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Royal jelly production relies on bee colonies with specific characteristics, requiring rigorous selection to ensure a productive stock. Aware of these requirements, the members of the Royal Jelly Producers Association have implemented a breeding program to develop a bee population suited to their needs. The main objective is to improve productivity while maintaining a sustainable approach, avoiding the importation of foreign genetic material to preserve colony adaptation to local conditions. In addition to royal jelly production, beekeeping traits such as disease resistance, wintering ability and ease of colony handling are also integrated into the selection program.

We analyzed the effectiveness of this breeding program by estimating the genetic parameters of these various traits using a database of nearly 2,000 queens evaluated over several years.

The results indicate a high heritability of royal jelly production, confirming the feasibility of an efficient selection. Furthermore, the observed correlations between productivity and other traits show that colony performance can be improved without compromising their hardiness and resilience.

However, the relatively small population size selected at each generation requires close monitoring to limit increase in inbreeding, which could reduce genetic diversity. Genetic management must therefore be optimized to maintain sufficient diversity and avoid potential negative effects on colony health and vigor.

This selection program highlights the importance of a rigorous and well-thought-out approach in beekeeping. It demonstrates that performance and sustainability can be combined, ensuring the long-term sustainability and profitability of royal jelly production in France while preserving the genetic diversity of the selected bee populations.,



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Honey bee selection for Sustainable and High-Quality Royal Jelly Production

Apimondia 2025

A. Empeyta*, B. Basso*, F. Phocas, T. Leroy, P. Faux

APIMONDIA
SCANDINAVIA
2025
SWEDEN | DENMARK | NORWAY

Royal jelly



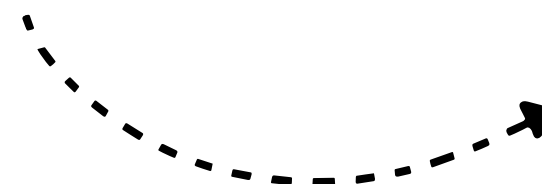
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What is royal jelly ?

Royal jelly is the food of queen bees in both their larval and adult stages of *Apis Mellifera* bees.

It is a natural, unprocessed food that contains no added substances.

Royal jelly production relies on bee colonies with specific characteristics, requiring rigorous selection to ensure a productive stock.



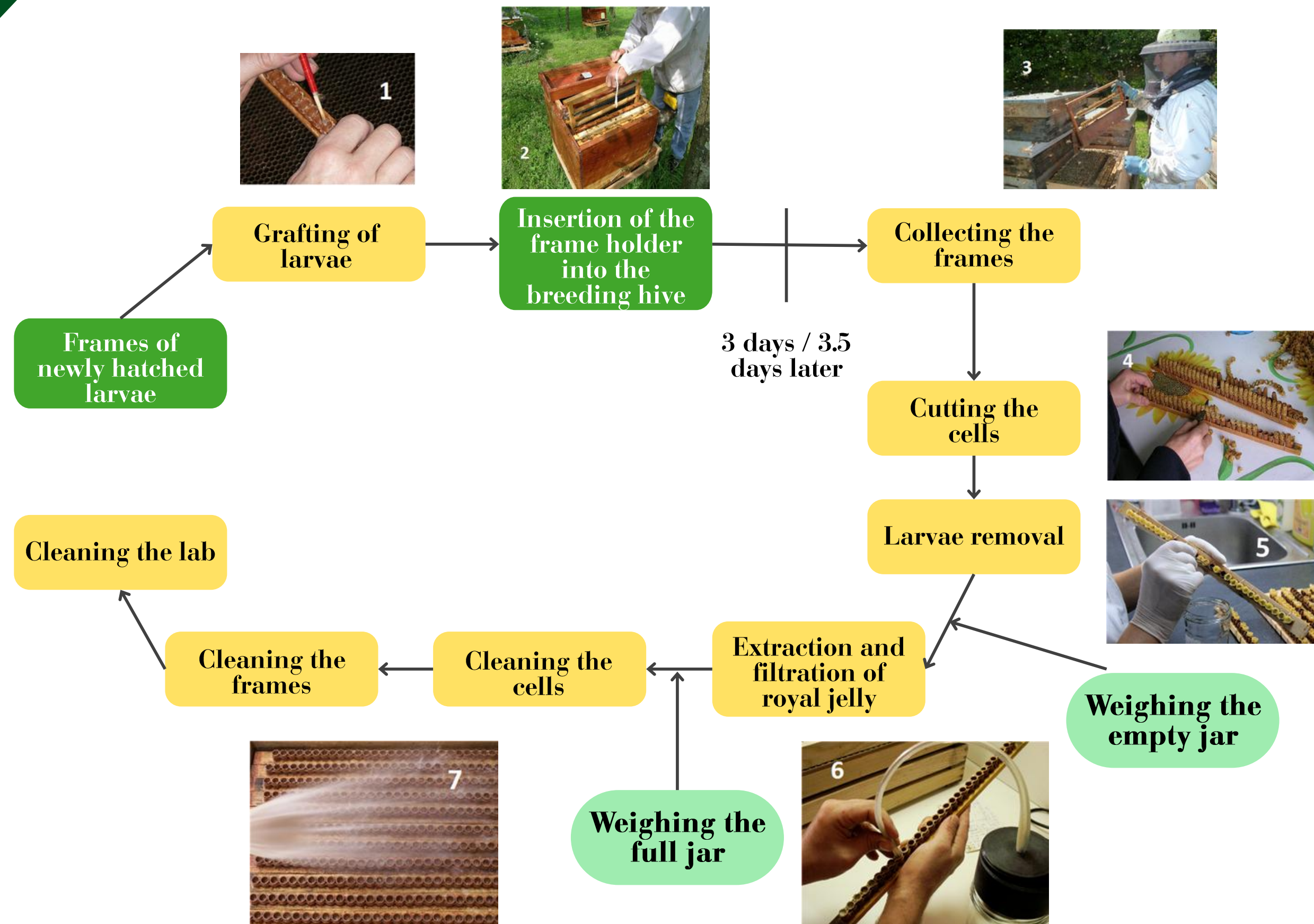
Royal jelly



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How is royal jelly
produced?



The GPGR



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Lines of Work

Quality charter

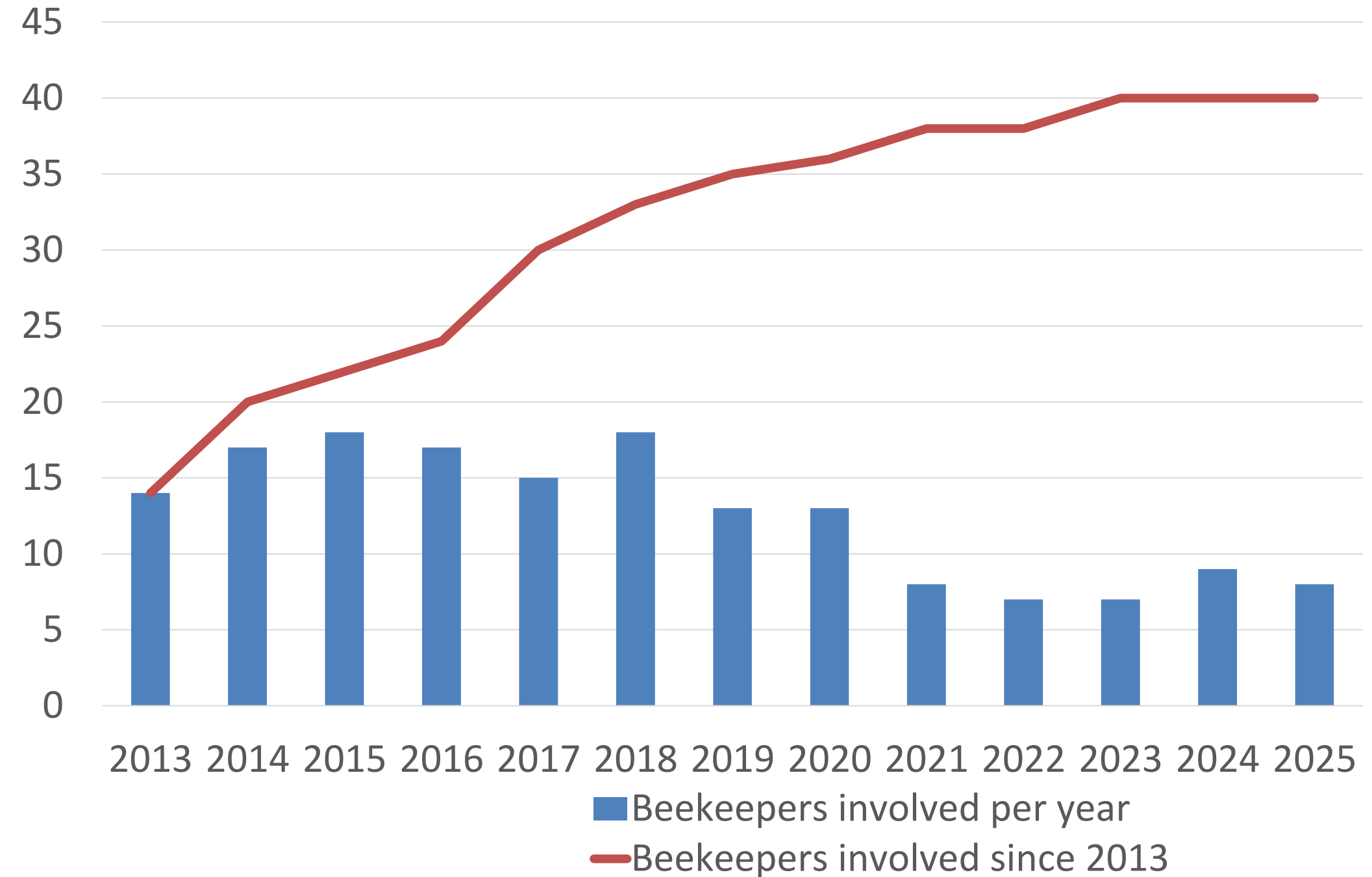
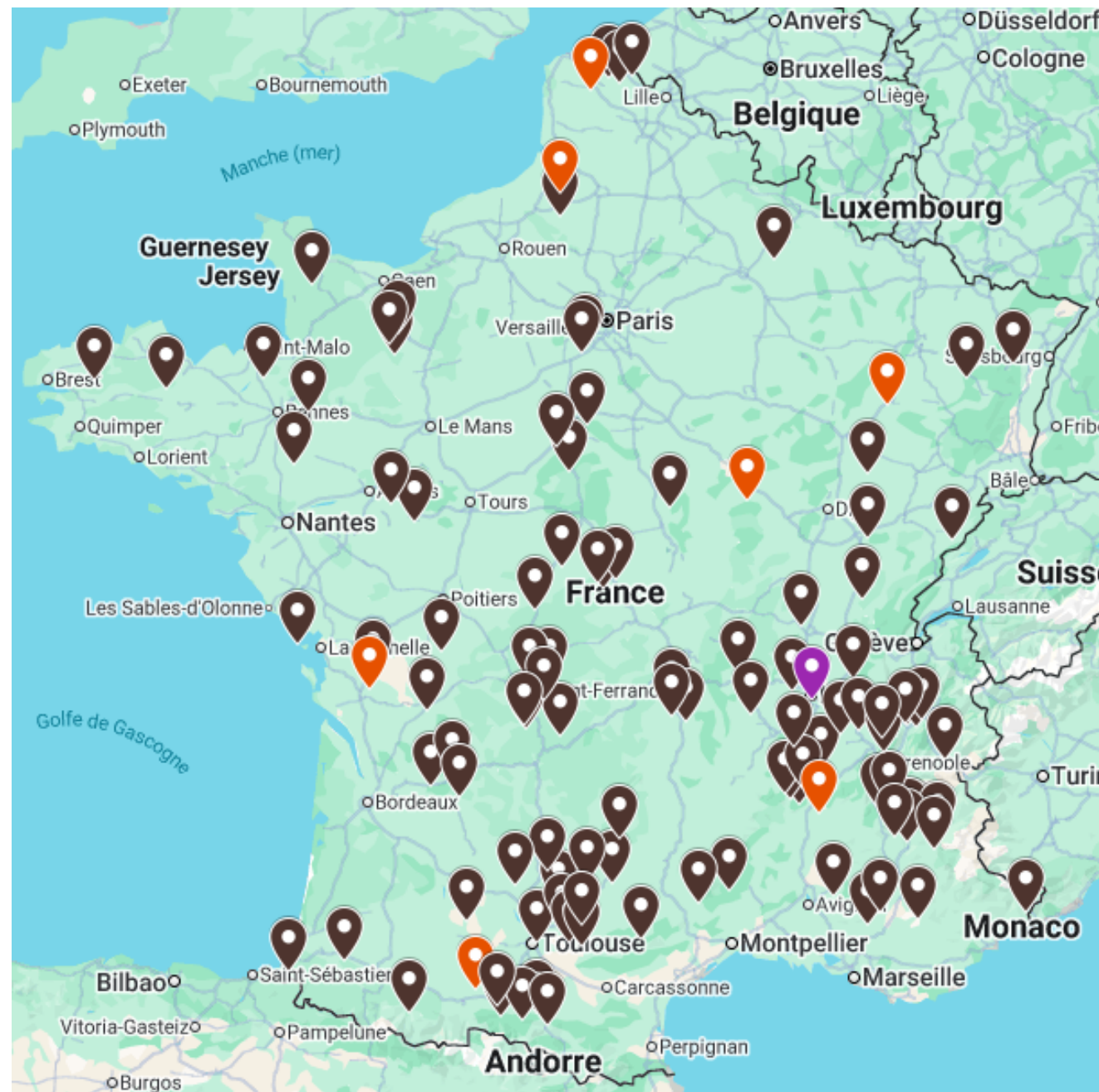
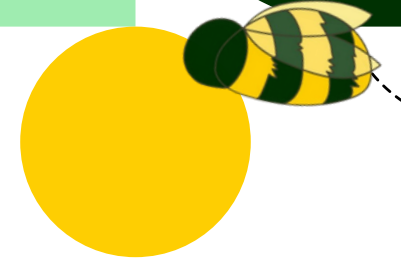
- ➔ **Strict control of inputs and practices**
- ➔ **Royal jelly produced without artificial feeding during the production period**
- ➔ **Specific product storage conditions**
- ➔ **Guaranteed traceability thanks to a unique number**



Breeders group



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➡ This selection program involves numerous beekeepers, representative of the production environments of the members

Main traits of interest



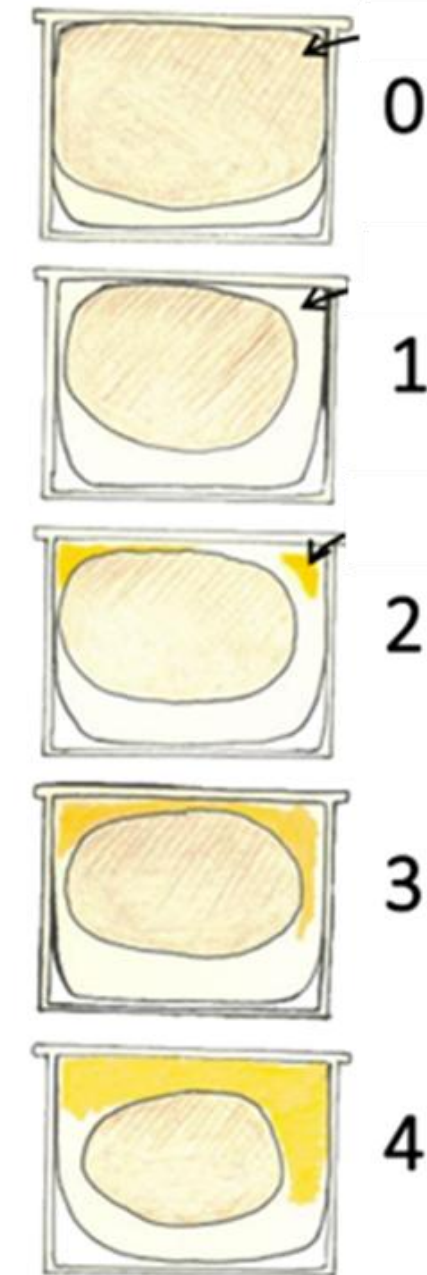
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Sanitary score



Royal Jelly production



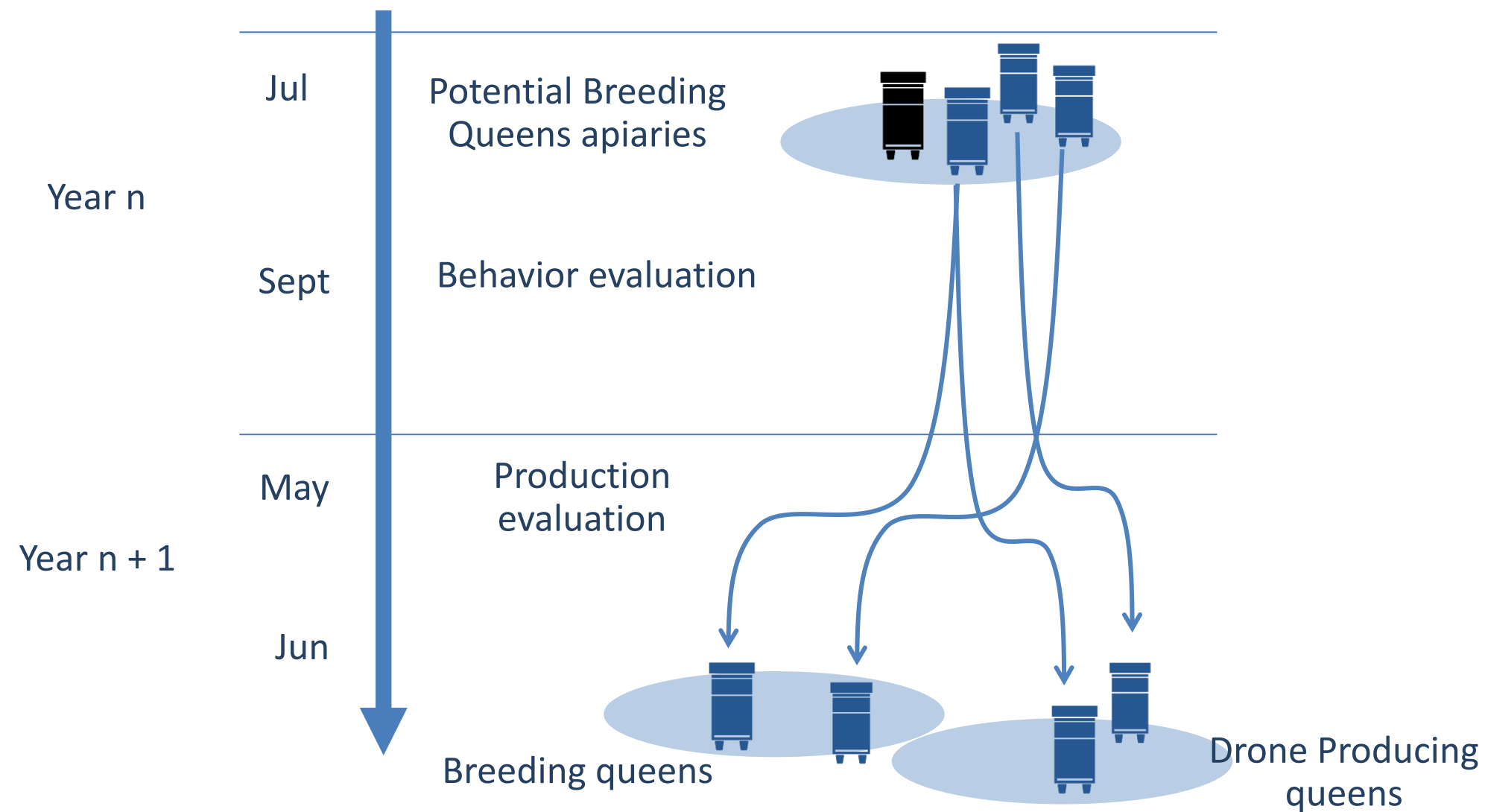
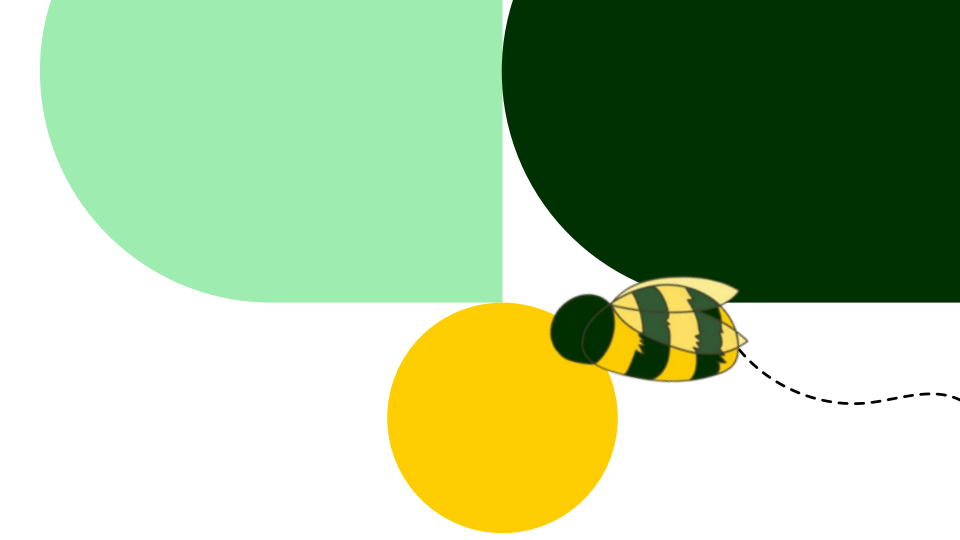
Reserves score

+ Honeybee behavior : swarming tendency,
calmness, aggressiveness

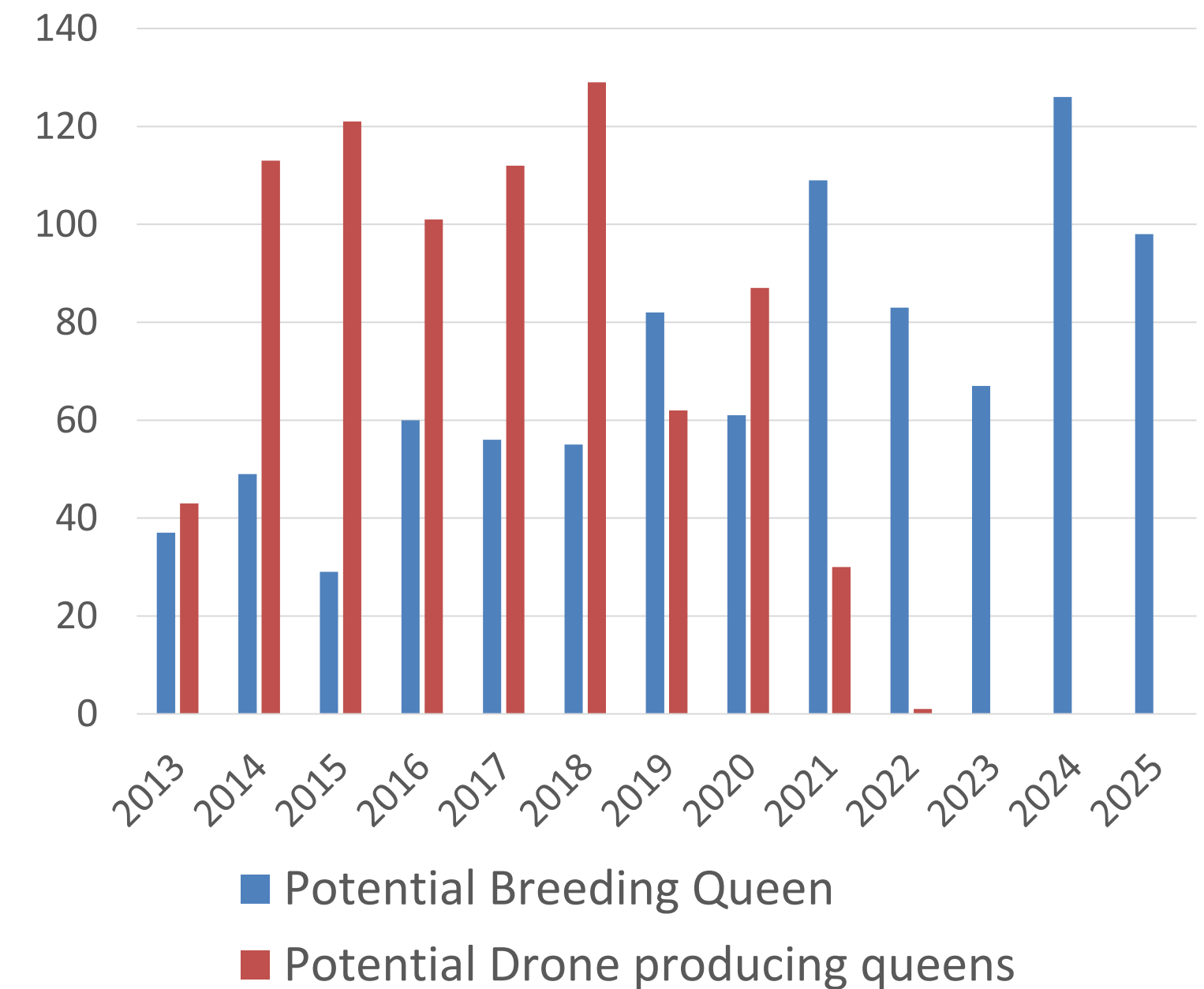
Breeding scheme



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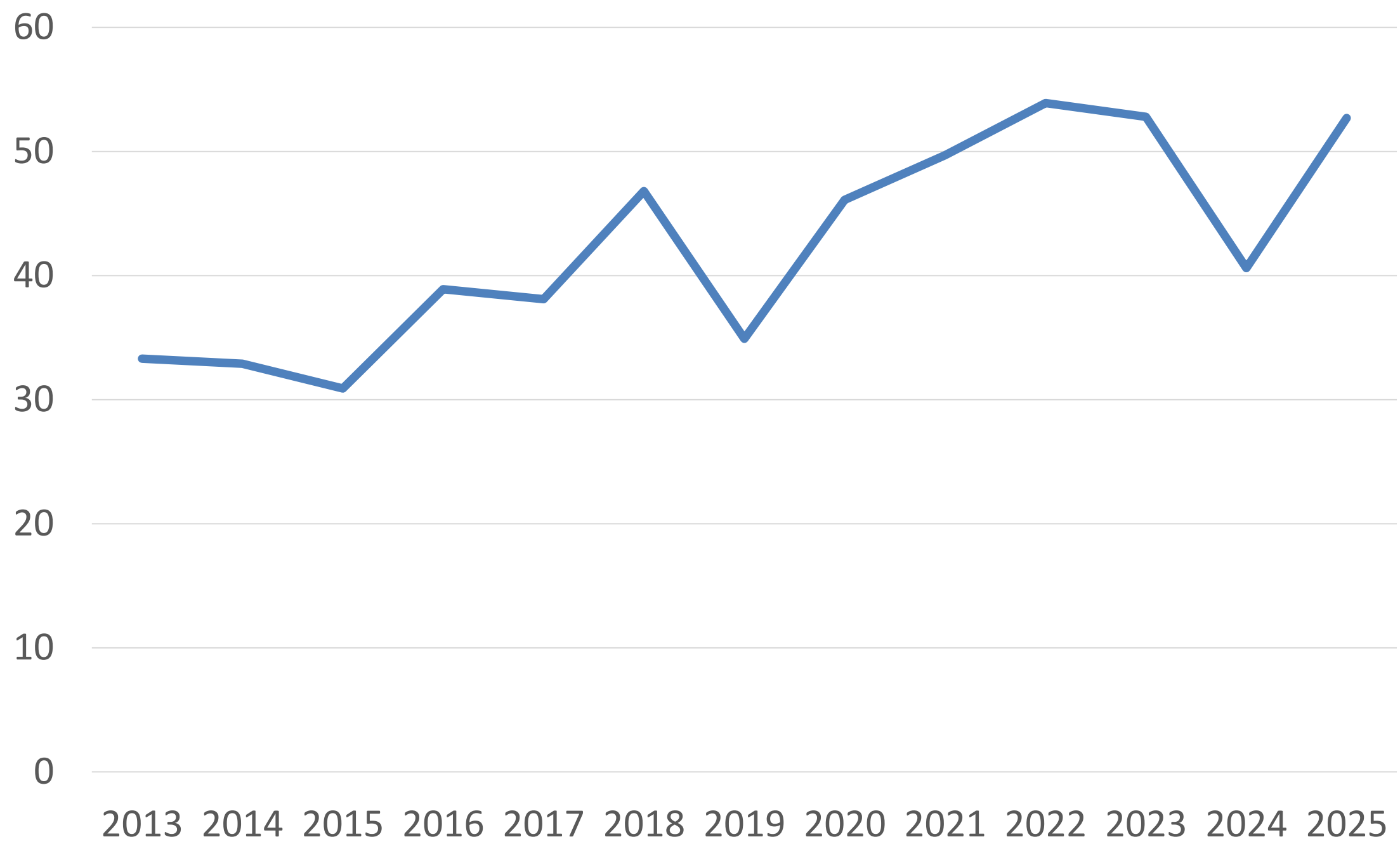
Queens with complete performance evaluation



RJ production evolution



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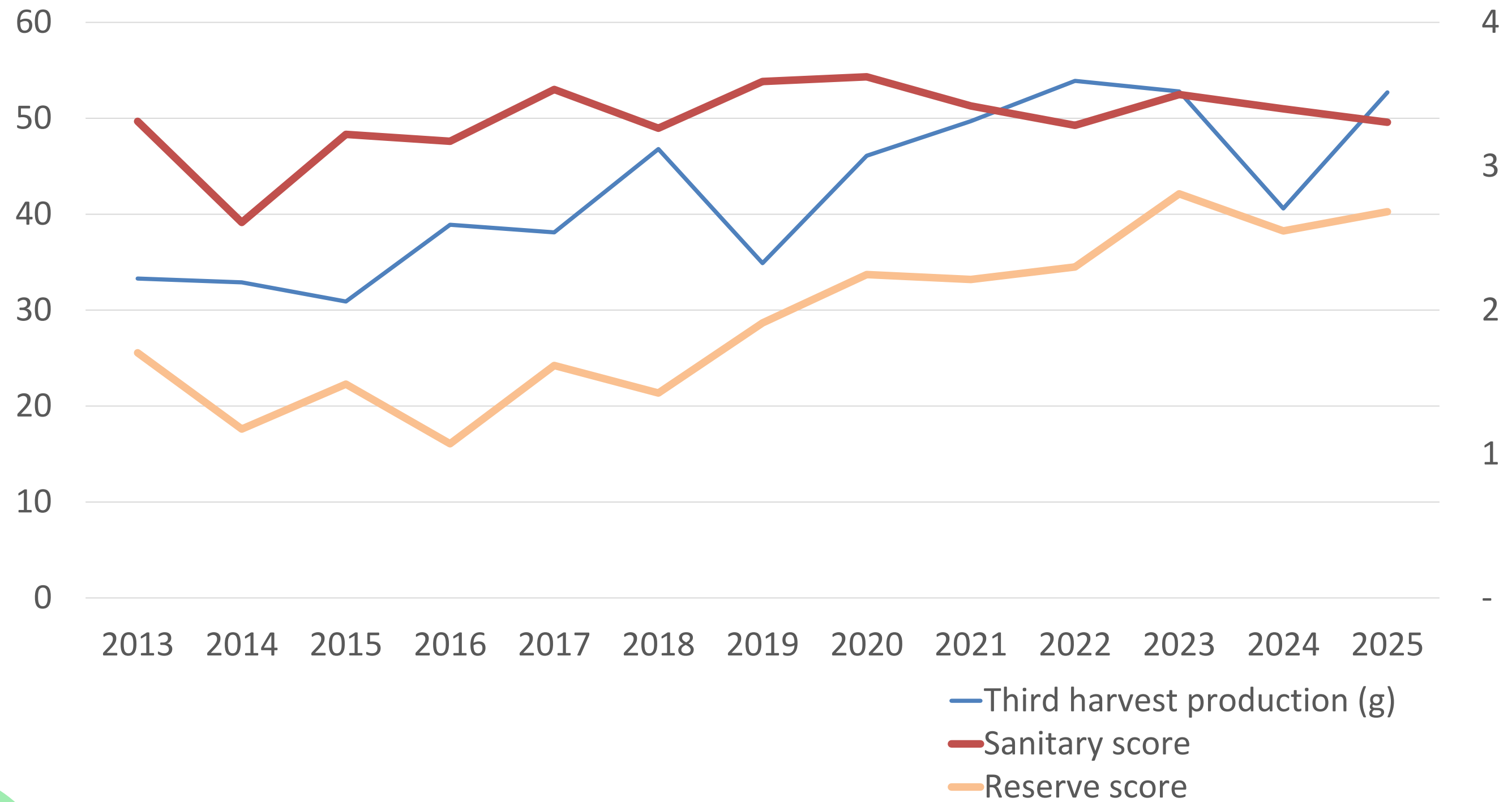


— Third harvest production (g)

Resilience score



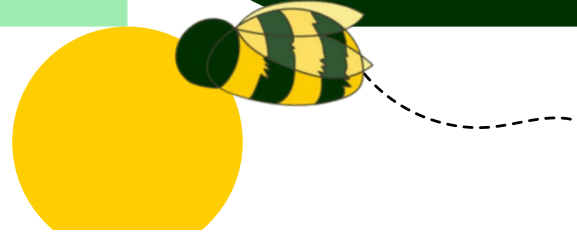
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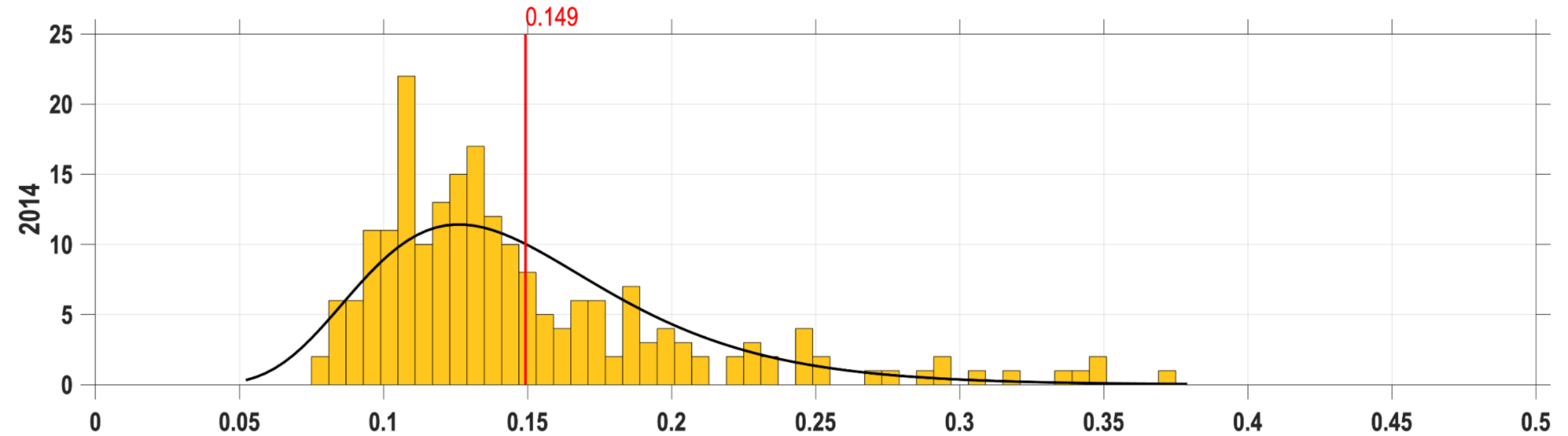
Inbreeding evolution



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Complete genome sequencing
of one drone of 22 colonies in
2014 and 2024

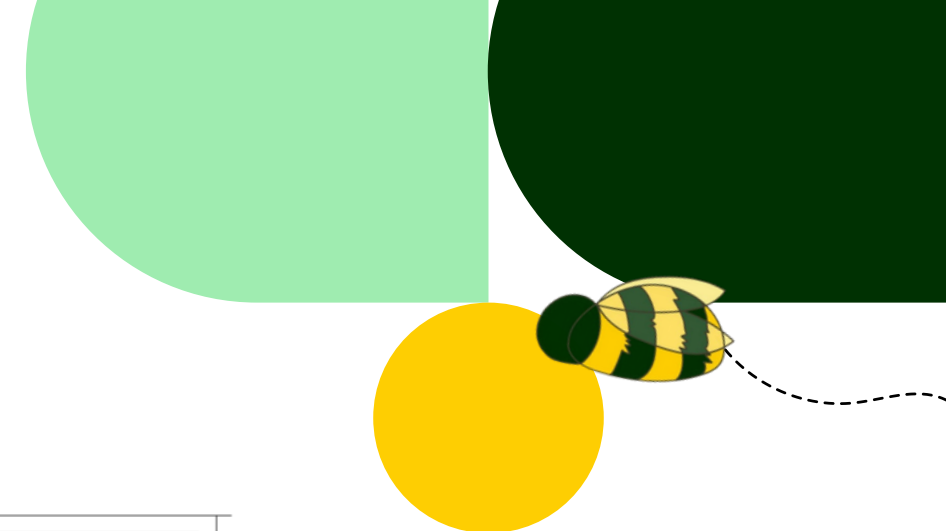


Genomic inbreeding coefficient

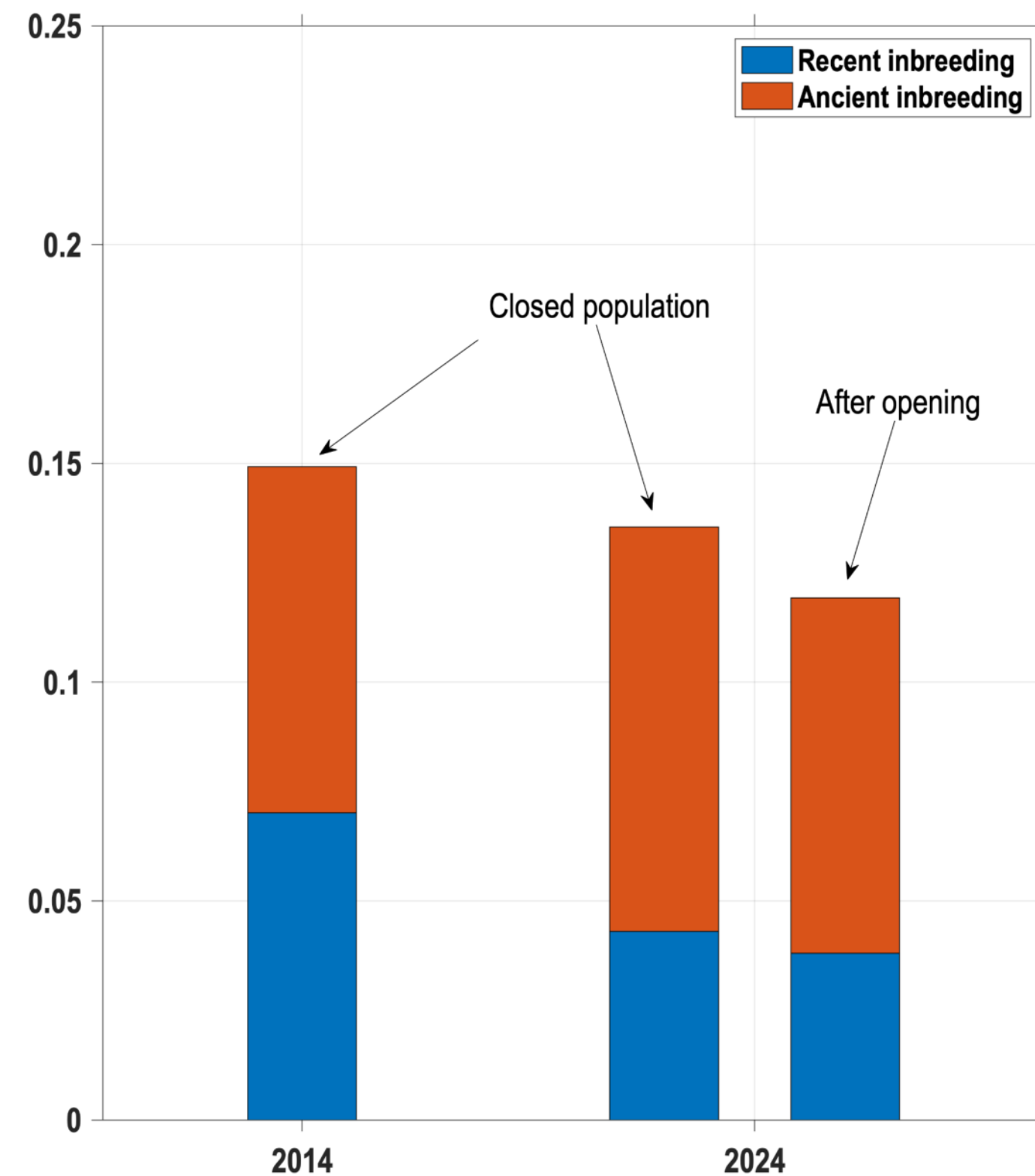
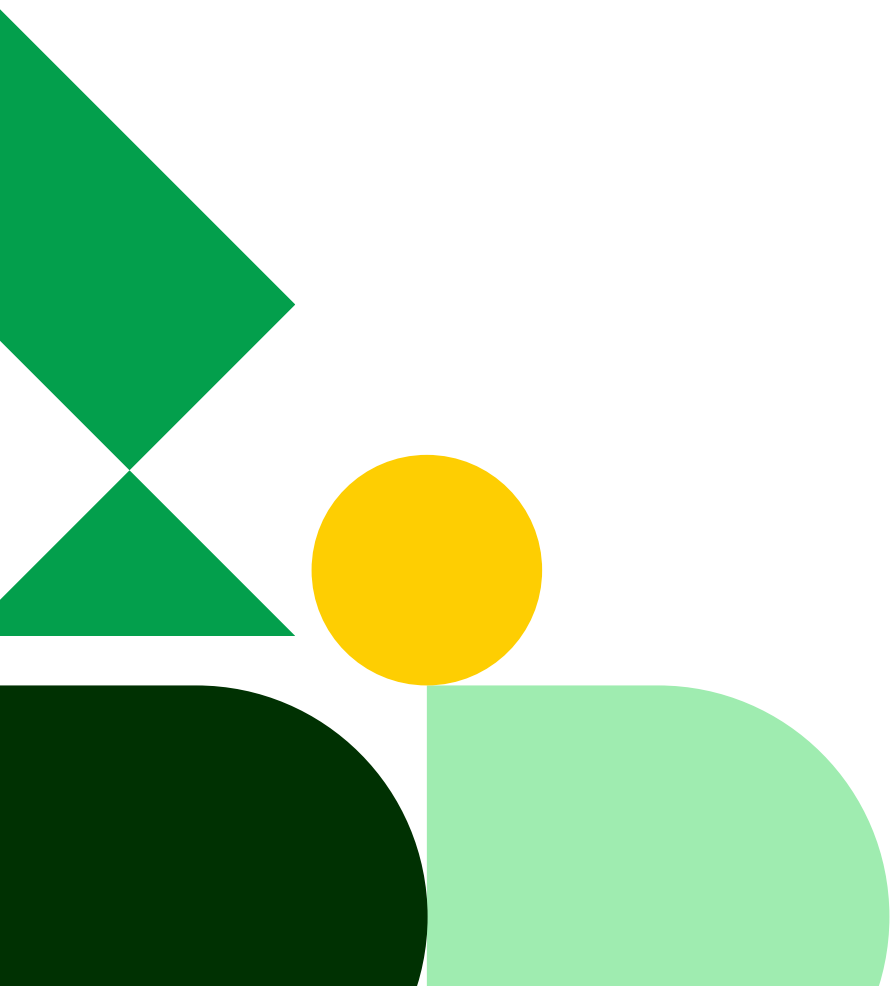
Inbreeding management



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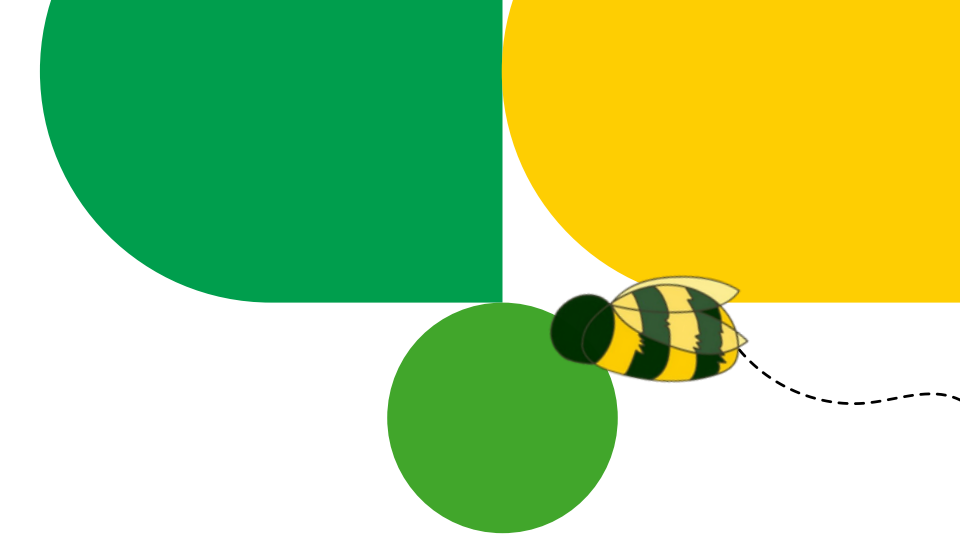
Genomic inbreeding coefficient



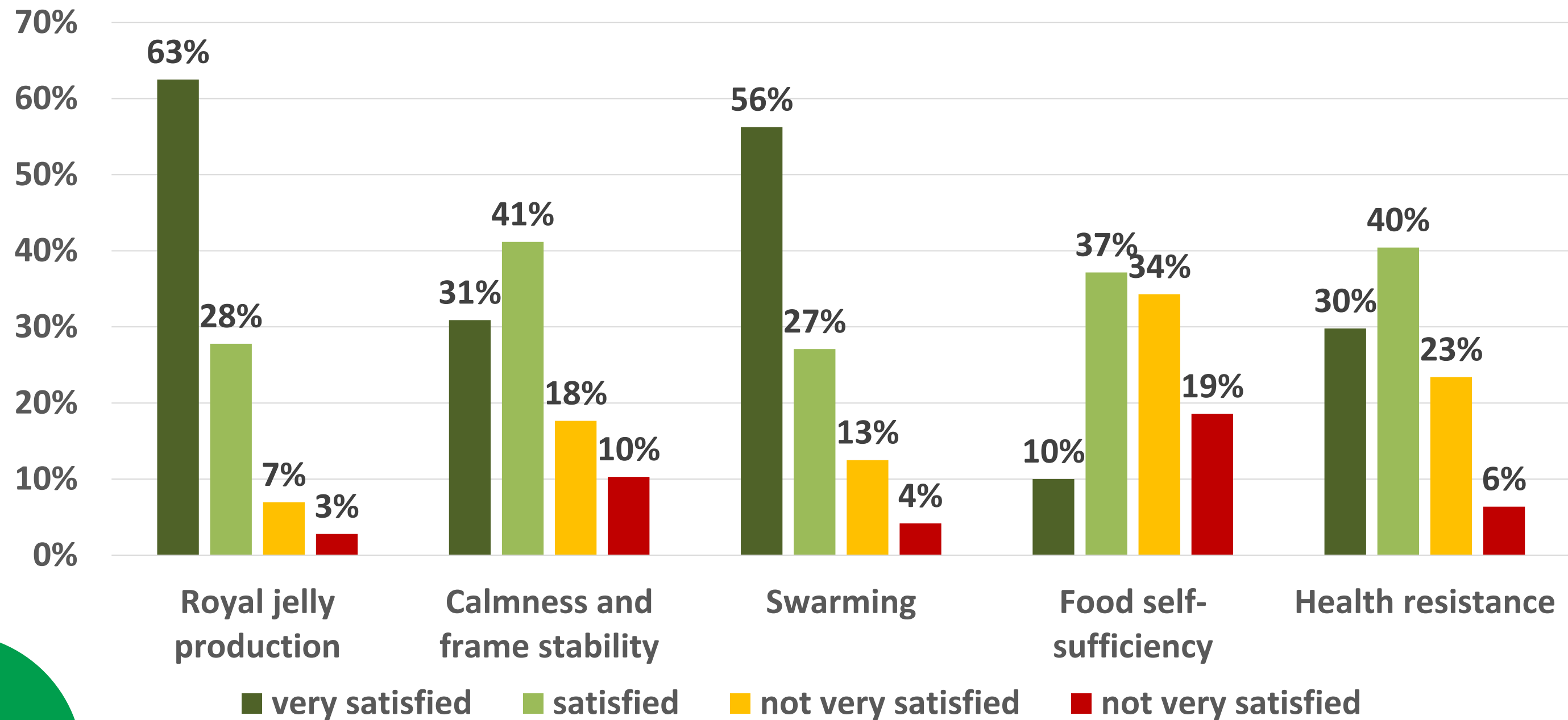
Beekeepers' impressions



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Distribution of members according to their satisfaction with genetic selection criteria in 2024



Conclusion



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- We have not degraded the genetic diversity through selection
- We supply beekeepers throughout France with high-quality bees that produce royal jelly.



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Thank you

- To the various beekeepers who have taken part in the selection plan over the years.
- To our funders: FAM, pepit.
- To our scientific partners: INRAE, ITSAP.

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