Winter losses and reneweal during beekeeping season; outcomes from four year study in the Czech Republic and Austria

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Introduction:

Austria and the Czech Republic have historicaly shared beekeeping thanks to geographical as well as cultural proximity. We collected key numbers that describe beekeeping in both countries and analyse data collected directly from beekeepers between 2014 and 2017 using the COLOSS questionnaire.

Material and Methods:

We calculated the total colony stock numbers of all participants providing all three time points and calculated summer change rate, winter loss rate, spring-spring change and spring autumn estimation. Altogether we collected data from 4893 beekeepers wintering 101373 colonies in Austria and 3632 beekeepers collectively managing 71130 colonies in Czechia.

Results:

Table 1. Comparison of the apicultural sector in Austria and the Czech Republic.

	Austria	Czech Republic
Number of beekeepers (2016)	26609	60039
Number of honey bee colonies (2016)	354080	693069
Average operation size (number of colonies)	13.3	11.5
Honey bee colonies / km²	4.2	8.8
Change in number of beekeepers in last 5 years	+4 %	+13 %
Change in number of colonies in last 5 years	-8 %	+40 %
Percentage of beekeepers in population	0.3 %	0.6 %
Response rate in winter loss survey (2014-2017)	4.0%, 5.0%, 4.9%, 6.2%	1.1%, 1.7%, 1.7%, 2.0%

Fig. 1: Scheme of terminology and to ilustrate calculation, examplary data of 2014/15 from 951 Czech beekeeping operations is shown.

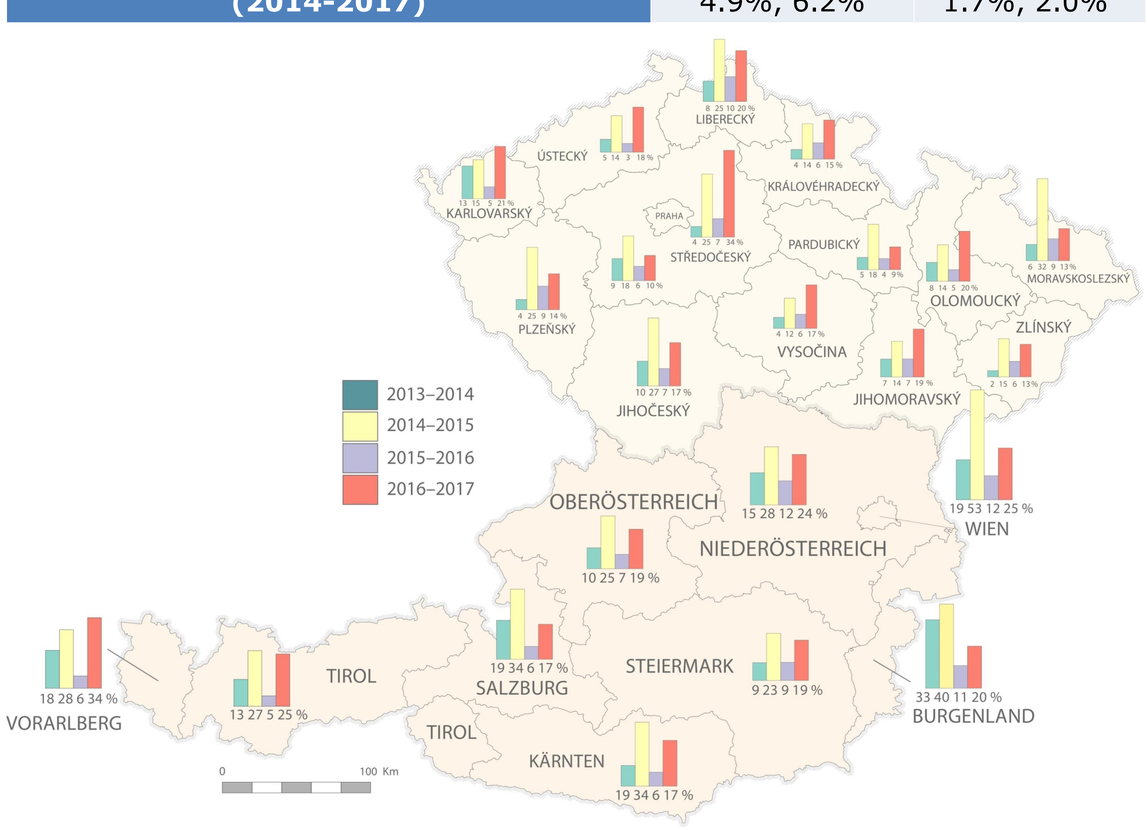

Fig. 2: Honey bee colony mortality (sum of dead colonies and colonies lost due to queen problems) for the winters 2013/14 to 2016/17 in Austrian and Czech provinces.

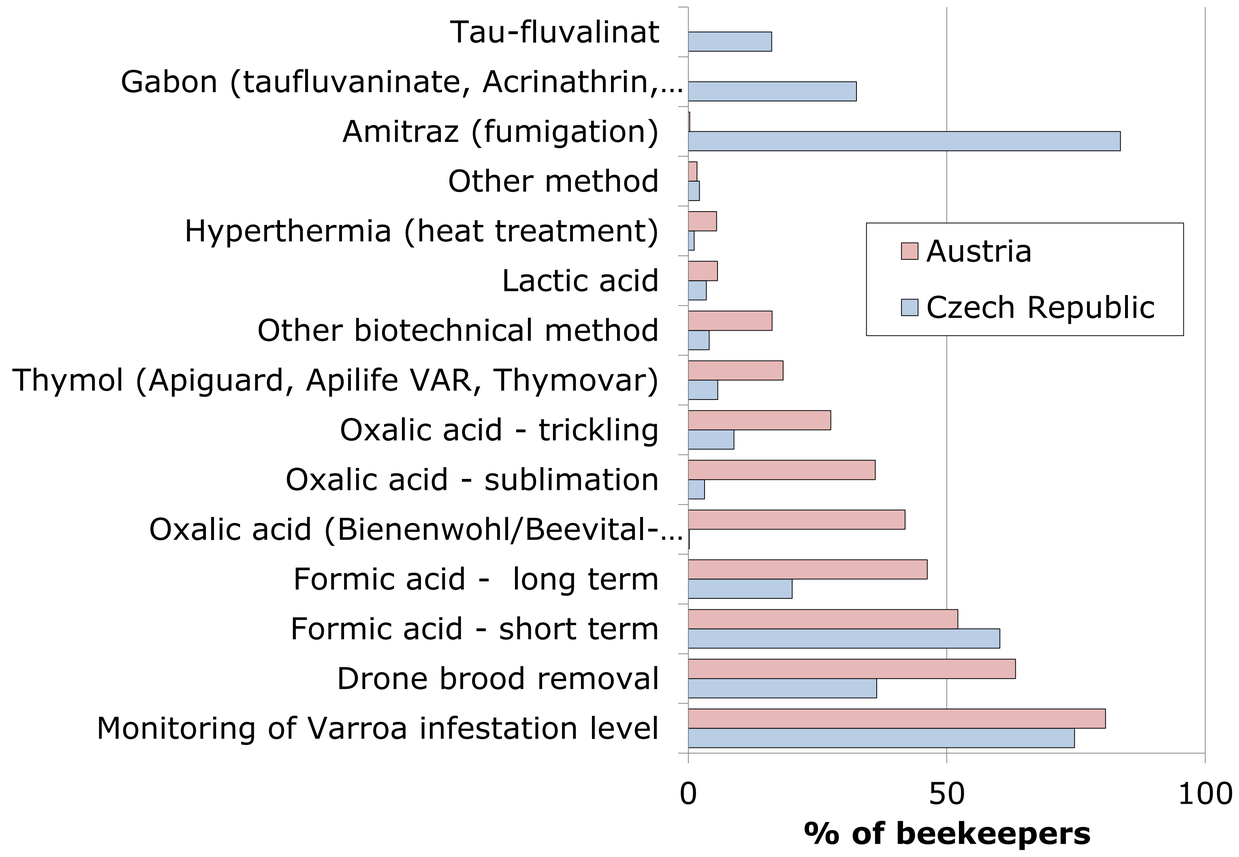

Fig. 3: Comparison of treatments to fight *Varroa destructor* used by Austrian (n=4986) and Czech (n=3688) beekeepers in the four investigated years. Percentage of beekeepers that applied the specified method in at least one month during the period April to April is shown.

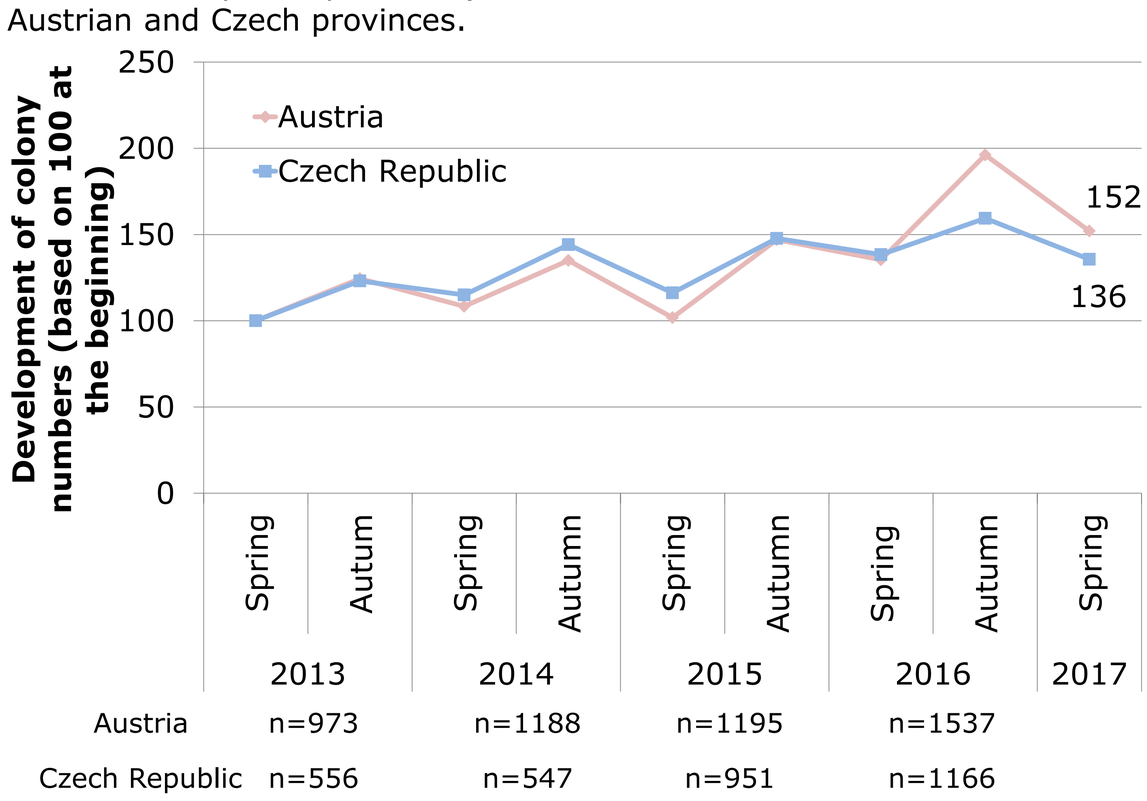

Fig. 4: Model development of changes in colony numbers based on winter loss rates and summer change of honey bee colonies as collected in Austria and the Czech Republic between 2014 – 2017. Change rates (losses and data on renewal) were applied to 100 fictitious colonies in spring 2013.

Discussion and conclusions:

- Winter losses are different in various provinces in Czechia and Austria. The differences could be influenced by a number of natural factors, e.g. climate, altitude, nutrition, pathogen spread etc. and density of colonies. A map of density of Czech colonies in particular districts is available at http://colosscz.webnode.cz/hustota-zavceleni/.
- Varroa treatment strategies are different in both countries, whereas Czech beekeepers use synthetic treatment, Austrian beekeepers focus on organic way of decreasing Varroa population in their colonies (Fig. 3). The Czech strategy is strongly influenced by official regulations.
- Although, colonies are dying in winter, we modeled that the colony population can be growing due to reproduction in summer. This also corresponds with the official data from Czechia, Austria had no mandatory registration of colonies in years used for modeling (Tab. 1 and Fig. 4).

Poster presentation: 13th COLOSS conference, Athens, Greece, 2nd – 3rd November 2017

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