. One caveat to the results must be remarked: about 1/3 of the respondents did not answer or know how to answer this question.

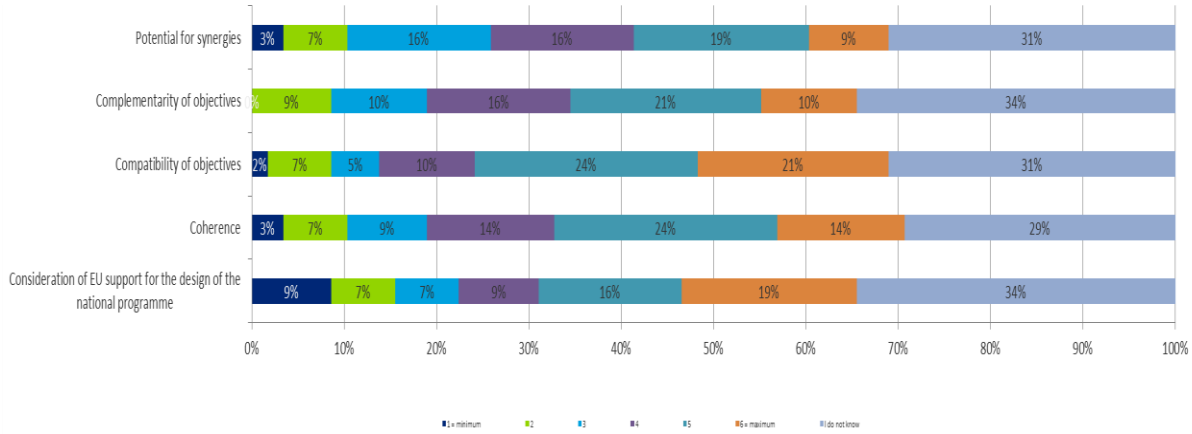


Figure 57 – The relationship between the national programmes and the EU support measures and policies related to bees

The heterogeneity of the support measures applied in each country and the concrete actions adopted under each of them should be highlighted. The generic character of the objectives presented in the Regulation ("improving the general conditions for the production and marketing of apiculture products") and the wide scope of actions potentially covered by the six support measures allow for a high degree of flexibility that is reflected in the Member States' National Apiculture Programmes.

Given the heterogeneity of circumstances across countries, such flexibility is valued positively. A further concretisation of the measures would likely result in a poorer satisfaction of the national needs.

A certain lack of coherence was however perceived amongst the applied research projects funded under different national apiculture programmes (it should be noted, however, that the coherence amongst the National Apiculture Programmes is not an objective of the regulation and that each Member State elaborates its own programme in isolation, without consulting other countries). Different countries, such as Bulgaria, Hungary or Spain financed research on methods to fight varroa. Similarly, several countries (such as France and Spain) funded research on the causes of bee mortality and the effects on bees and human health of phytosanitary products. These initiatives also happen to overlap with other EU, cross-country

research projects (although not with the CAP measures supporting apiculture, which constitute the object of this evaluation question).

Among the case study countries, no additional support to beekeeping on top of the National Apiculture Programme was provided in Greece and Hungary. In Germany, several additional apiculture programmes exist at national level (e.g. promotion of young beekeepers; vocational training towards becoming a professional beekeeper; German Bee Monitoring project; Agri-environmental Programme and Varroasis Control research programme). These measures were found to be coherent on the whole with the CAP measures. In Spain, pollination aids were provided by several regions in the past but were eliminated, as the 2nd CAP pillar agri-environmental measures supporting biodiversity essentially supported the same objective. Support to young beekeepers and the beekeeping sector was briefly provided in Valencia (€2-3 were conceded per hive), but does not exist anymore. Andalusia offers beekeepers the possibility to place their hives in public lands (restricted otherwise for private usages). A particular example of lack of coherence between the 1st CAP pillar and national measures appeared in Spain. Beekeepers in Valencia received support to compensate for the obligation to remove their hives from the areas of farming of orange trees. The obligation to remove the hives and subsequent prohibition of placing them in areas of orange trees cultivation was adopted with a view to prevent the spread of an orange tree subspecies of foreign origin that produces oranges with no pips. The result was the adoption of measures with a non-productive objective, conflicting with the productive and pro-pollination orientation of the CAP measures supporting apiculture.

No relevant private actions supporting apiculture were found through the case studies. On the contrary, examples of private actions (by farmers) with harmful effects were quoted in Greece and Hungary. In Greece, a study reported colony losses due to the use of plant protection products, especially from apiaries placed close to cotton, tobacco, corn and citrus crops. These losses would range between 3 and 5%. In Hungary, it was mentioned that self-pollinating plants are generally favoured for the breeding of new plant species. These plants tend to have less nectar which bees could feed on. In addition, the veterinarians from the largest beekeeping association in Spain complained vehemently about the harmful effects on bees of the use of neonicotinoids. The same position has been defended in the association's publications in the last few years. Evidence remains inconclusive at the time of the writing of the study, but the EFSA has given a first step towards the recognition of the negative effects of certain neonicotinoids.

Desk research for this evaluation has shown that there are multiple projects that foster beekeeping carried out at local level. They are both of private and public origin. They range, for instance, from the installation of beehives in the roof of public and private buildings in Lyon (project "UrbanBees"), to the placement of beehives in the roof of private companies' buildings in central London (the intention is also to boost employees' morale and teambuilding), to the lending of beehives for free to unemployed persons (six beehives for a period of three years) in Spain so that they can initiate themselves in beekeeping as a source of income.

Certain SMEs across Europe, as mentioned above, are also teaming up to develop applied research programmes.

Main finding:

- Overall, the national policies related to beekeeping were found to be coherent with the CAP measures supporting apiculture as stated in the Regulation, mainly because, aside from Germany, generally the only support to apiculture is granted through the National Apiculture Programmes. These programmes develop and concrete the CAP support measures, tailoring them to the specific situation and needs in each Member State.

Q.6.2: *To what extent are the objectives of the CAP measures supporting the apiculture sector relevant given the needs as formulated in the Regulation?*

The objectives of the CAP measures supporting the apiculture sector as well as the sector's needs are formulated in a flexible way in the Regulation.

Regarding the objectives, Article 105 of Council Regulation (EC) 1234/2007 states that national apiculture programmes will be drawn up every three years "with a view to improving general conditions for the production and marketing of honey". However, nothing else is specified in terms of what such improvements consist of. For instance, it is not specified whether it is intended that the sector becomes more professional (larger share of production coming from professional beekeepers), or that total production (amount of honey produced) increases, or that productivity (average yield per hive) improves. No direct allusion is made to the quality of honey produced either (conceivably, improvements in production can also be qualitative). Similarly, there is no specification as to what does an improvement in the marketing of honey mean. Is it related to the prices producers receive for their honey or to producer prices? Or to average honey consumption per capita in the EU?

In a similar fashion, the Regulation does not formulate precisely the needs of the sector. In this respect, the only mention to needs in the regulation is provided in recital (46) of the Regulation's preamble. The recital states: "Beekeeping, being a sector of agriculture, is characterised by the diversity of production conditions and yields and the dispersion and variety of economic operators, both at the production and marketing stages. Moreover, in view of the spread of varroasis in several Member States in recent years and the problems which that disease causes for honey production, action by the Community continues to be necessary as varroasis cannot be completely eradicated and is to be treated with approved products. Given such circumstances and in order to improve the production and marketing of apiculture products in the Community, national programmes should be drawn up every three years, comprising technical assistance, control of varroasis, rationalisation of transhumance, management of the restocking of hives in the Community, and cooperation on research programmes on beekeeping and apiculture products with a view to improving the general conditions for the production and marketing of apiculture products. Those national programmes should be partly financed by the Community."

The only direct reference to needs concerns varroasis ("action by the Community continues to be necessary"). The objectives are stated in the same manner as later on in the binding part of the Regulation ("with a view to improving the general conditions for the production and marketing of honey"). As for the rest, the heterogeneity of the sector conditions across

countries is stressed ("beekeeping…is characterised by the diversity of production conditions and yields and the dispersion as variety of economic operators, both at the production and marketing stages"). Implicitly, the Regulation conveys the idea that it is not possible to identify concrete needs that are homogeneous across the countries (except for the need to act against varroa). Therefore, no precise needs neither precise objectives related to them are stated. Instead, taking the diversity of situations across Member States as the starting point, the Regulation leaves the door open for Member States to further precise the objectives in their respective territories according to their local conditions. In the same line, the Regulation sets out a wide range of measures that cover a potentially high number of very diverse activities.

All in all, the Regulation seems to convey the notion that the needs of the sector are varied. In accordance with it, it sets out rather generic objectives that can be adapted to the particular conditions in each country. In this sense, the CAP measures supporting apiculture are coherent with the needs as expressed in the Regulation.

Indeed, different production and yield conditions, as well as marketing structures, lead inevitably to different orientations of National Apiculture Programmes. The contrasts across EU countries are startling. Taking Germany and Spain as an example, in Germany: 99% of the beekeepers are non-professional, keeping less than 7% of the beehives; yields range approximately between 30 and 50 kg/hive per year; 2/3 of the beekeepers own less than 10 hives, while only 0.5% own more than 100 hives; 70% of honey is sold directly to the consumers; and to practical effects the whole production of German honey is consumed internally in the country. By contrast, in Spain professional beekeepers represent around 22%, but control over 80% of the hives; average yields are around 13 kg/hive per year; beekeepers own an average of 104 hives, with non-professional beekeepers holding an average of 27 hives and professional beekeepers owning an average of 367 hives; owning at least 150 hives is a requirement for benefitting from the support measures; 10% of honey is sold directly to consumers; around 50% of the honey produced in Spain is exported. With such marked differences, national programmes have different orientations: the German National Apiculture Programme focuses on non-professional beekeepers while the Spanish one focuses on professional beekeepers (it explicitly recognises as its objective "to consolidate the existence of a professional sector and modernise operations by incorporating the latest techniques and scientific advances"). These differences are also reflected in spending patterns (in 2011, Germany spent around 40% of its budget on technical assistance, while the fight against varroa and the rationalisation of transhumance accounted for over 80% of the spending in Spain).

On a similar note, the coverage of the support measures was found to be sufficiently wide. While stakeholders in Greece (and other countries such as France) seem to favour the addition of more measures to the current list of six support measures, overall it was found that the current measures enable enough flexibility to cover a wide range of varying needs. The current National Apiculture Programmes reflect such flexibility (for instance, the purchase of equipment is co-financed under the technical assistance measure in countries such as the Czech Republic, Germany, Hungary and Poland, whilst it is funded under the measure of rationalisation of transhumance in Spain).

The main issues brought up by beekeepers and beekeeping associations (both during the interviews and through the online survey) and which fall under the competencies of DG AGRI are tackled by the measures (including the high production costs, the damage caused

by varroa, the high costs of equipment, and the lack of availability and/or high costs of laboratory analyses). The marketing of honey, which was found to be lacking development, is however part of the measures and one of the specific objectives of the Regulation. Other complains raised by beekeepers do not fall under DG AGRI competencies (such as the trade and sanitary laws governing the imports of honey from non-EU countries).

Main finding:

- The variety of conditions across Member States leads to different needs per country and to different objectives in order to cover those needs. This leads to a difficulty to find general needs and objectives, and therefore to difficulties in assessing whether the objectives (which remain very flexible) have been met or not. The analysis should remain national in many cases.

Conclusions

The CAP measures supporting the apiculture sector have been found to be coherent with the CAP as a whole. Analysed individually, each of the apiculture measures supports one or several of the general CAP objectives. Taken as a whole, the CAP measures supporting apiculture also match the main objectives of the CAP. A possible lack of coherence was only perceived between the 1st pillar support measures and one particular 2nd pillar measure, the agri-environmental measures supporting biodiversity. While the agri-environmental measure aims to ensure pollination of both traditional crops and wild flora, there appears to be potential for finding a better balance between the achievement of these objectives and the interest of bees and beekeepers. Bees are by nature pollinating agents, and therefore any loss of bees eventually results in an environmental loss.

The wide range of EU programmes on research and initiatives on bee health address the majority of the topics covered by the support measures. However, a significant dispersion of research efforts exists. Several Commission Directorates General are financing research projects, and other EU stakeholders, such as the EFSA, or the recently appointed EU Reference Laboratory for Bee Health, also have competencies on the domain.

CAP measures supporting apiculture and national policies related to bees were found to be highly coherent, mainly due to the fact that the later constitute for the most a development of the former. Aside from Germany, no other countries were found to support beekeeping in a significant manner outside of the National Apiculture Programme. Similarly, anecdotal evidence of private sector actions related to bees was found, but not representative enough to draw conclusions on their coherence with the CAP measures.

The objectives of the CAP measures supporting apiculture and the needs of the sector are formulated in a very flexible way in the Regulation. The diverse conditions across EU Member States are stressed. The generic character of the objectives and needs seems to reflect the heterogeneity of conditions. The wide scope of the support measures follows the same pattern. In this context, Member States enjoy a high degree of flexibility to adopt concrete actions suiting the particular situation in the country. As a consequence, while coherence is maintained at a high level, the analysis of needs and objectives, as well as of the achievement of those, can hardly be generalised and should be undertaken at a national level.

10 PART IV: General conclusions and recommendations

Conclusions

The Council Regulation (EC) No 1234/2007 defines, in articles 105 to 110, six measures to improve the general conditions for the production and marketing of apiculture products. These measures were designed, as specified in the Regulation, taking into account the diversity of production conditions and yields in the apiculture sector, and the dispersion and variety of economic operators both at the production and marketing stages. Furthermore, the measures were designed in a context of increasing concerns regarding the spread of varroasis, an ineradicable parasite which can impact production if not adequately treated.

This evaluation has therefore assessed whether the measures have enabled to improve the general conditions for the production and marketing of apiculture products. The main conclusions of this evaluation are presented in this section. The evaluation was centred on six evaluation themes, for each of which we have drawn conclusions.

Effects on production, marketing and trade

The measures should support production, marketing and trade of honey. It has been assessed that:

- The support measures have contributed to stabilising honey production levels in the EU in a context of rising production costs, threats to bee survival posed in particular by varroasis and other diseases (Nosema, American Foulbrood) and fierce international competition by price-competitive honey imports from third countries.
- The production of high-quality honey has been positively supported by the apiculture measures.
- The application of the support measures had local and targeted effects on the marketing of honey. Honey producer prices and sale channels were essentially determined by the national market structure. In some Member States, promotion of honey supported by actions developed under the measures at national level led to increase awareness of consumers on quality of honey produced locally. This was the case in Germany thanks to the quality label introduced by the DIB and in Hungary through the Hungarian producer's honey jar introduced by the OMME. There was no observable increase in honey consumption.
- External and intra-EU trade of honey remained stable between 2008 and 2011 in volume. A moderate effect of the measures, via the support to the production of high-quality honey in Europe, was perceived in the widening gap between the average export price of EU honey and the average import price of honey into the EU.
- The intra-EU trade of live bees seems to be a marginal activity. Local trade of live bees appears to be a relatively common activity to compensate for losses of bees suffered. Very mild positive effects were attributed to the measures in the facilitation of the keeping and trade of live bees.
- The measures contribute to curbing the surge in production costs which has been observed over recent years. Experts interviewed have asserted that this increase can

be traced back to the increase in the price of colonies in certain Member States, greater fuel expenditure incurred by beekeepers for transhumance, particularly in drought-prone countries, the increase in the price of varroa medication, and the increase in the use and cost of non-natural feeding costs, such as sugar. The measures have therefore enabled to limit the impact of this increase in production cost on the income of beekeepers and farmers which derive a part of their revenue from beekeeping.

- When included in the national apiculture programmes, experts interviewed asserted that the apiculture measures have encouraged the diversification of beekeepers' income by raising awareness on the potential of other apicultural products such as wax or royal jelly.
- The apiculture measures have contributed to price stability via the consolidation of production levels (therefore helping to secure supply). While accounting for significant national disparities, EU honey producer prices have increased moderately throughout the years. There were not enough data on honey consumer prices to make inferences about them.
- For many professional beekeepers, the CAP apiculture measures are vital to support the production of honey in the EU.

Effects on the structures of production

The measures should encourage beekeepers to upgrade their production equipment and techniques. It has been assessed that:

- The measures have contributed to rendering the beekeeping activity more productive and have induced structural improvements in the sector. Impacts however differ for individual and collective measures:
  - Measures supporting individual beekeepers, such as technical assistance, rationalisation of transhumance, and control of varroa have encouraged the mechanisation of the beekeeping activity and access to more modern equipment, particularly for professionals. However, experts have highlighted that there may be risks of double payment for such measures. It is important to put in place mechanisms that exclude the possibility of any double payment for the same purpose from different sources. Furthermore it must be made sure that the measures are only used to improve production tools which relate to apiculture. For professional beekeepers, if correctly used, the measures should thus increase their profitability, and reduce their reliance on the measures in the future.
  - Measures benefiting collectives of beekeepers, such as technical assistance, control of varroa and rationalisation of transhumance, have also induced structural improvements in the sector and increased awareness through trainings and the dissemination of information. These measures have been used to inform beekeepers, both professionals and amateurs, of adequate beekeeping techniques, notably as regards varroa treatment. Information on adequate varroa treatment is particularly useful and necessary for non-professionals, as this treatment requires a collective effort. As such, varroa can spread from hive to hive, and therefore exploitation to exploitation if not treated, thereby creating a negative externality for beekeepers. Furthermore, these measures were used in order to provide beekeepers with market

information, such as on the pollination potential of a specific area. This is particularly useful for professional beekeepers, and has contributed to increasing their productivity.

- The evidence gathered does not enable to clearly identify an impact on the professionalization of the beekeeping activity. As such, the EU beekeeping sector remains highly diverse, in terms of the type of individuals which carry out this activity. Furthermore, there are substantial disparities across Member States in the levels of professionalization the apiculture sector. In some Member States, such as Spain, the beekeeping activity is highly professionalised, whereas in others, such as Germany, the professional sector is very marginal.

Effects on the downstream sector

The apiculture measures are meant to ensure sufficient levels of production to meet the needs of the downstream sector.

In order to conclude on the effects of the measures, a number of elements should be kept in mind. These are that:

- The knowledge of the downstream sector of the measures is quite limited, as greater importance is attached to developments in terms of price and output. As honey is an international market, they are more focused on price developments related to climate events or regional crisis.
- As the EU's self-sufficiency ratio is rather low (60%), imports are inevitable to meet the overall household and industrial demand in terms of quantity.
- EU consumers have different willingness to pay according to the type of honey which they purchase. They are willing to pay a higher price for specialist honey, and notably local specialist honey. However, consumers, and the downstream sector, are much more price sensitive for honey used in mixes. As in this case demand does not focus on quality *per se*, this type of honey is highly substitutable and European producers face strong competition from abroad, notably South America and China.

It has been assessed that:

- The measures enable to maintain a high-end EU honey production, as well as ensure that lower-end production remains competitive, notably by providing beekeepers with the adequate tools to adapt to the evolution of the market and its ecosystem.
- The measures allow to support laboratories analyses and this is particularly appreciated by the downstream sector as it enables beekeepers to internalise this cost which is beneficial for the production and marketing of honey.

Effects on rural areas and the environment

The measures should foster the development of rural areas and contribute to preserving the environment. It was assessed that:

- By reducing costs and inducing structural improvements in the sector generating higher productivity, the measures have notably helped to maintain the beekeeping activity, which is essentially a rural one. Therefore, the measures indirectly contributed to maintaining other economic operators who develop their activity

around beekeeping, which range from suppliers to farmers. Indeed, beekeeping generates a positive externality through pollination, on which farmers are dependent. Although the direct impact of the measures on rural development is proportional to the size of the apiculture sector in the EU, which remains limited in comparison to other agricultural production, the indirect impact, by maintaining widespread pollination, is considerable.

- The measures contribute to encouraging more sustainable beekeeping practices, particularly on the issue of varroa, although large discrepancies remain between professional and non-professional beekeepers. There are concerns that non-professional beekeepers, which often do not benefit from the CAP apiculture measures, are unaware of them or are resistant to change, may still be using inadequate treatment methods.
- The projects funded through the applied research measures often involve fundamental research components. This is notably the case for research related to bee health or pesticides. Experts interviewed have pointed out that these research results scarcely trickle down to beekeepers, which makes it difficult for the latter to receive tangible benefits from the research projects. However, the fundamental research initiatives may have longer-term impacts on production and the environment, as the recent French research on the sub-lethal effects of neonicotinoids has proven. Indeed, these research results were used by EFSA to reassess the situation on neonicotinoids and on this basis the EU banned the three neonicotinoids for a period of at least two years.

Efficiency, management and administration

The apiculture measures should be implemented in the most cost effective way. It was found that:

- The implementation of the measures at the EU level has not been excessively cumbersome, as requirements for Member States are limited to preparing a national programme, every three years, detailing the production and marketing structures of their beekeeping sectors, as well as the specific actions foreseen under each of the six measures.
- Bureaucracy has been identified as a major drawback at national level, and for beekeepers applying for the measures.
- The decentralised management of the measures, in some Member States, at regional level, can create severe inefficiencies in the implementation of the measures. As such, varroa products covered by the measures may vary from region to region, reducing the profitability of these products for laboratories, and consequently increasing their market price. Furthermore, the type of equipment which can be financed through the measures may also differ, leading to comparative advantages or disadvantages for beekeepers in different regions. Finally, retroactive changes of eligibility criteria, in each region, can seriously disrupt the effective implementation of the measures. Beekeepers claimed the need for common criteria at national level.
- Programme beneficiaries signalled the increase of the online availability of procedures, as well as the reduction of the time elapsed between finalising the application and actually receiving the support as areas with potential to improve the efficiency of the measures.

Coherence with CAP objectives and other measures; relevance

The CAP apiculture measures should be coherent with the CAP as a whole, and other agri-environmental measures. Furthermore, the measures should be relevant to the needs formulated in the Regulation. It has been assessed that:

- The objectives and needs stated in the Regulation remain broad. It includes no clearly defined objectives, homogeneous for all EU Member States. This allows for national disparities and particularities in the elaboration of National Apiculture Programmes, but complicates the assessment of the achievement of objectives at EU level. Similarly, the six support measures delimitate the scope of the support while providing the necessary flexibility to account for the substantial national disparities.
- The apiculture support measures are coherent with CAP objectives.
- 2nd pillar CAP measures accessible to beekeepers, and in particular agri-environmental measures, are generally coherent with 1st pillar CAP measures supporting apiculture.
- A wide range of EU and external public bodies have competencies related to bees. Overall, the network of EU bodies with competencies of some kind in beekeeping is complex. The Commission works to ensure internal coordination and the consistency of actions of different DGs, but it does not remain clear to what extent the selection of research topics, the allocation of funds and the continuity and complementarity of research projects across DGs is optimal. Efforts carried out in this direction are positive.
- With the exception of Germany, little support to beekeeping is reported at national level apart from the CAP support measures implemented through the National Apiculture Programmes.
- The needs of the sector are described very briefly and in a flexible way in the Regulation. In view of such lack of concreteness, the objectives of the measures supporting apiculture are coherent with them. The specific measures and actions applied in each country can cater to the needs of the sector in that territory. Furthermore, the objectives and the scope of action covered by the six support measures are relevant given the perceived needs of the sector. The six support measures provide enough flexibility and cover a sufficiently wide range of activities to meet varying needs in different countries.

Recommendations

Based on the findings and conclusions of the study, we propose a series of specific recommendations:

- The current six support measures should be maintained. It was found that the current measures cover the main needs of the sector, while providing sufficient flexibility to account for the diversity of conditions in Member States. Therefore, it would not be convenient to eliminate any of the current measures whereas there is room for strengthening the measures to make these even more effective for the production and marketing of honey

- The degree of concreteness of the objectives at EU level should be re-examined. The objectives of the measures, as stated in the Regulation, remain purposely quite broad in order to reflect the disparity in production structures and yields across Member States. However this complicates evaluating the effects of the measures at EU level as the objectives are interpreted differently per Member State. Some Member States, such as Spain, gear the measures towards consolidating the professional nature of

their beekeeping sectors -and therefore make greater use of individual co-financing measures-, whereas others such as Germany make greater use of technical assistance reflecting the non-professional nature of their beekeeping sector. While national disparities should always be taken into consideration, currently there is not a clear direction or orientation at EU level. It is not clear whether the priority is to consolidate the development of a competitive professional sector or to increase the spread of beekeeping activities through a higher number of non-professional beekeepers (providing, inter alia, environmental benefits), or rather a combination of both.

- The issue of the quality of the imported honey should be addressed. The current import regulations aim to ensure consumer safety in the EU. However, the amount and vehemence of complains received by beekeepers across Europe warrants attention. Compliance with food safety requirements (Regulation (EU) No 37/2010 for residues of pharmacologically active substances in honey (e.g., tau-fluvalinate and almitraz) and Regulation (EC) No 396/2005 for residues of pesticides) as well as with the requirements of the Honey Directive (Council Directive 2001/110/EC of 20 December 2001 relating to honey) must be ensured, while guaranteeing that the product imported has the same components and properties of natural honey. If necessary, a wide stakeholders' consultation should be launched, and the development of scientific tools for the analysis of honey encouraged. While this suggestion goes beyond the competencies of DG AGRI and beyond consumer safety requirements, it is in line with the objectives of the Regulation setting up the apiculture support measures.

- Greater synergies should be ensured between the various bee related research initiatives funded by the EU:
  - Research results should be effectively communicated across Member States, as well as to beekeepers by using national and local relays. Approval of the apicultural measures could be made dependent on sufficient dissemination and cross-border coordination of EU research funded by the apiculture measures. This would promote that research projects have a European dimension and benefit beekeepers. Dedicating directly a part of the CAP funds allocated to the support of the apiculture sector to fund research carried out at EU level could be another potential solution to ensure this European dimension. First, a list of topics where research funded at EU level would provide added value and higher efficiencies as compared to research at national level should be agreed upon. This list should be elaborated taking account of the sector needs and the opinion from the Member States. Certain overlaps between researches currently co-financed at national level could thus be avoided. Open calls for tenders could be launched for the projects, favouring when appropriate consortia involving institutions from different Member States to account for possible national particularities.
  - As applied research funded through the CAP apiculture measures may include fundamental research components, greater synergies need to be achieved e.g. through common conferences and policy coordination with the activity of other Directorate Generals within the European Commission, such as DG SANCO, which are also involved in financing apiculture related projects. In addition, it could be advantageous to carry out brief presentations on on-going

and finalised research efforts in the meetings of the Advisory Group on Beekeeping and possible on certain meetings of the Management Committee for the Organisation of Agricultural Markets.

- It could be considered to adapt the dates of the payments made through the CAP apiculture measures. These adaptations should preferably be in-line with Member State budgetary cycles in order to avoid investment uncertainties.

- Marketing efforts in those Member States where local honey quality is insufficiently valued should be scaled up. This would enable beekeepers to move up the value chain and produce (and/or sell) higher quality honey, which is less subject to international competition, and which can be sold directly to consumers. Communication on these actions towards the consumers would be needed.

- Member States should establish a list of approved equipment eligible for co-financing. This list should be established based on consultations with local stakeholders.

- With a view to provide reliable evidence for decision making, further efforts –along the lines of the study coordinated by the EU Reference Laboratory for Bee Health on this matter- should be pursued in the monitoring of bee colonies in the EU. Registration and follow-up requirements could be linked to the eligibility for support as a way to achieve such objective.

- Promotion of cooperation among beekeepers through the apiculture measures should be strengthened as it would not only enable to centralise resources and reduce costs from an economic perspective, but also enable knowledge sharing and make the measures more effective and relevant.