

DESCRIPTION FOR THE GENERAL PUBLIC

Bacterial and protozoal diseases of honeybees (*Apis mellifera* L.) may severely decrease the honeybee population, honey and other bee products production, causing significant damage to the beekeeping industry. The most destructive and widespread bacterial and protozoan diseases affecting bee brood and adult honeybees, and thus are major economic problems due to the large losses in apiaries are American foulbrood (AFB), European foulbrood (EFB) and Nosema diseases. These infections have usually been treated in bee colonies by using antibacterials. However, the use of antimicrobial substances in commercial beekeeping is prohibited by law in the European Union because there are no Maximum Residue Limits (MRLs) for these drugs in honey. In honey, there is no time dependent depletion of residues based on pharmacokinetic behaviour as it is in mammalian or avian tissues. Residues, once present in honey, largely remain there. As a consequence, illegal use of antibacterials could result in an accumulation of their residues in honey and other bee products, in honeybees, as well as in different components of the hive.

Honeybee products such as honey, beeswax or propolis have the image of being natural and healthy products. They find important applications in food, cosmetic and pharmaceutical industries and they require good quality. They are natural products and no additives or residues should be present. However, any toxic substances dissolved or incorporated in honey, beeswax or propolis can be released much later when they are consumed as food, used in the production of cosmetics or pharmaceuticals and consequently constitute a potential risk for humans.

Due to their low cost and large availability MNZ belonging to nitroimidazole and OTC to tetracycline group are commonly used (alone or in combination) in several countries even as a preventive treatment of above mentioned honeybee diseases. MNZ has been classified by the International Agency for Research on Cancer (IARC) into Group 2B as possibly carcinogenic to humans. OTC, on the other hand, may lead to drug resistance and allergic reactions in humans.

To prevent unwanted contamination of bee products and accumulation phenomena in the hive, the distribution pathways and end fate of these toxic drugs must be studied to determine whether and how they are eliminated by the system. Thus the aim of this study is to examine the possible distribution of MNZ and OTC to bee products after experimental treatment of honeybee colonies. Moreover, depletion study in honey, beeswax and propolis, will be carried out and persistence of MNZ and OTC residues in these bee products as well as in honeybees and different components of the hive after different administration protocols will be compared. In addition, to compare with the apiary environments, the stability of nitroimidazoles and tetracyclines in honey stored in laboratory conditions will be examined. The matter of this project is also development of methods for the simultaneous determination of MNZ and OTC as well as other compounds belonging to nitroimidazole and tetracycline groups in bee products, honeybees and the different components of the hive. Additionally, acute toxicity of MNZ and OTC (alone or in combination) to adult honeybees will be assessed and median lethal dose (LD_{50}) will be calculated.

The project investigations are entirely original and basic in nature. The obtained results will allow investigating whether the treatment of honeybee colonies with MNZ and OTC can have an impact on safety of bee products such as honey, beeswax and propolis, and on health conditions of honeybees. The results will also provide information on the likelihood of detecting the use of these compounds in apiculture in Poland. In the longer term the results will help to improve food safety and protect consumers and environment.