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Queen banks, Safe for Quality

Evaluated the effects of overwintering on banked honey bee queens during the next spring.

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A new study just published by Journal of Apicultural Research investigated whether honey bee queens (*Apis mellifera*) can be successfully overwintered in queen banks without compromising their physiological quality or colony performance. The research specifically compared queens stored in banks with those wintered individually in standard colonies.

Methods

The experiment was conducted in Québec, Canada, from October 2020 to April 2021. Two overwintering strategies were tested: queens stored in "queen banks," and control queens wintered individually in colonies. Each queen bank consisted of a strong colony (approximately least 16 frames of brood and bees in Langstroth hive) containing each 40 caged queens, while control colonies contained a single queen.

Before and after the overwintering period, researchers evaluated a set of seven key reproductive and nutritional parameters. These included queen body weight, ovary weight, abdominal index, sperm count, sperm viability, total protein levels, and vitellogenin concentration in the hemolymph. These measurements were chosen as indicators of queen fertility and physiological condition.

To assess post-winter performance, surviving queens were introduced into newly created nucleus colonies in spring 2021. Colony development was then monitored throughout the season. Performance metrics included brood area (measured as surface area of developing bees), colony strength (number of frames covered with bees), and weight gain. Measurements were taken repeatedly from May to August to track colony growth over time.

Results

The most notable difference between treatments was winter survival. Banked queens had a significantly lower average survival rate (37%) compared to control queens (89%). Additionally, survival varied widely among queen banks, ranging from 11% to 70%, indicating strong variability depending on colony conditions.

Despite this reduced survival, the physiological quality of surviving queens was largely unaffected. Before wintering, banked queens had lower body weight, ovary weight, and protein levels than control queens. However, after winter, these differences disappeared. Body weight and ovary weight became similar between groups, and no significant differences were detected in sperm count or sperm viability at any stage.

Protein levels followed a similar trend: initially lower in banked queens, but equivalent to control queens after overwintering. Overall, these findings indicate that queen banking did not negatively impact reproductive or nutritional physiology in surviving individuals.

At the colony level, early spring performance differed between treatments. Colonies headed by banked queens showed reduced brood production and fewer frames of bees during the first month after introduction. For example, brood area and colony strength were significantly lower compared to colonies with control queens.

However, these differences were temporary. As the season progressed, colony performance converged between groups. After approximately two months, there were no significant differences in brood production, colony population size, or weight gain. By mid-season, colonies headed by banked queens performed similarly to those headed by control queens.

Conclusion

The results demonstrate that overwintering queens in banks of 40 individuals does not impair their physiological quality or long-term colony performance. However, the method is limited by substantially lower and highly variable survival rates during winter.

References

Lamothe Bordeaux M. and Giovenazzo P. (2026) - **Physiological qualities of honey bee queens (*Apis mellifera*) overwintered in banks** - Journal of Apicultural Research - https://doi.org/10.1080/00218839.2025.2558395