we were able to summarize management information into a quality index, based on experts' opinion, and confirmed the association between management practices quality and overwintering colony loss.
Further, we ranked individual practices based on their associated potential reduction in colony mortality. The top management criteria were identified in various subsets of respondents, resulting in different set of regionally and operation-size specific recommendations. In particular, we will develop the topic of varroa management and how it differed between small-scale and commercial operations. The disparity of top influencing criteria between operation types illustrates the divergence in the beekeeping industry and the need of extension programs to address backyard and commercial beekeepers independently.

P190 Perception of risk factors affecting bee colonies (*Apis mellifera*) health and mortality in Belgium

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Understanding beekeepers' perceptions of risk factors impacting bee health and mortality is essential to analyze the reasons for adopting or rejecting some beekeeping management practices. To date, to the knowledge of the authors, no study on how beekeepers perceive and manage these risks has been carried out. For beekeepers, adopting strategies that mitigate risk to health and bee mortality is an action involving behavioral changes. In order to better understand the factors that determine changes in management practices, as well as the decision-making and action process, in Belgian apiaries, a perception survey was designed and launched online, based on the Health Belief Model (HBM) commonly used in human medicine. This sociological survey concerns 355 randomly distributed beekeepers all over Belgium. A first descriptive analysis of the data shows that beekeepers tend in general to take little risk, their perception of climate change, Varroa destructor and management practices is acceptable. On the other hand, their perception of pesticides use in beekeeping and agriculture, is confusing. Their main motivations are the production of a quality honey, bee health and environment. A Welch test (mean test for samples with unequal variance) comparing beekeepers' perceptions in function of mortality rates, indicates that beekeepers (N=213), with mortality rates <10% (rate considered acceptable in Europe) have a significantly better perception of risk factors for their colonies and apply more measures limiting these factors. Despite a real perception of risk, the constraints of investing time in the execution of these actions and the lack of feeling of the financial impact that the loss of a colony entails, are the main obstacles to the implementation of measures to limit the risk. The results of this study highlight the importance of taking socio-economic determinants into account in any strategy aimed at mitigating the risks associated with bee mortality.

P191 Natural comb honeybee management in frame hives for professional beekeepinga

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The increasing of problems connected with the pesticide residues in commercial wax foundations, highlights the necessity to change the concept of wax production in particular in organic beekeeping. Moreover the beekeeper is in trouble in finding insured no contaminated wax foundations and they are generally sold at constant high price. On the other hand and in the same time, natural beekeeping is involving day by day more beekeepers, focusing on the role of natural combs for the general fitness of bee colonies. In both case natural combs, built totally by bees, are the only available solution for Natural beekeeping, but can be a solution even for professional and conventional beekeeping, allowing to reduce costs and increasing the value of the products obtained by bees.

For this reasons a trial have been conduct during the 2018 season by the Ecotossicology and honeybees decline group of Edmund Mach Foundation (Italy) to evaluate the speed and the structure of comb building in frame hives. The trial took place in Maso Franch (46° 08' 35''N 11° 07' 12'' E), Giovo, TN, Italy
3 different treatments were tested and challenged:
1. 7 Dadant-Blatt beehives with wax foundations,
2. 7 Dadant-Blatt beehives with empty frames (equator frames) and no wax
3. 7 Italian Natural Hives (a new concept of hive developed in Mach foundation) beehives with small empty frames.

All colonies have been obtained using a bee queen and a bee package of 1,5 kg. Both queens and bee packages were of Apis mellifera carnica. All colonies received the same amount of glucose-fruttose syrup.
The assessments consist in the evaluation of the frame building surface, and the estimation of quantity of brood and food storage twice a months until the trial ending.

P192 First European study of honey production in beehives under an annual "Vita Feed" nutritional protocol

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In recent years, climate change, crop spraying and monoculture are some of the factors that have led to a decline in honey production worldwide. Variations in the content of available proteins exerts a serious effect on the needs of bees. Five years of making records and evaluations in Argentina showed that supplementation with VitaFeed Nutri by sprinkling during the honey flow generated an average increase of 2.5 kg of honey per beehive. This led to the creation of an annual nutritional supplementation protocol with the objective to observe the impact on production of those beehives. The 2014/15/16 seasons showed an average increase of 20% of honey for the colonies treated under the protocol, compared with untreated control colonies, so it was decided to repeat the test in order to confirm if we can achieve the same excellent results in Europe.
The tests were conducted in the 2017 season, at one conventional apiary located in Neo Klima town, in the island of Skopelos, Greece.
The apiary was divided into two groups, one group subject to the supplementation protocol and the second comprising control (only sugar syrup).
The nutrition plan was administered to the experimental colonies, consisting of: 300g of "Vita BeeFood", 25 ml of "VitaFeed Power" in sugar syrup and 50g of "VitaFeed Nutri", the latter sprinkled on top of the brood frames.
The measurements were performed in the extraction room. From the field, honey supers were marked to extract honey were carried separately.
In this test in Europe, the honey production obtained was an average of 10.3 kg for the treated colonies and 7.71 for the control hives. This increase of 34% per hive not only shows the necessity of good quality of nutritional products but also show that a good investment has quick positive results. The use of products designed exclusively for bees shows a positive effect, which correlates with the last 5 years of trials carried out in Argentina.

P193 Validation of reference genes for RT-qPCR analysis of thermal stress gene expression in *Bombus terrestris*

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Bumblebees provide an important pollination service for both crops and natural ecosystems. Nowadays, however, there is increasing evidence that bees of the genus *Bombus* are decreasing at both local and regional scales. One of the multiple factors advocated as a cause of this decline is climate change, which could be adversely affecting warm- and