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Forms of work organisation in farms

Work organisation in professional beekeeping and consequences of queen management practices

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Abstract: *Professional beekeeping is a highly seasonal activity that leads to high workloads during the beekeeping season. This workload and its distribution across the year are current issues for beekeepers' quality of life and for the farm sustainability, as, it can be a challenge for beekeepers to achieve their technical goals while continuing to match their own expectations, including their quality of life and work-life balance. As in most agricultural sectors, beekeepers also have to cope with changing contexts, mostly through the colony management practices. In particular, the colony and queen replacement strategy currently plays a central role in maintaining a sufficient number of productive colonies. Different replacement practices can be implemented to maintain a sufficient number of productive colonies, mainly the creation of new colonies and the queen management practices (queen breeding, queen replacement). These practices require additional work during the beekeeping season, where the risk of overwork increases due to the occurrence of additional activities (e.g. pollination services, hive shifting). Thus, our work aimed at assessing the possible consequences of these technical choices on the beekeeper's workload and organisation, and at identifying the main work organisation issues in bee farming operations.*
The Work Assessment Method, developed by livestock researchers (Dedieu & Servière, 1999), was adapted to beekeeping to consider the main on-farm activities of the beekeepers and some specific constraints of beekeeping work. Then, two successive interviews were conducted with professional beekeepers in metropolitan France, to identify the beekeepers' colony management practices and to assess their workload through the adaptation to beekeeping of the Work Assessment Method.
The analyses of the consequences of the beekeepers' technical choices on their workload and work organisation revealed that some practices may affect the on-farm work organisation. In particular, some queen management strategies lead to a higher time spent to the colony management during already high workload periods, and induce some management issues.
Besides these references on the consequences of specific practices, this study identifies the main issues regarding work organisation in bee farming and provides a beekeeping version of the Work Assessment Method.

Keywords: *colony management strategies, bee farming, requeening, Work Assessment Method*

Introduction

In livestock farming systems, the farmer's quality of life is directly related to their work conditions. Thus, the work organisation is a growing concern (Béguin *et al.*, 2011; Couzy & Dockès, 2006). This work organisation is central in the farmer's work-life balance and more generally in their quality of life, which is among the main social sustainability issues of livestock farming systems (Lebacq *et al.*, 2013).
Besides the farmer's personal goals, the work organisation also contributes to their technical goals: the choice of some management practices may be partly related to the available workforce of the farm. The existence of some room for manoeuvre, *i.e.* of some available time, in the work organisation also greatly

contributes to the flexibility of the farm management as it allows the farmers to change their practices when they have to face an unpredictable context (Hostiou & Dedieu, 2012; Rigolot *et al.*, 2019).
These multiple links between technical choices and work organisation lead to consider both the management practices and the work organisation in livestock farming system research (Madelrieux & Dedieu, 2008; Malanski *et al.*, 2019). In bee farming systems, these work organisation issues and their links with technical choices are also met, and appears among the sustainability issues of bee farming operations (Kouchner *et al.*, 2019). As beekeeping is a highly seasonal activity, it induces high workloads during the beekeeping season and the work organisation can then be a major concern for professional beekeepers. Thus, the time needed by some management practices during these high workload periods may directly contribute to the technical choices of the beekeepers.
Among these management practices, the management of queen and colony replacement may include some practices which can be time-consuming. This is in particular the case of queen breeding for ensuring the beekeeper to have available queens when needed, *e.g.* to manage a weakening colony by requeening. While many professional beekeepers set up a queen breeding activity on their farm, most of them consider the needed time and organisation as a major inconvenient of this activity. The need for better knowledge of the consequences of the queen breeding activity is reinforced by the heavy colony losses (Brodschneider *et al.*, 2018; Jacques *et al.*, 2017) and by the variability in production levels that beekeepers may experience (FranceAgriMer, 2019), which encourage them to develop a queen breeding activity to ensure their queen and colony replacement.
Still, work issues in bee farming systems are poorly addressed so far and mainly through health and safety issues, *e.g.* bee venom allergy risks (Stanhope *et al.*, 2017) or other health risks as the regular carrying of heavy loads (Fels *et al.*, 2019; Topal *et al.*, 2019). While several methods and approaches were developed in livestock farming systems research to study the work organisation at the farm scale and to consider this organisation in relation to the management practices (Benoit Dedieu & Servière, 2012; Malanski *et al.*, 2019), these methods have not been applied to beekeeping yet. Among these methods, the Work Assessment Method (WAM) allows to estimate the main agricultural tasks and the workload they generate across the year, and to identify the work organisation between the members of the workforce (Cournut *et al.*, 2018; Dedieu & Servière, 1999). Even if some specific work issues in beekeeping may require some adaptations of the method, the WAM goals and principles appears consistent in the beekeeping case.
This study aims at providing an outlook on the main work organisation issues in bee farming operations and on the possible consequences of the queen and colony replacement practices on this work organisation in French bee farming operations. It was based on an adaptation of the WAM to professional beekeeping, which is presented in the first part.

Methodology: the Work Assessment Method (WAM) and adaptation to beekeeping

The WAM, developed by Dedieu & Servière (1999), aims to estimate the workload generated by the herd and land management practices across the year. This estimation is based on an analytical reconstitution of both the different agricultural tasks and the time they require, through an interview with the farmer. Different kinds of tasks, workers and temporal scales are considered. Box 1 describes the main principles of this method.
The WAM was initially developed for ruminant livestock system. This method considers the common issues of these agricultural systems, *e.g.* the daily work for the herd care, but was ill-adapted to some

specific issues of the beekeeping case. The modifications that were needed to provide a beekeeping version of the WAM were identified through a collective work involving both people from "work in agriculture" scientific community and people from beekeeping research and development community. The final version that we present here is the result of successive tests with professional beekeepers, modifications of the WAM and exchanges with beekeeping advisors that have been made from Spring to Autumn 2017.

The Work Assessment Method is based on an analytical reconstitution of the time spent to the main herd and land management tasks across the year, through an interview with the farmer. This interview can be carried out at any time of the year, and the collected data consider the last agricultural year or an average year according to the farmer. Several kinds of workers and tasks are defined, and the work time and organisation are considered across the year at the fortnight scale.

Workforce categories: the Basic Group
The **Basic Group** gathers all the workers whose time and income are mainly driven by the farm activity: farmers, farming couples, farm business partners. They contribute to the planning of the on-farm work according to their goals, and they usually are the ones who adapt their work time if needed (*e.g.* during high workload periods). All other workers are **outside the Basic Group**: employees, mutual assistance, unpaid labour (*e.g.* retired people helping with the farm work).

Seasonal and routine work
Two types of tasks are defined: **routine work** has to be done almost every day, and cannot be postponed (*e.g.* daily care of the herd). Routine work is estimated in hours per day. **Seasonal work** includes the tasks that not performed regularly enough to be considered in routine work, and can be postponed (*e.g.* crop management). It is estimated in days per fortnight, with an accuracy of an half-day.

Agricultural tasks considered in the WAM
The considered tasks are all the land and herd management tasks, and classified as herd, crop, forage areas management, and land upkeep. Some non-agricultural tasks are also included, *e.g.* commercialisation of the farm production. The time spent to the equipment and building maintenance or the administrative tasks, which can be difficult to quantify, are not considered.

Efficiency and workload indicators
Several indicators may be used to analyse the farm workload and work organisation. The **workload** may be calculated by category of workers (basic group or not), and ratios are considered as **efficiency indicators**, *e.g.* workload per livestock unit or per agricultural land area. These efficiency ratios are useful to compare the results of a farm to those of other farms, or to the livestock sector's workload references.

The **Calculated Time Available** represents the available free time for the Basic Group workers and also includes the time left to perform the unrecorded or unpredictable tasks. Therefore, this Calculated Time Available also represents the possible flexibility of the organisation: an increased available time allows an easier adaptation of the organisation when an unpredictable event has to be faced.

***Box 1: Main principles of the Work Assessment Method, based on* Dedieu & Servière (1999) *and* Cournut *et al.* (2018).**

Beekeeping version of the Work Assessment Method

The main principles of the WAM were kept in this beekeeping version: the analytical reconstitution of the main tasks and workload across the year is realised through an interview with the beekeeper after the beekeeping season (*i.e.*, in autumn or winter). For each task, the required time and the involved people (members of the Basic Group or outside the Basic Group) were identified at the fortnight scale.

Seasonal work and non-postponable work

In bee farming operations, the notion of "routine work" is less present than in other breeding activities as honey bees do not require repeated daily care. Thus, only "Seasonal work" was considered, and estimated in days per fortnight. Besides, for migratory bee farming operations, the colony management includes some night work for hive shifting. This night work is frequently carried out in addition to the

usual daytime work (which duration depends on the period of the year). Thus, it is considered as an extra work compared to an usual day for this period of the year, and counted as a possible "third half of the working day". This methodological choice leads to periods with more than fifteen days of work per fortnight, *i.e.* more than one day of work per day.
While there is no routine work, some tasks still constitute a specific constraint for the beekeeper. These tasks cannot be postponed to the following days, *e.g.* the royal jelly production tasks or the queen breeding tasks, which ask for a very precise work calendar to be successful. These "non-postponable" tasks decrease the flexibility of the work organisation. Thus, the beekeeping version of the WAM classify each task as postponable or not.

Apicultural tasks

To facilitate the analytical reconstitution of the year with the beekeeper and to allow a more detailed analysis of the work organisation, new categories of tasks have been defined in the beekeeping version and an extra level of analysis have been added compared to the initial WAM. Each of the categories includes several tasks which can be performed at the same time, while two tasks belonging to different categories cannot be performed at the same time. For instance, several tasks can be carried out by the beekeeper during an apiary visit: the creation of artificial swarms, the requeening of some weak colonies… Such simultaneous tasks are grouped into the "Apiary visits and activities" category.
All the on-farm tasks are here considered, including the equipment or building maintenance and the administrative work that are not included in the original WAM. The whole list of the defined categories and which tasks they include is available as Supplementary Material.

Workload categories

To allow a specific analysis of the high workload periods, four kinds of periods have been defined: high workload, medium workload, low workload, and holidays, according to the beekeeper's own definition of "high", "medium" and "low" workload in terms of worked days per week and worked hours per day. All the fortnight periods across the year were classified by the beekeeper into one of these four workload levels. These workload categories allow to identify the periods were the work organisation issues are a particular concern. They also allow to detect some possible missing data in the time estimation (*e.g.* if the reconstituted time is low for a period considered as a "high workload period"), and thus to consolidate this estimation.

Colony and queen replacement practices and their consequences on the beekeeper's work organisation

A first interview to identify the main colony and queen replacement practices was conducted with fifty-eight beekeepers in metropolitan France. These interviews allowed us to identify the main replacement practices, and highlighted that the work organisation was a major issue in bee farming operations. To study the possible consequences of the replacement practices on this work organisation, a second interview was conducted with forty-five of the previously interviewed professional beekeepers. This second interview aimed to assess their workload and work organisation through the beekeeping adaptation of the WAM. These interviews were conducted by researchers and by beekeeping advisors between 2016 and 2018.

Farm sample

The forty-five interviews were conducted in metropolitan France, and mainly took place on the farm. The sampling aimed to represent a broad diversity of productions (honey, royal jelly, paid pollination

services…), beekeeping practices, farm size (from 150 to nearly 3000 hives, from one to four workers in the basic group) and beekeeping experience.

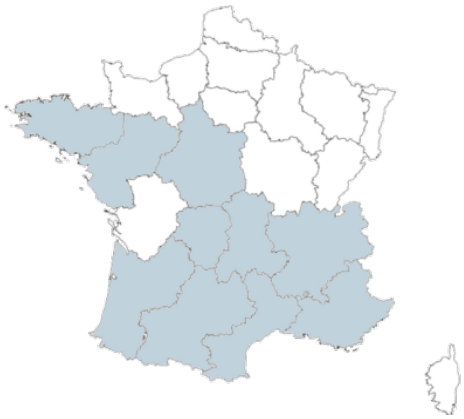

Figure 1. Localisation of the bee farming operations that were included in our sample (grey regions).

Colony and queen replacement practices

The main queen and colony replacement practices in professional beekeeping were identified through the first interview with the beekeepers. These interviews allowed us to classify the farms according to their colony and queen replacement practices, including the creation of new colonies (artificial swarms or package bees, with or without a queen introduction), colony requeening (*i.e.* queen replacement by the beekeeper), the management of weak colonies, and on-farm queen breeding (that allows the beekeeper to have supplementary queens for introducing in new or weak colonies).

Work organisation and consequences of the replacement practices

About one year after the first interviews regarding their replacement practices, a second interview was conducted with the same professional beekeepers based on the beekeeping version of the WAM. The whole annual work was quantified, for all the categories defined in the beekeeping version of the WAM (see Supplementary materials).
Besides the different farm management tasks, the main colony and queen replacement practices that were included in the workload analysis were:

- the constitution and management of artificial swarms or package bees, with or without introduction of a bred queen (queen cell, virgin queen or mated queen): the related tasks in the beekeeping version of the WAM are *Creation of artificial swarms or package bees* and *New colony management*,
- the requeening of colonies (queen replacement by the beekeeper: removal of the old queen and introduction of a queen cell, virgin queen or mated queen) : the related tasks in the beekeeping version of the WAM is *Requeening and queen introduction*,
- queen breeding up to different level: no queen breeding, queen breeding up to queen cell or virgin queen, queen breeding with management of mating colonies[1] (up to mated queen), management of mating colonies only (without the first stages of queen breeding, in particular

[1] Mating colonies or nucleus colonies are small honey bee colonies whose purpose is not to produce honey or other bee products but to allow the mating process of the queen to take place, so that the beekeeper can dispose of mated queens which can be picked up to be introduced in other colonies.

grafting). The related tasks in the beekeeping version of the WAM are the tasks of the *Queen* breeding category,

Some practices which contribute to the replacement strategy but are hard to estimate in the work organisation assessment were not considered, *e.g.* the time spent to note-taking about the colony quality while working on the apiary, which contributes to the colony selection.

Data analysis

Differences in time spent to the colony and queen replacement tasks (see Supplementary material for the detailed list of considered task) and to the whole colony management (*i.e.* to the whole "Apiary visits and activities" and "Royal jelly" categories, see Supplementary materials) were studied through the efficiency, defined as time per colony for the considered task, and statistically analysed using non-parametric Kruskal-Wallis tests. In the statistical analysis, thelevels with less than three farms were not included. The data analysis was carried out using R software (R Core Team, 2016) and the graphical representations using the ggplot2 package (Wickham, 2016).

The proportion of time spent during "high workload" periods, and the possibility to postpone or not the considered tasks, were studied for the different colony and queen replacement strategies. We considered both the time spent to the replacement tasks and to the whole colony management tasks.

Results

Main work organisation issues in professional beekeeping

The adaptation of the WAM to beekeeping highlighted some common organisation issues in beekeeping, mainly the postponable or non-postponable nature of the tasks and the high workloads periods which are frequently cited as a key issue for the beekeepers' work-life balance.

The survey analysis revealed the high variability of workload from one farm to another, and its distribution over the year. The average working time per person of the Basic Group is 218 days per year, and ranges from 83 to 342 days per year.

While "high workload" periods (as defined by the beekeeper) cover an average of four months of the year, mainly from April to June, this can be as much as nine months for some farms where direct selling requires a significant amount of time throughout the year (Figure 1). The extent of these "high workload" periods did not appear to be directly related to the operation size (considering the number of colonies in autumn) nor to the colony and queen replacement strategy.

During these "high workload" periods, the mean workload is around 13 days per fortnight with a mean daily workload of 11.3 hours per day, which leave little time to rest but also little room for manoeuvre for unpredictable events.

These "high workload" periods are also when the tasks which cannot be postponed are the most frequent, complicating the work organisation: around 45 % of the tasks during the "high workload" period are identified as non-postponable.

Almost half of the interviewed beekeepers are satisfied with their work organisation and their work-life balance. Beyond working time, various factors are cited as contributing to the beekeepers' perception of this issue and differ from one beekeeper to the other. For example, some beekeepers are satisfied with a high workload as long as they can take winter holidays, while others want to be able to take some rest or holidays during the beekeeping season. The same annual work pattern may thus suit some beekeepers and not others, and opinions may differ between members of the Basic Group within the same operation.

When the work organisation is not considered satisfactory, the main reasons cited are too much work and no time for rest during the beekeeping season, or holiday periods that are difficult to reconcile with those of other family members. The workload during "high workload" periods therefore appears to be a major challenge for the work organisation and the quality of life of professional beekeepers.

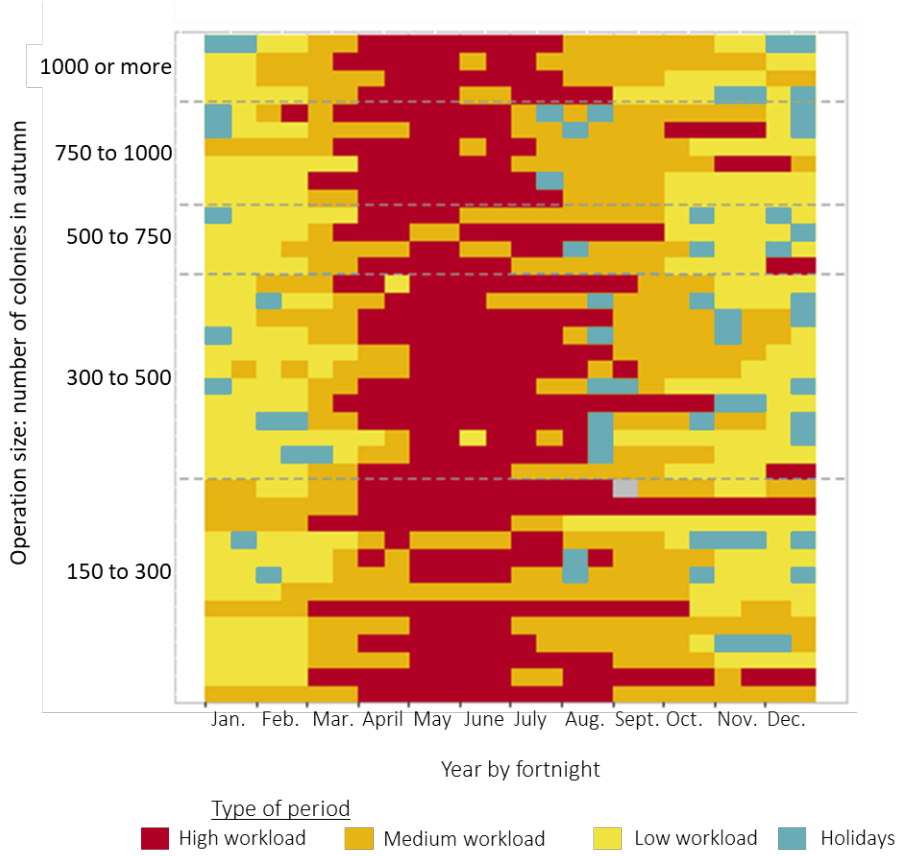

Figure 2. Type of period along the year as defined by the interviewed beekeepers. *Each row represents a bee farming operation, the operation size in terms of number of colonies in autumn is given by the ordinate axis. Only the holiday periods for a whole fortnight are indicated (e.g. a fortnight with a holiday week and a low workload week appears as a low workload fortnight).*

Queen management practices and their consequences on the beekeeper's work organisation

Among the interviewed beekeepers, the annual time spent on the colony and queen replacement tasks is highly variable and ranges from 0.02 to 0.5 days per colony (with an average of 0.2 days per colony). It represents an average of 18 % of the annual working time per member of the Basic Group and can go up to 40 % in some operations, in relation with the time spent per colony but also with the time needed for the other activities (*e.g.* packaging, commercialisation…). The whole colony management represents approximately half of the annual working time per member of the Basic Group.

This time spent on the colony and queen replacement tasks and even on the whole colony management significantly increases with the usage of mated queens in the replacement practices – when new colonies are created and for colony requeening. In most situations in our sample, these mated queens come from an on-farm breeding by the beekeeper, *i.e.* from an on-farm queen breeding with

management of mating colonies. This greater use of mated queens is reflected by the on-farm queen breeding level: a higher queen breeding level is associated with a higher time spent on the replacement tasks, from no queen breeding to queen breeding with management of mating colonies (queen breeding up to mated queen, Figure 2: the median number of days per colony spent to the colony management ranges from around 0.25 when there is no on-farm queen breeding to more than 0.5 for queen breeding up to mated queen). Thus, the on-farm queen breeding level may be considered on this point as a relevant indicator of the different replacement practices.

The annual time spent to the replacement tasks and to the whole colony management when there is an on-farm queen breeding activity up to queen cell or virgin queen or when only mating colonies are managed (without the early stages of queen breeding) do not significantly differ from the other categories. This may be related to the high variability of this time when there is a queen breeding activity up to queen cell or virgin queen (which may be due to the highly variable number of bred queens from one operation to the other), and to the small number of operations where only mating colonies are managed in our sample.

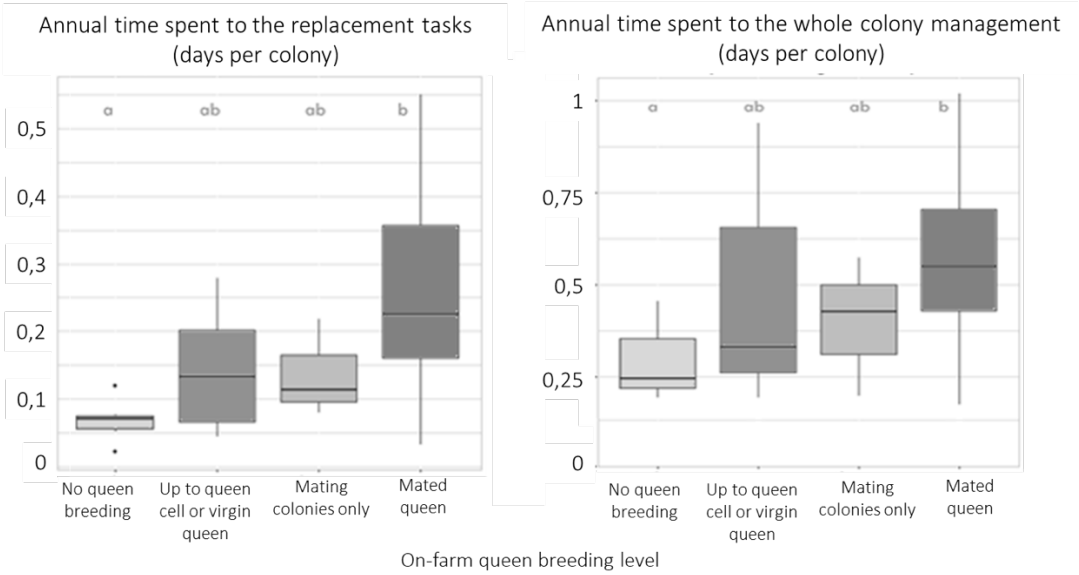

Figure 3. Annual time spent to the replacement tasks of colonies and queen and to the whole colony management according to the on-farm queen breeding level*. Different letters indicate a significative difference (p<0.05). The numbers of operations per category are 6 (no queen breeding), 8 (up to queen cell or virgin queen), 3 (mating colonies only), 24 (mated queen).*

This supplementary time spent to the colony management when mated queens are frequently used and when they come from an on-farm queen breeding with management of mating colonies is mostly at “high workload” periods. The proportion of time in these periods devoted to the replacement tasks is higher on the farms with this frequent use of mated queens, and the replacement tasks are also more frequently non-postponable. This higher proportion of non-postponable tasks is likely related to queen breeding, as the first stages of queen breeding cannot be postponed from one day to the next.

However, this increased time spent to the colony management does not appear to have direct consequences on the whole farm management time, which is highly variable and also a major consequence of the type of selling of the farm products. Still, the supplementary time spent to colony

management when the use of mated queen is high is mostly located in “high workload” periods and these tasks may not be postponable, which may represent a high constraint for work organisation.

Discussion

Work organisation issues in beekeeping

Work organisation and work-life balance appear as important sustainability issues in beekeeping, as in other livestock sectors where the work organisation plays a central role in the quality of life of the farmers (Seegers *et al.*, 2006). While the annual workload of the Basic Group is broadly comparable to that of other sectors (Cournut & Chauvat, 2012), professional beekeeping is mostly characterised by the absence of daily routine work and by the high seasonality of the work. Thus, the main issues in work organisation in bee farming operations may differ from those of other livestock sectors.

While in other livestock farming systems, the routine work all year long may be a major constraint and prevent some farmers from having holidays (Couzy & Dockès, 2008), in beekeeping the main issues are mostly related to the high workload during the beekeeping season. Night work during hive migrations is another particularity of beekeeping work (Phillips, 2014) which can also contribute to the magnitude of some work peaks. The time and organisation of work during the beekeeping season are therefore central issues.

Besides the work time, the satisfaction of beekeepers with their work organisation and work-life balance relies on other factors that cannot be quantified and that are related to their own expectations (familial situation, personal preferences…). From a support perspective, this underline the importance of taking into account the adequacy between the work time and organisation and the beekeeper’s expectations rather than the working time itself. This satisfaction also relies on other expectations regarding their work: the income level, the technical performances or the difficulty of the working conditions are also linked to the farm work and may be considered in the work organisation choices of the farmer (Couzy and Dockès, 2008; Fiorelli *et al.*, 2010).

The high variability of working time and work organisation from one farm to another is also found in other livestock sectors. For instance, the daily working time per livestock unit may range from 1 to 4 between two farms within the same livestock sector (Cournut and Chauvat, 2012; Cournut *et al.*, 2010). If the size of the farm, the type of selling or the number of person working on the farm all contribute to explain this variability, it is also linked to some technical choices.

Work organisation in beekeeping and consequences of technical choices

Despite the high variability of the working time in professional beekeeping, some replacement strategy appeared to have an impact on the work organisation, especially during the high workload periods of the beekeeping season. In particular, the on-farm queen breeding level and the replacement practices that require a high use of mated queens may induce an increased work time. Besides this extra time required for the replacement tasks and in particular for queen breeding, the period during which they are carried out can lead to difficulties in the work organisation as they mainly take place in high workloads periods. These tasks may also induce some specific constraints in the work organisation when they are not postponable to the next day.

While on-farm queen breeding is described as a flexibility factor as it allows the beekeeper to have supplementary queens that can be introduced in their colonies when needed (*e.g.* when creating a new colony or if a colony is weakening), it may also decrease the room for manoeuvre in the work

organisation. Yet this room for manoeuvre is also essential to allow the agricultural activity to adapt to the environmental constraints or to other unexpected events (Hervé *et al.*, 2002).
These impacts of some technical choices on the work organisation can be found in other livestock farming systems, for example the management practices of feed management or reproduction (Gleeson *et al.*, 2007; Hostiou and Dedieu, 2012). Still, the work organisation is usually the result of a set of technical choices rather than of a particular practice (dos Santos Filho *et al.*, 2012) and other factors contribute to the work organisation on the farm: the composition of the working group and the distribution of tasks between the different persons, the size of the farming activities and the allocation of time for these activities (Fiorelli *et al.*, 2010). All these different factors should also contribute to the variability in the work organisation and workload in bee farming operations, especially between farms with relatively similar colony management, operation size and type of selling.

Conclusion

The queen and colony replacement practices do not appear to have direct consequences on the work time at the farm scale, but they can still have consequences on the work organisation as some practices may generate a higher work time during high workload periods and some specific constraints induced by the non-postponable tasks. These results underline the importance of considering these work organisation consequences in technical choices, and provide some new knowledge about these consequences for replacement strategies.
Work organisation appears as a key issue in professional beekeeping, regarding the quality of life and work-life balance of beekeepers but also the adaptive capacity of the farm through the room for manoeuvre in the work organisation. Thus, the adaptation of the Work Assessment Method to the beekeeping specific issues we provide should be useful both for scientific research to better understand the issues and determinants of work organisation in bee farming, and for extension services as a tool for exchange and support to beekeepers.

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Supplementary material: categories of tasks and tasks considered in the beekeeping version of the Work Assessment Method

- **Apiary visits and activities**:
  - *Tasks related to the colony and queen replacement practices:*
    - Creation of artificial swarms or package bees
    - Requeening and queen introduction
    - New colony management (*e.g.* artificial swarms)
  - *Tasks unrelated to the replacement practices:*
    - Colony health management (veterinary treatment, varroa counting…)
    - Feeding
    - Honey production monitoring (*e.g.* supers addition)
    - Colony monitoring
    - Honey harvesting *(removing full honey supers, on the apiary)*
    - Hive shifting
    - Hive shifting for paid pollination services
    - Colony management during paid pollination services
    - Pollen production (*e.g.* pollen harvest)
    - Propolis production (*e.g.* harvest)
    - Other
- **Queen breeding** (*all the queen breeding tasks are related to the colony and queen replacement practices*):
  - Grafting and queen rearing up to the virgin queen stage
  - Mating and nuclei management
  - Queen insemination and drone breeding for insemination
- **Royal jelly**
- **Honey extraction and packaging**:
  - Honey extraction *(removing honey from honeycombs, in the honey house)*
  - Honey packaging and labelling
  - Wax extraction and packaging for sale
  - Pollen drying and packaging
  - Propolis processing and packaging
  - Honey house or royal jelly laboratory cleaning
  - Other
- **Processing and commercialisation**:
  - Processing (*e.g.* ginger bread)
  - Commercialisation of the hive products (honey, wax, royal jelly, pollen, propolis): selling, delivery…
  - Commercialisation of livestock (queen, package bees, artificial swarms)
  - Other
- **Administrative work**
- **Maintenance of building and equipement, supply**:
  - Supply
  - Queen or colony buying
  - Maintenance of equipement and hive
  - Maintenance of building
  - Hive or equipement crafting
  - Wax management for on-farm use
  - Apiary site management: search, clearing,…
  - Other
- **Out of farm beekeeping time**:
  - Training
  - Professional involvement
  - Other
- **Other activities**