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BeeConSel - Joint Effort for
Honey Bee Conservation and
Selection

DELIVERABLE 4

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EXECUTIVE SUMMARY

Legislation regulating the beekeeping sector and especially the breeding activities have pronounced effects on the implementation of mating control in honey bee breeding programs. We summarized the national legislation affecting bee breeding in Croatia, Macedonia, Slovenia, and Norway. Here are some similarities among the countries, e.g. honey bee breeding is regulated by the law on animal husbandry and the domestic subspecies are recognized and partly protected in the legislation. However, with the exception of Norway, the legislation does not enable sufficient mating control to achieve optimal genetic improvement in the breeding populations. Further, there is a general lack of sufficient economic incentives for breeders to invest in mating control. Based on results within D1 and D2 and Norwegian experience we propose several items to be incorporated in the CORE and secondary legislature.



Figure 1. Mating boxes (©J. Prešern)

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PRESENT LEGISLATION AFFECTING MATING CONTROL IN HONEY BEE

Croatia



The breeding of honey bees in Croatia is regulated by the law act on breeding of domestic animals ([NN 115/18, 52/21](#)). By the last changes in this Act (22.5.2021), queen bees that are on the market must be reared by queen producers registered in the Registry of queen honey bee breeders, which is counselled by a recognized breeding association on behalf of the Ministry of Agriculture (see below). The law enabled the legal protection of the native Carniolan honey bee (*Apis mellifera carnica*) in Croatia.

The location of apiaries and mating stations, the method of moving honey bee colonies, the conditions for keeping and protecting bees, keeping the cadastre of bee pastures, the management of bee pastures, and the records of beekeepers and apiaries are regulated by the Rulebook on beekeeping and cadastre of honey bee pastures ([NN 18/2008](#)) which is in force from 2008. By this rulebook, the distance between the nearest apiary and the registered mating station must not be less than 2000 meters.

The Register of breeders of Croatia is led by Association of Carniolan honey bee Breeders of Croatia according to the Rulebook on the implementation of the [Carniolan bee breeding program](#) approved by the Ministry of Agriculture.

This rulebook defines:

- keeping the Registry of breeders
- determining the conditions for entry into the Register of breeders
- issuing an annual license for breeding and queen production
- entering queen bees in the registry book and other records
- tasks that the Association performs for non-member of breeders Association
- control of breeding and queen production of registered breeders
- enactment of the annual plan for the implementation of the Breeding Program

Breeding and queen production is determined by the [National Breeding program](#) which defines that the breeding is carried out on the native

Carniolan honey bee population. The basis of breeding are the apiaries of registered breeders, from which the colonies with best performance results are selected for further propagation. Given that the goal of the National Breeding program is to protect the native bee population, and on the recent studies on the importance of keeping locally adopted honey bees, Carniolan queen bees bred outside the Republic of Croatia are not accepted for breeding, and the breeding of local populations adapted to the climate and pastures in the territory of the of Croatia is encouraged. Importation of other subspecies of honey bees is not allowed. Currently there are 52 registered breeders in Croatia managing around 11.000 honey bee colonies with around 2.500 colonies involved in performance testing. However, none of registered breeders operates fully isolated mating stations. It has been scientifically proven that this distance of 2.000 meters between mating station and nearest apiary (determined by the Rulebook on beekeeping and cadastre of honey bee pastures) is not sufficient to enable mating control of queens with desired drones. The limited mating control is particularly expressed in areas with high density of apiaries, which is a feature of the largest part of Croatia. Because of the high density of apiaries and honey bee colonies, it is not feasible to increase the prescribed distance between the mating station and neighbouring apiaries. Therefore, it is necessary to introduce alternative, practically implementable methods of controlled mating.



Macedonia

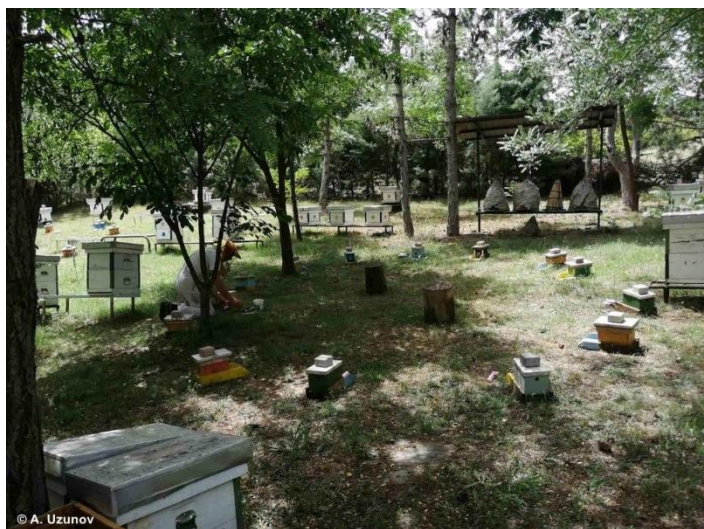


In the current legislation, *Apis mellifera macedonica* is recognized as a native honey bee population protected by the state program for biodiversity protection. In Macedonia, there is no special Law that regulates the honey bee breeding, and within that framework, the mating control of the queens.

Selection, production and the turnover of queens are regulated by the Law on Animal Husbandry ([Official Gazette of Republic of Macedonia N° 07/2008](#)). According to this Law, the production of queens intended for sale can only be carried out by legal entities (breeding organizations) that must have their own breeding program, previously approved by the Animal Husbandry Council that exists within the Ministry of agriculture, forestry, and water economy. Also, within the framework of the Ministry, there is a register of approved breeding organizations, which, in addition to the approved breeding program, should have at least one employee with higher education in the field of biotechnology, possesses honey bee colonies as well as appropriate facilities for work and equipment storage. Mating of young virgin queens with drones from selected bee colonies (drone-producing colonies) is allowed to be performed in two ways:

- With instrumental insemination and
- Open mating within a protected area

A protected area represents land space within a radius of 3000 m around the approved breeding apiary location or a location where the queens are going to be mated. In this protected area, honey bee colonies with queens no older than two years can be reared, and which originate only from the breeding material of the approved breeding organization in the protected area.



Honey bee queens that are intended for sale must be accompanied by a zootechnical and veterinarian certificate containing data on the registered

breeding organization, data on the produced queen (unique identification number, date of birth) as well as a pedigree on the origin of the queen.

State financial support

In addition to the regular subsidies per bee colony (11.5 EUR), in order to provide financial support to registered breeding organizations, within the framework of the [Program for Financial Support in Agriculture](#), a subsidy of about 16.3 EUR per honey bee colony used in the breeding process for the production of queen bees has been established.

According to the [Program for Financial Support of Rural Development](#), a subsidy of at least 50% of the value of a queen purchased from a registered/approved breeding organization is provided. This measure is implemented irregularly.



Norway



In Norway, the breeding of livestock is regulated by the law of livestock breeding (lov om husdyravl-[LOV-1992-12-04-130](#)) under the Ministry of Agriculture and Food. The aim of the law is to secure proper breeding of livestock, including instrumental transfer of semen, egg and embryo. In addition to the general provisions in the law, there is a regulation “Regulation of measures to advance breeding in honeybees” ([Forskrift om avlsfremmende tiltak på bier](#)) which aims to facilitate controlled breeding of honey bees. The regulation defines important terms:

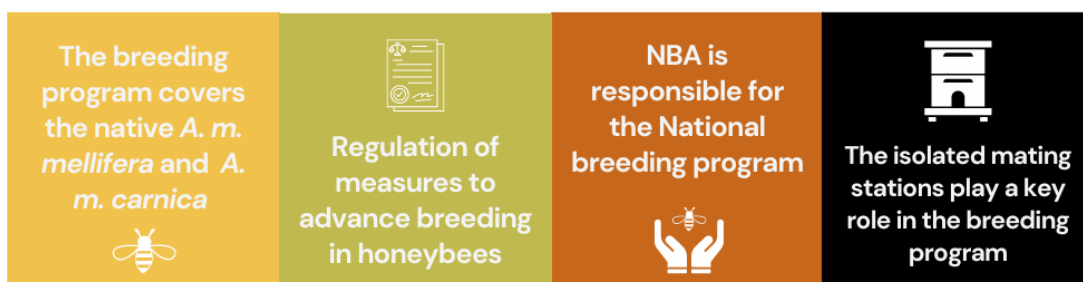
Mating station – a geographic location where special rules of beekeeping apply to allow controlled mating of honeybee queens.

Pure breed area – a geographically defined area where all the beekeepers have originally agreed to keep a specific breed/population of bees and carry out breeding work on this.

The Norwegian Beekeepers Association can apply to the Ministry of Agriculture and Food to have mating stations and pure breed areas approved. Mating stations should preferably be located in areas without honey bees, but if this is not possible the Department of Agriculture and Food can impose beekeepers to keep colonies with queens of a certain breeding line, but these queens should be supplied by the breeders using the mating station. In general, it is forbidden to keep honey bees within a 20 km distance from the mating stations, unless a dispensation exception is given by the Norwegian Beekeepers Association. The Norwegian Beekeepers Association is responsible for the National breeding program funded by the Ministry of Food and Agriculture. The breeding program covers the native *A. m. mellifera* and the population of *A. m. carnica* that has been under selection in Norway since the 1970s. The isolated mating stations play a key role in the breeding program as they allow full mating control.

The Norwegian beekeepers Association can also apply to the department of agriculture and food for approval of pure breeding areas where it is only allowed to keep bees of a defined subspecies. Such areas are mainly for conservation, but there must be an active mating station within the area, though the degree of isolation is not defined. Within these pure breed areas beekeepers must follow rules given by the Norwegian Beekeepers Association, e.g. migratory beekeeping out of the area is only allowed if the queens in the colonies are marked. Colonies in the border zone should be regularly sampled and analysed to sort out hybrid colonies.

There are currently 5 mating stations and 8 pure breeding areas under this regulation. Beside these, there are several local mating stations that are managed without any legal protection. However, beekeepers in the area agree to keep the mating station free of honey bee colonies during the period the mating station is used, normally from late June until early August. Some of these mating stations are fairly isolated (>10 km from other apiaries) whereas some are too close to other apiaries to provide proper mating control.



Slovenia

Core legislation



Animal Husbandry Act (ZŽiv 18/02, 110/02) with its amendments (ZdZPKG 45/04, ZdZPVVHVR 90/12, ZŽiv-A 45/15) provides foundations in the queen breeding. Specifically, it sets provisions for:

- apiary / bee yard registration (link to owner, coordinates, biannual reporting on colony count),
- recognition of breeding bodies such as associations of breeders charged with keeping the origin stud book of *Apis mellifera carnica*,
- approval of secondary breeding organizations,
- animal husbandry (zootechnical) standards applicable for *Apis mellifera carnica*,
- criteria for approval of queen bee mating stations and test stations,
- trade in honeybee genetic material and
- register of honeybee forage cadastre, provisions for forage forecasting service.

As a special provision within Animal Husbandry Act, article 70 regulates the special protection of the native bee subspecies, *Apis mellifera carnica*, and stipulates that the rearing of and trade in breeding material of other honey bee breeds is not permitted in the territory of the Republic of Slovenia. The article has been later transferred to the EU Legislative (Treaty of Accession of Slovenia to EU, 2003: Official Journal of the European Union, L236, 984.2003).

The Ministry responsible for Agriculture approves breeding program pending the Animal Husbandry Council expert opinion and provides the finances to the breeding bodies as a form of public service. The breeding body - Beekeepers' Association of Slovenia in case of honey bees - may outsource certain activities (specific technical activities related to execution of breeding programs) to secondary breeding organization, which must be also approved by the relevant Ministry.

The Animal Husbandry Act also makes provisions for Zootechnical standards, which are defined in separate Rules on Zootechnical standards for *Apis mellifera carnica* (henceforth ZooSt, 2003, EVA 2001-2311-0038;) by the relevant Ministry. The ZooSt defines:

- full-pedigree queen bee: mothers queens' pedigree and pedigree of paternal mother are known (full parentage known) and recorded in stud book,
- commercial queen bee: only mother queens' pedigree is known (half parentage) and recorded in stud book,
- drone producing colonies (DPCs) are colonies with common mother queen which pedigree is known and is recorded as paternal mother in the stud book,
- stud book content and sections,
- stud book,
- conditions which need to be met before the queen is recorded in the stud book,
- queens' pedigree number is a record in the stud book,
- mating yards as the location of virgin queen matings without any control,
- mating stations as the location with full mating control and
- criteria and content of Zootechnical certificates.

The ZooSt Rules is important in sense of mating control and gives two options: either »open-mating«, which is performed in mating yard without any control over paternity, resulting in commercial queen bee or »controlled mating« at the isolated mating station with full control over paternity resulting in full-pedigree queen bee. The latter also includes the use of instrumental insemination.

The ZooSt by-law also defines the conditions concerning the queen breeder: each breeder is approved for a five-year period and inspected yearly just before the breeding season on breeding and veterinary conditions. Based on inspections' outcome, the ministry issues annual certificate as the precondition for breeders' zootechnical certificate.

Animal Husbandry Law also sets provisions for another key by-law regulating breeders, breeding yards and secondary breeding organizations (henceforth BreedReg). BreedReg is a key legislature over which a genetic progress is regulated and recorded. It defines:

1. test station as a location at which performance testing is being done,
2. breeding colony as a colony from which genetic material for future queen bees is taken and is headed by mother queen with known and recorded pedigree,
3. drone-producing colonies (DPCs) as colonies aimed at drone production and have common mother queen with known and recorded pedigree,

4. breeder as an individual or company who follows the breeding program with commercial goals,
5. queen bee multiplication as a method of rearing and mating regardless of the goal and
6. secondary breeding organizations.

More importantly, procedure of approval of breeding yards (headed by breeder/ 4.), their obligations and other rules are also defined in BreedReg.

Support (Secondary) legislation

Legislation with provisions for support in honeybee breeding come through the 5-year Sector Interventions based on EU Common Measures in Agriculture Strategic Plan (period 2023 - 2027) as the successor of previous three-year programs (Decree on implementing the apiculture programme in Slovenia for periods 2020 - 2022, 2017 - 2019, 2014 - 2016 and 2011 - 2013).

Regardless of the implementation, yearly subsidies to queen breeders were provided in form of closed public tender with fixed amount of funding divided between queen breeders on basis of their application, recorded queen production and its yearly increase. The precondition was proof of own performance testing (direct tests).

Yearly subsidies are provided also for the breeder that operates his private mating station to cover the basic operating costs.



Cross-comparison between countries

The present legislation affecting honey bee mating control in the 4 countries shows many similarities, but also some important differences as summarized in Table 1.

Table 1. Cross-comparison of important points in the legislature and financial support between countries.

		Norway	Croatia	Macedonia	Slovenia
Legal regulation of honey bee breeding	Regulated by Animal Husbandry Law	Y	Y	Y	Y
	Existence of secondary legislation	Y	Y	Y	Y
	Native population (full or partially) protected or recognition	Y	Y	Y	Y
Financial support of honey bee breeding	Performance testing	Y*	Y	Y	Y
	Management of breeding organization	Y*	Y	Y	Y
	Queens propagation	N	Y	Y	Y
	Instrumental insemination capacity building	N	N	N	N
	Promotion	N	N	N	N
Legal regulation of mating control	Isolated area definition	Y	Y	Y	Y
	Isolated area protection	Y	N	N	Y
	Queens mated in full geographic isolation conditions are legally recognized as full pedigree	N	N	N	Y
	Mating control as a public service in the breeding program	N	N	N	N
Financial support of mating control	Compensation for logistical and technical costs for the mating station	Y*	N	N	Y**
	Compensation for II	N	N	N	N
	Compensation for verification of isolated location	N	N	N	Y*
	Promotion	N	Y	N	N

* - For the national breeding program run by the Norwegian Beekeepers Association

** - only if breeder owns the mating station

MODEL FOR DRAFT LEGISLATION

We have combined our review of existing legislature covering the subject to identify blind spots with experience gained by Norwegian partner, own results of surveys in beneficiary countries (presented in D1 - especially Economics), and Scouting experience (presented in D2) to develop minimal model of legislature that will be later tailor-made for partner countries in future deliverables.

We have outlined two models for draft legislations: core and secondary.

According to our expertise, the core legislation model should include:

- **Protection of locally adapted gene pool.** Local subspecies are legally protected to some extent in all three beneficiary countries; level of protection differs considerably. We propose equalization of this protection based on maximum example.
- **Management and organization of breeding.** Definitions and financial provisions of breeding organizations and secondary support/expert organizations that perform certain tasks, e.g. organization of performance testing, centralized data storage for performance testing, pedigree, and genomic information, evaluation of breeding values, dissemination of the results.
- **Capacity building.** Capacity building seems to be the key to both understanding the process of selection and conservation and the use of available methods. Instrumental insemination, for example, requires specialized course and intensive practice, both are subject to costs.
- **Performance testing and genetic evaluation.** Phenotyping of breeding queens should be made through a standardized performance testing followed by the estimation of breeding values.
- **Acknowledgement of full pedigree.** Legislative should recognize the value of full pedigree queens regardless of the method over which it was achieved.
- **Recognition of half-pedigree.** The »production queens« achieved in open-mated normally have maternal side of pedigree known. Regardless of incomplete pedigree, genotype is passed on. In similar fashion, one could use a service for controlled mating (e.g. instrumental insemination, isolated mating station) and have pedigree known only on paternal side.

Secondary legislation model should comprise:

- **Definitions of acceptable mating control methods.** Currently, the permissible methods are very limited (either fully isolated mating station or instrumental insemination). We propose that legislation to include whichever method allows genetic gain over the open mating. Methods will be selected based on BeeConSel results.
- **Definition of controlled mating as a public service.** To propagate selection efforts, the mating control should be accessible to beekeepers and bee breeders. Running of such service is done by local beekeeping association and incur certain costs. Proposal will include provisions for partial financial compensation of such services.
- **Financial stimulation of pedigree bookkeeping by breeders.** As a mean of »conservation through utilization« to achieve both long-term bookkeeping (*deep relationship information*) and popularization of mating services to achieve optimum selection.

Already in 2021, one of the above-mentioned secondary legislation models has been introduced in Slovenia, based on our findings and mainly through the introduction of the measure »**Financial stimulation of pedigree bookkeeping by breeders**« in Slovenia. That was positively accepted by breeders and would to some extent stimulate them in the endeavour of mating control.