

ULTIMATE HIVE GRADING PLAYBOOK



HOW TO USE HIVE GRADING TO PUT YOURSELF IN A POSITION FOR MAXIMUM POLLINATION

INTRODUCTION

This guide is designed to help growers consider the numerous details that go into grading hives for pollination — a key component of a successful pollination season.

THE IMPORTANCE OF GRADING HIVES

If this write-up was about water, pesticides, fertilizer or any other input a farmer needs to produce a successful crop, there wouldn't be any reason to discuss the idea of measuring how much to apply. When it comes to pollination, however, there are many growers who have never taken steps to measure the quality of bees rented.

Reasons to grade hives:

1. You are paying for quality bees — be sure you receive them
2. Bee and harvest qualities are strongly connected
3. You would not buy another farm input without first verifying quality and quantity
4. Even the best beekeeper can have a bad year
5. You can resolve issues before bloom

Reasons against grading hives:

1. You trust your beekeeper and have no reason to doubt their bees
2. You do not want your beekeeper to think you are skeptical of their bees
3. You rent from a broker who grades the hives before they're delivered

Counterpoints:

- ◆ Trust your beekeeper: Trust only goes so far (see point 4 under "Reasons to grade hives")
- ◆ Don't want to seem skeptical: Relationship management is key (see point 3 under "Reasons to grade hives")
- ◆ Rent from a broker: It's valuable that hives are graded but it's important to get an unbiased opinion

There are many reasons why you should grade hives every season; giving you control of your input is towards the top of that list. With hive grading, you gain the power to correct issues before poor pollination impacts your harvest. When properly applied, results from hive grading can create an advantage for growers to ensure effective pollination each season. If you grade early enough, you can allot time for your beekeeper to replace weak hives or secure new, stronger hives. If you don't grade your bees, you're jeopardizing the potential of your harvest at the beginning of the season.

TAKE INTO CONSIDERATION

Now that you are sold on the idea of grading hives, you have to weigh your options. When making these decisions, keep your beekeeper's time and operation in mind while also deciding what is best for you.

What to consider:

- Who should grade my hives?
- When should my hives be graded?
- What percentage of hives should be graded?
- How do the results affect me?
- Where do my results take me?
- What happens when I receive weak hives?



Who Should Grade My Hives

There are different ways to conduct grading your hives. One simple option is to ask your beekeeper to go through the hives with you. This is the least ideal option aside from not grading hives at all, especially if you do not have much experience with bees. If you go this route, you should be the one to choose which hives will be checked. Select them at random and make sure to look into a few hives at each drop location. Inspecting the bees yourself is a cost-effective way to gain peace of mind about your bees. What you lose with this process, is an unbiased, objective assessment. You will need a bee suit — which your beekeeper should be able to provide — and should prepare to get up close and look at the bees yourself. While looking at the hives, ask your beekeeper to explain what you're looking at and what are the indicators of a healthy hive.

If you don't want to personally grade hives alongside your beekeeper, you could hire a third-party inspector to grade your bees. Be sure to **notify your beekeeper** before you do this. They should not give you any push-back but will appreciate a heads up before a stranger starts digging through their bees. Opening hives is inherently disruptive to bee production, so beekeepers can be understandably anxious at the idea of someone they're unfamiliar with handling their bees. It's not a bad idea to go along with the inspectors when they grade your hives; throw on a bee suit and ask plenty of questions as they grade. Hiring a third-party inspector is one of the better ways to get an unbiased assessment of your bees, but it is not necessarily objective.

Some good questions to ask a third-party inspector prior to hiring them:

- How experienced is your team?
- When can I expect you to grade my hives?
- How and when will I receive my results?



Though hiring an inspector to do manual frame counts is a great first step, inspections can be surprisingly subjective. If you hire an inspector, test it for yourself. On a couple hives, ask two of the inspectors to write down their frame counts individually and compare the results. We have found that more often than not, two sets of eyes counting the same bees tend to differ by a frame or two.

Verifli offers a third option for grading bees, and it is the only one that gives you an unbiased and objective measure of hive strength. Like a third-party hive inspector, Verifli takes care of all the hard work. In doing so, we don't open any hives, which is a unique feature that your beekeeper will appreciate. Verifli uses an infrared (IR) image of the hive surface to capture the heat signature of the bee cluster within each hive graded. Verifli adjusts thermal readings for weather factors based on the time and location of each image, delivering rapid results.

When Should My Hives be Graded

You'll want to give yourself enough of a cushion between the time you grade hives and when trees start to bloom. If you wait until mid-February and you find a 4-frame average, you are in a tough position to improve your pollination before bloom. We suggest grading hives as soon as they are delivered, or around the **first week of February** (growers up north can afford to wait an extra week or so). Grading early allows you time to determine whether you need to take action before bloom.

You should also consider grading again when trees are blooming at roughly 10-15%, especially when using hive strength results to determine pricing. Prices should be **based on results from this second grade** because that is when you need the bees to perform. Be sure to clarify in your contract when the hives need to reach the required strength.

If you want to take it an extra step, you can grade a third time after the trees have reached full bloom. Keep in mind that colonies will grow during and after bloom. If you grade on February 1, and you find a 9-frame average, that hive will most likely grow to 10 or 11 frames by full bloom. This is a good way to show how much value your beekeeper gained from pollinating your trees, which you can use as a point of **leverage when negotiating price** the following season.



Do not wait to line up and schedule your third party inspector, as appointments quickly book up. The Bee Corp begins scheduling Verifli hive grading **roughly 10 months prior** to the next pollination season — usually March or April.

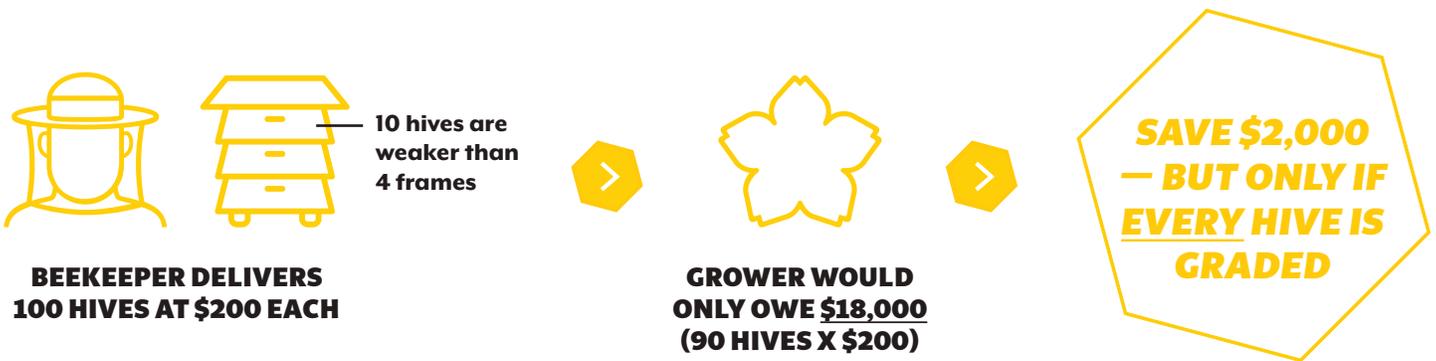
What Percentage of Hives Should be Graded

Common knowledge is that grading a 15-25% sample of hives is enough to give a grower a sufficient representation of the rest of the hives. To some growers, grading is just a way to go through the motions — making beekeepers feel accountable. However, pollination is an essential job that can only be completed with a full workforce of strong bees. Not many growers would allow 3/4 of their employees to go unsupervised, resulting in a costly backlog of work with an overdue deadline.

Growers are typically fine with sampling a small portion of the received hives. A primary reason is that manual grading can take a large amount of time — especially when dealing with thousands of hives. Once hives are placed in the orchard, a highly competent bee grading team might be able to grade 500 hives per day. A novice bee grading team could potentially reach 200 on a good day.

Consider your price structure when determining how many hives to grade. Some growers put language in their pollination contracts stating that they will not pay for hives below a certain strength — typically 4 frames.

If a beekeeper delivers 100 hives at \$200 each and 10 are weaker than 4 frames, the grower would only owe \$18,000 (90 hives x \$200). But that \$2,000 savings is only achieved if the grower grades every hive. If this grower graded 20%, statistically they would have only found two hives below 4 frames, saving only \$400. By grading every hive, this grower saves an extra \$1,600 in pollination fees.



	GROWERS WHO GRADED 100%			IF THEY ONLY GRADED 25%		SAVINGS GAINED BY GRADING 100%
	HIVES GRADED	HIVES < 4 FRAMES	SAVINGS	HIVES < 4 FRAMES	SAVINGS	
GROWER 1	841	41	\$8,200	10	\$2,000	\$6,200
GROWER 2	375	27	\$5,400	7	\$1,400	\$4,000
GROWER 3	497	104	\$20,800	26	\$5,200	\$15,600

In 2020, a few growers that use The Bee Corp’s Verifli hive grading decided to grade 100% of the hives they received. The chart demonstrates the number of hives under 4 frames that were found, how much they saved assuming they didn’t pay for hives under 5 frames and what they would have saved if they had only graded 25%.

With Verifli, you can have thousands of hives graded while you sleep, plus pricing is structured to save you money with the more hives you grade. Verifli makes the choice to grade more hives simple. In the real-life example above, Grower 3 saved over \$20,000 in pollination fees while only spending \$2,500 on hive grading with The Bee Corp's Verifli. That grower did need to scramble to find more hives, but with their savings, they ended up with enough room in the budget to cover the expense.



How Do the Results Affect Me

Bee colonies are measured in terms of frame strength. Frame strength is the number of “frames” that are covered by bees in a hive. Typically, a third-party inspector will report colony strength results in terms of “average frames.” Most experts recommend an 8-frame average across all your hives. With two hives per acre, you should have 16 frames of bees per acre. If you place fewer than two hives per acre, you should expect a higher average frame count.

Counting frames of bees is a good rule of thumb to gauge overall hive strength, but by no means is it a perfect measure. Simply put, it is a rough estimate of hive population. Inspectors must quickly add up the number of frames fully covered front and back by bees, making adjustments for frames that are half-full or ones that have just a few bees. Additionally, the bees tend to not sit perfectly while being counted, making the estimate even more challenging to calculate.

By our math, a full frame should contain 2,300 bees. Resulting in a population of roughly 18,000 bees in an 8-frame colony. Inspectors don’t count individual bees, but sometimes a 3/4 full frame can look like a complete full frame or vice-versa, and the frame count is off by approximately 600 bees.

Verifli calculates hive strength results by **modeling the actual number of bees** capable of generating the thermal signature captured under IR. Using physics to model colony size is one way The Bee Corp seeks to make hive grading a more precise science.

Where Do My Results Take Me

Your hive strength results end up becoming your beekeeper’s report card. Results can be used to decide whether you want to offer a bonus for strong bees, haggle on price if you get weak bees, and decide whether or not you will work with the beekeeper again next season. These are good ways to create an advantage for yourself using your hive grade results. But if you get poor quality bees and you don’t take action to get new hives before bloom, you are not taking full advantage of hive grading.

Using hive strength results to determine price is a good way to protect your bottom line while giving your beekeeper an incentive to deliver their best bees. With this method, you and your beekeeper become better aligned on goals. If your beekeeper has a bad season, your yield may suffer, but you save on pollination. If your beekeeper has a great year, you spend a little extra, but you will recoup the cost with a stronger yield.

AVG. FRAMES	PRICE PER HIVE
5-6	\$170
7-8	\$190
9-10	\$200
11-12	\$210
12+	\$220



Another way to use your hive strength results is by viewing them as a pre-bloom action plan. If you grade hives before the second week of February and you are concerned about the results, your beekeeper can accelerate feeding to build them stronger by the time your trees reach full bloom. This is your best outcome because you still end up with strong bees when it matters and you give your beekeeper a chance to fulfill their end of the partnership.

With Verifli, each hive you grade is tagged with a site name, beekeeper and GPS location. A quick glance at your Hive Map on your **personal Verifli dashboard** will show which sites have weak bees, who owns those hives and where they are situated in the orchard. If your beekeeper has a few pallets of weak bees on the southwest corner of Site X, you can easily direct them to the problematic hives, allotting for time to resolve the issue before bloom occurs.

What Happens When I Receive Weak Hives

There are a few approaches mentioned in the section above that detail what to do when you find weak bees. By the time you find out you have received weak hives, you will only have a short time before bloom, so it's a good idea to outline some backup plans well before your hives arrive. Be sure to consider how each backup plan might affect your relationship with your beekeeper in the coming years.

Simply letting your beekeeper know that you need stronger hives by bloom will result in the **best outcome for both parties.** Your beekeeper can either begin an intensive feeding program or work to swap out weak hives with stronger ones.

You could also look into bringing extra hives in from a different broker or beekeeper at the last minute. This is more likely to harm your relationship with your beekeeper, but hopefully they will understand that the job needs to be completed. You will probably end up dishing out a higher fee per hive if you are renting them at the last second, but you will be glad you paid extra when it comes time to harvest.

Verifli's Hive Map feature allows you to pinpoint the location of weak hives, making it easy to dispatch your beekeeper to the source of the hive strength concerns. If you feel the need to rent additional bees at the last second, you will be able to determine exactly where the extra hives are needed.

WHY LOSE YIELD WHEN IT'S PREVENTATIVE

There are many ways for growers to use hive grading to their advantage when it comes to renting bees for pollination. Give us a call today to learn more about **Verifli infrared hive grading.**



For both beekeepers and growers, Verifli is brought to you by The Bee Corp. Ensure pollination transparency with easier, faster hive grading at: www.thebeecorp.com.
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Call us at **(559) 314-2030** or visit **thebeecorp.com** today.