

Using weight metrics for colony assessment

Lorenzo Pons

It is well known that continuous hive weight monitoring can be applied for honeybee management. Typical applications are during the production season to assess the nectar flow conditions or during the overwintering to manage feeding.

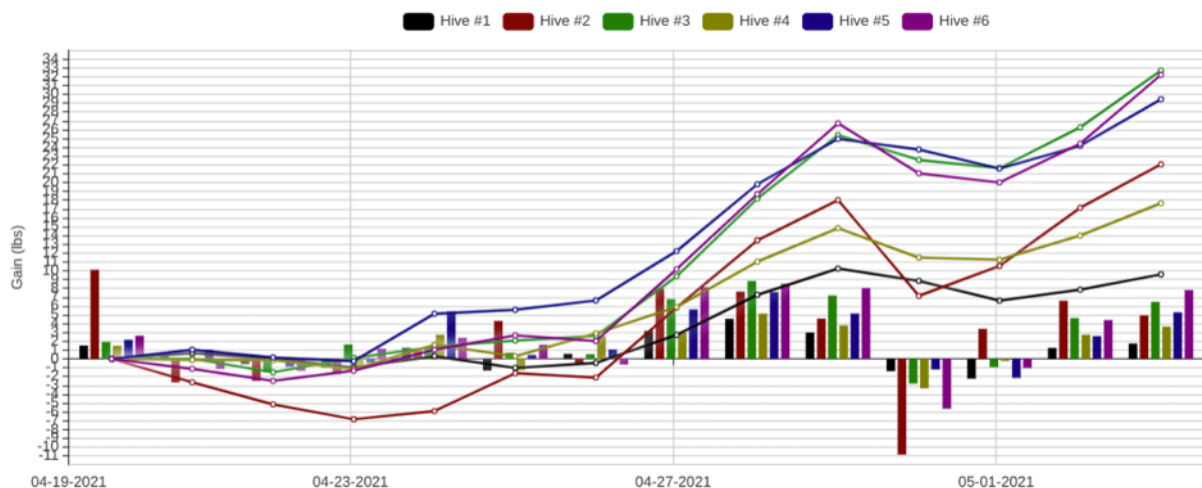
That said, there is a third application of weight monitoring which is for **breeding and selection**. Here the approach is more related with comparing colonies and their queen dynamics.

Best way to illustrate this approach is taking an example brought by our friend Ray Walker: Ray keeps bees in the Mid-Atlantic piedmont near Newark, Delaware. He applies colony monitoring technology to maintain colonies with a history of survival and productivity in Delaware's climate and habitat.

A brief scenario:

An apiary's overwintered colonies may contain potential breeder queens with desirable colony survival and performance traits. The challenge for beekeepers is selecting one or two breeder queens that have demonstrated egg laying rates that are in harmony with the availability of the local habitat's major nectar & pollen flows.

A locally raised, overwintered mated queen's colony "build-up" rate can be measured by hive scales. Accumulated colony weight gains during the first major nectar flow is an inferential measure of the queen's performance (prior egg laying rate profile) and her daughter's contributing traits – their ability to raise brood, build-up spring bee populations quickly, forage for food and accumulate nectar (the dominant source of hive weight gains).



I'm monitoring 6 colonies with potential breeder queens from different genetic "lines". Your multi-hive chart provides a visual comparison of the 6 queen's performance profiles on one display. Three of the queens have produced similar profiles of weight gain. Three other queens produced significantly smaller weight gains.

The age of the queen, her colony's temperament, mite counts/treatments as well as highest weight gains are analysed numerically to pick one or two breeder queens. These breeders will produce larva for building queen cells during the end of our Delaware nectar flow. The virgin queens will emerge around the time of the summer solstice. In our area, the nectar flow usually dries up by July 4th.

I don't practice spring colony equalization, splitting or brood mixing (so I can assess the strengths and weaknesses of each colony/breeder queen).

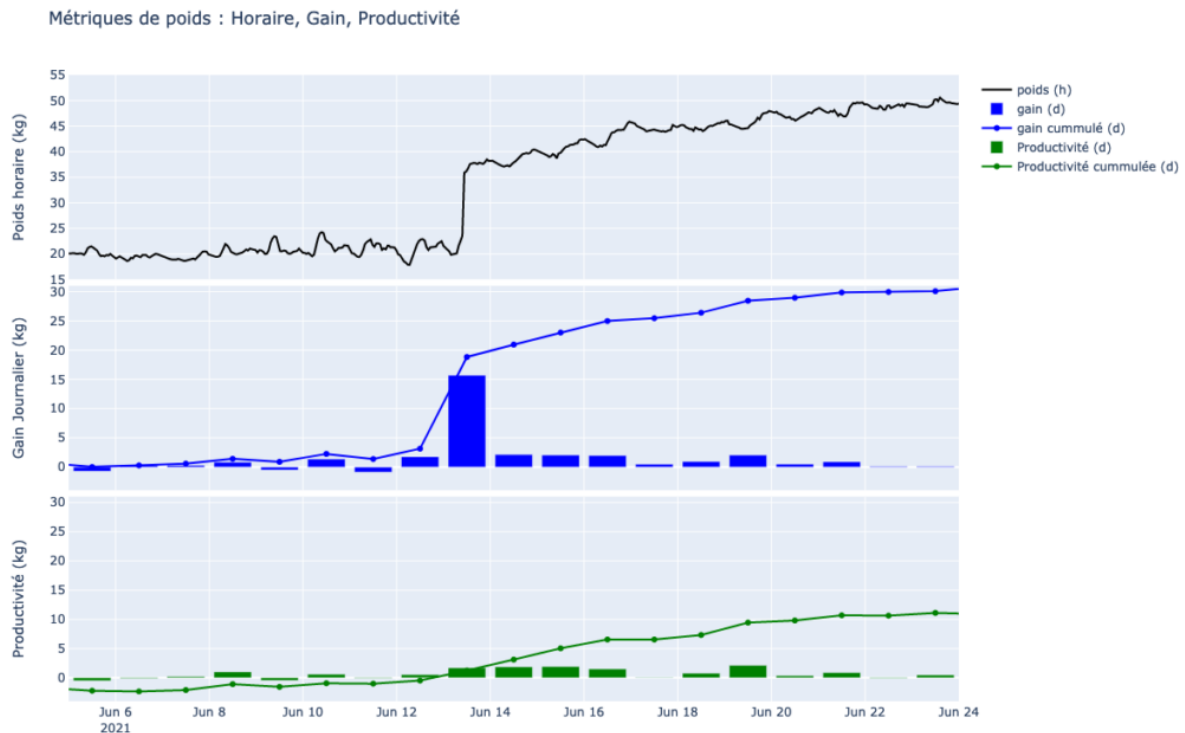
Evaluate the gain and productivity of the hive

In this example Ray is looking to the hive weight from the bee perspective. This means that the weight he's assessing is the net income or outcome from bees exclusively. Let's call this "Nectar foraging Productivity".

But in some other cases, namely feeding for example, the interest is looking to the **overall weight variations. Including those from the beekeeper itself.** For example, when I wish to monitor how the colony weight evolves before and after adding candi or syrup. Let's call this "Overall weight Gain".

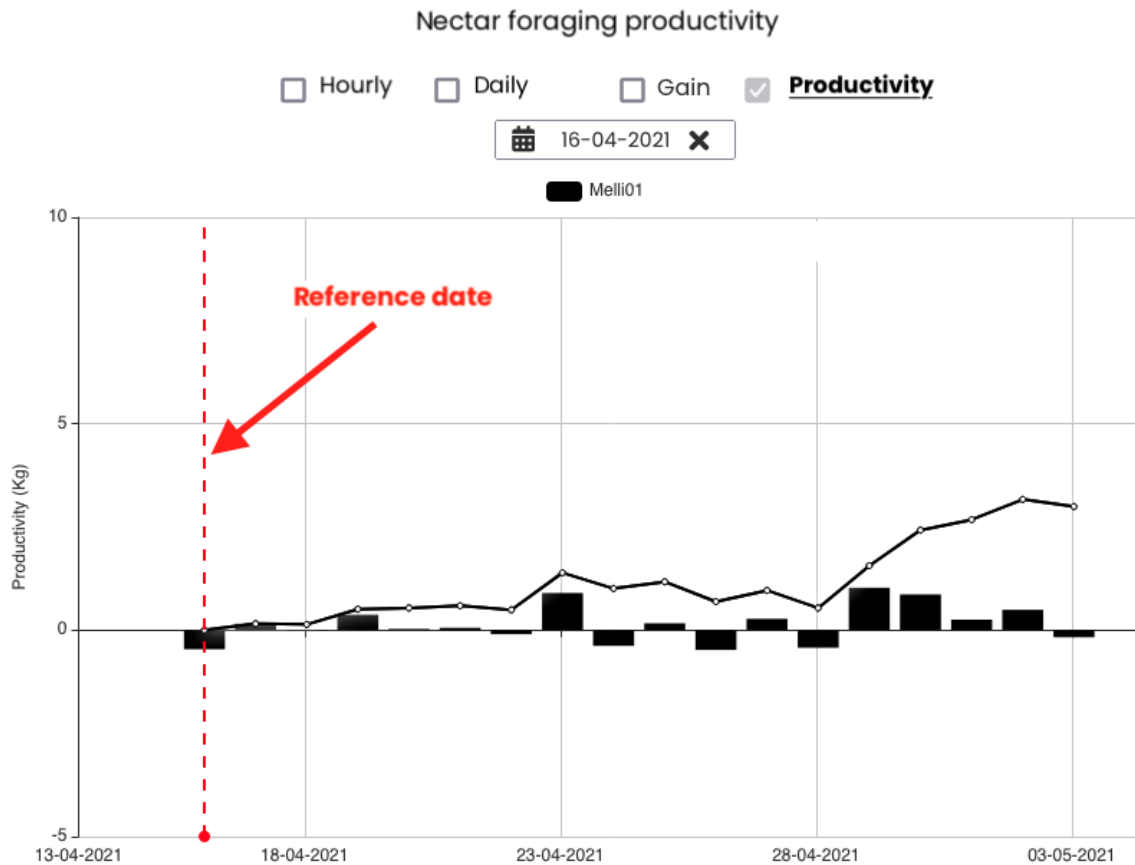
Both metrics are available in Mellisphaera so that depending on the case you can use one or the other.

Below is a condensed view for a single hive: Black is the hourly-weight (raw measurement), blue is the daily-weight-gain and green the nectar foraging productivity.



All the three plots show similar trends, you could even make this “subtraction” in your mind to carry this assessment. But when it comes to comparing several hives among each other, the tools are helping make this much less painful.

Another useful feature in Mellisphaera is the “reference date” that allows to set an arbitrary date from where the weight variations are recomputed. This helps greatly the comparison too.



To fix ideas:

When to use Overall weight **Gain**?

- Manage feeding
- Monitoring winter weight losses
- Manage Nectar flows together with super addition/removal

When to use Nectar foraging **Productivity**?

- Queen selection
- Colony comparison whatever their weight or stack composition

Lorenzo Pons