



## **A – Requirements No. 3**

### **Deliverable D10.3**

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**B-GOOD**

**Giving Beekeeping Guidance by cOMputatiOnal-assisted Decision making**



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## Table of contents

Preface.....	4
Summary .....	4
1. Assessment of ethics issues .....	4
2. Confirmations.....	6
3. References .....	6

## Preface

This deliverable is one out of five related to ethics requirements. It covers ethics issues with respect to animal studies within B-GOOD.

## Summary

B-GOOD's key focus is on healthy and sustainable beekeeping. Hence, the B-GOOD project inevitably involves studies with honeybees (*Apis mellifera*). Apart from honeybees, the following arthropod species will also be involved in the B-GOOD studies: *Varroa* mites (*Varroa destructor*); small hive beetle (*Aethina tumida*); Asian hornet (*Vespa velutina*), and tracheal mites (*Acarapis woodi*). The latter are pest species since they act as parasites and stressors to honeybees. Honeybees (as well as the other involved arthropods) are invertebrates and a non-endangered species. Invertebrates are not covered in the European Union Directive 2010/63/EU on the protection of animals for scientific purposes (EC, 2010), Article 1, §3. As the proposed studies involving animals in B-GOOD only involve arthropods, the use of animals for scientific purposes does not raise specific ethics issues and the animal studies do not require specific authorisations, training certificates or personal licenses related to animal experiments. The B-GOOD consortium is fully aware of the importance of honeybees and the potential sensitivity of their use in animal studies (e.g. in line with the coverage of honeybees in the Norwegian Animal Welfare Act (10/07/2009)). Therefore, animal studies involving honeybees in B-GOOD will be performed in line with the principle of the 3 R's (Replacement, Reduction, Refinement). In practice this means that 1) the number of experiments will be limited, the number of colonies used in experiments will be reduced, and pesticide exposed bee colonies will be used for multiple purposes (Reduction); 2) all honeybee colonies will be appropriately housed, taken care of, and receive proper treatment, e.g. against *Varroa* mite infections (Refinement); and 3) where possible, we will expose individual (caged) bees to insecticides rather than whole colonies (Replacement). The B-GOOD consortium confirms that 1) if relevant, copies of relevant authorisations for animal experiments will be kept on file and submitted to the Agency upon request; and 2) if applicable, copies of training certificates/personal licenses of the staff involved in animal experiments will be kept on file.

## 1. Assessment of ethics issues

B-GOOD's key focus is on healthy and sustainable beekeeping. Hence, the B-GOOD project inevitably involves studies with honeybees (*Apis mellifera*). Apart from honeybees, the following arthropod species will also be involved in the B-GOOD studies: *Varroa* mites (*Varroa destructor*); small hive beetle (*Aethina tumida*); Asian hornet (*Vespa velutina*), and tracheal mites (*Acarapis woodi*). The latter are pest species since they act as parasites and stressors to honeybees.

Honeybees (as well as the other involved arthropods) are invertebrates and a non-endangered species. Invertebrates are not covered in the European Union Directive 2010/63/EU on the protection of animals for scientific purposes (EC, 2010), Article 1, §3.

As the proposed studies involving animals in B-GOOD only involve arthropods, the use of animals for scientific purposes does not raise specific ethics issues and the animal studies do not require specific authorisations, training certificates or personal licenses related to animal experiments. The exact purpose of the B-GOOD project is to improve honeybees' health status, likelihood of survival, natural living environment and welfare. The aim of the studies is to develop support for beekeepers in keeping their honeybee colonies healthy, i.e. to cause

minimal disturbance of bees, minimal labour for beekeepers, minimal pesticide use or action needed, and to lead to optimal colony health based on validated guidance and technology.

The B-GOOD consortium is fully aware of the importance of honeybees and the potential sensitivity of their use in animal studies (e.g. in line with the coverage of honeybees in the Norwegian Animal Welfare Act (10/07/2009)). Therefore, animal studies involving honeybees in B-GOOD will be performed in line with the principle of the 3 R's (Replacement, Reduction, Refinement).

Some of the colonies within B-GOOD will be exposed to stressors in such a way that effects on their health are to be expected. This exposure is essential to validate the tools that are developed within B-GOOD to determine the health status of the colonies. The stress exposed colonies will be restricted to Tier 1, Pilot B studies and be performed at one location by one partner (WP1, partner WR, country: the Netherlands), which has ample experience in such work (e.g. Blanken et al. 2015, Van Dooremalen et al. 2018). Pilot B will last for three years. The number of honeybee colonies experimentally exposed to stressors will be strictly limited to 25 colonies (5 colonies x 5 experimental conditions), of which 20 in the experimental group and five in the control group. This number is the absolute minimum to obtain data with sufficient statistical power and scientific insight with adequate potential for extrapolation. Since exposure levels must be chosen in such a way that effects at colonial level can be expected, the number of colonies may be reduced compared to field studies at field realistic exposure levels. Such experiments are typically run with 7 colonies per experimental group (Reduction).

Each year new colonies will be installed. Expected yearly mortality of exposed colonies is 60-100% during the winter after exposure, and for the control colonies 0-10% (normal background mortality). Colonies that survive will receive proper care and treatment to recover from the stressors they have been exposed to and they will not be involved in further experimental procedures. All experimental procedures will depart from healthy honeybee colonies. The experimental procedures will most likely (final work plans are not yet determined) consist of exposing honeybee colonies to either neonicotinoid insecticides, reduced food availability, *Varroa destructor* pest, or removing the queen, in a similar way as this may occur in honeybees' natural environment. The installed measurement systems have no detrimental health or welfare impacts on the honeybees. However, older existing methods to determine the health status of the colonies will need to be implemented to validate the new tools. These old methods may cause stress or disturb colonies to a minor-medium extent (for the reason that new non-disturbing methods need to be developed and validated). All honeybee colonies will be appropriately housed, taken care of, and receive proper treatment, e.g. against *Varroa* mite infections (Refinement).

Within task 2.4, the lateral flow device will need to be validated using exposed matrices (bees, food, wax). These matrices will be sampled from the 5 colonies that will be exposed to neonicotinoid insecticides and the control colonies in the Pilot B studies, rather than exposing additional colonies to these compounds (Reduction). For the validation, however a higher variation of concentrations in the matrices may be needed. If so, matrices from these same colonies, including individual bees, will be exposed under laboratory conditions to gain sufficient statistical power for validation (Replacement of colonies by individual bees).

Within Tier 1, Pilot A studies (WP1), similar methods will be used as in Pilot B studies, but the purpose of Pilot A is to keep the bees as healthy as possible using conventional beekeeping methods. The Pilot A studies will be performed at 8 EU apiaries of 8 EU Research institutes and be coordinated by partner WR. Due to the use of the existing methods to determine the colony (health) status in a reliable way, some minor disturbance and stress is to be expected. Locally adapted colonies will be kept at the apiaries with a maximum of 7 colonies for 3 years. Expected mortality will be 0-10%, similar to the control colonies in Pilot B. Seven colonies per

apiary is the absolute minimum to obtain data with sufficient statistical power and scientific insight with adequate potential for extrapolation. This low number of colonies, does not allow us to lose colonies over the years. Therefore, dead or very weak colonies will be replaced, when possible using their naturally acquired off spring. Additional off spring will not be used for scientific purposes.

No stress beyond normal beekeeping is to be expected in the Tier 2 and Tier 3 studies. In those tiers, honeybee colonies will only be passively monitored using the newly development measurement devices and validated protocols and taken care of in a similar vein as experienced beekeepers would apply.

## 2. Confirmations

The B-GOOD consortium confirms that:

1. if relevant, copies of relevant authorisations for animal experiments will be kept on file and submitted to the Agency upon request;
2. if applicable, copies of training certificates/personal licenses of the staff involved in animal experiments will be kept on file.

These copies will be kept on file by the coordinator and made available upon request.

## 3. References

EC (European Commission) (2010). Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes. *Official Journal of the European Union*, 20/10/2010, L276/33-79.

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