

*“A young wife cut the ends off of a pot roast before putting the pan in the oven. ‘Why did you do that?’ her husband asked. ‘That’s the way mom always did it,’ she said. Her curiosity piqued, she called her mom and asked her the same question. ‘That’s the way grandma always did it’ was her response. So she called grandma and asked her why the ends of the pot roast should be cut off before cooking. Grandma said, ‘What? Oh, when your mother was a child, I had a small stove and a large pot roast wouldn’t fit.’*

— Unknown

Do you remember way back before you became a beekeeper, before you had thousands of stinging insects who depended on you for housing, sustenance and medical care? Before you ever took a beekeeping class? Did you realize then all the things that you would have to learn to be at least a minimally adequate honey bee caretaker? I suspect that when looking forward into the unknown, few people can anticipate the sheer volume of all of the minute details, what-ifs, if-then-thats, best-if-you-do-this-except-when-such-and-such and so on that a beekeeper has had to stuff away in her or his brain along the way to not being a complete failure. Perhaps that helps explain why beekeeping is, for the most part, a solitary sport: in the bee yard, no one can hear you scream.

As a layman educator who enjoys seeing eyes light up when a bit of shared knowledge tickles someone’s brain, I think that one challenge we face is that we often get answers without explanations. If we are given the answer to a question such as “how long do drones live in the warm months?”, we can memorize it and we’ll know it for as long as our memories hold up. But if we get an explanation, such as, “their wings, like worker wings, only have so many miles of use in them... they die when their wings wear out”, then we can reconstruct the answer even if we forget it.



There are countless ways to feed honey bees, such as this classic Miller-style top feeder. But what should go into the feeder? Photo: Bailey Bee Supply

With that in mind, let’s look at a seemingly simple question that confuses lots of people, whether they are new to beekeeping or have done this for a while. I’m sure it is mentioned many times in every beginner beekeeping class, then mentioned again by mentors everywhere, then gets asked repeatedly throughout the year. It is the follow-up to the question, “Do I need to feed my bees?” (see [“Yum Yum, Eat ‘Em Up!”](#) and [“Seasonal Management”](#) for the answer to that one). Our question-of-the-day is, “Should I be feeding my bees one-to-one sugar-to-water syrup, two-to-one or something else?”

Like most things in beekeeping, the answer is clearly “It depends.” But rather than give a formula based on the calendar, let’s look at why different syrup formulas are used in the first place. What do they accomplish? Note that there are infinite possibilities for syrup concentrations, so we’ll just look at the main two that are popularly discussed. And when we mention proportions, whether we measure by volume or weight isn’t important -- the resulting concentration is in the same ballpark either way, certainly close enough for our purposes.

Maybe it goes without saying but often those things need to be said anyway – we are talking here about plain sucrose from the grocery store mixed with water, not things like high-fructose corn syrup that commercial beekeepers buy by the truckload but most hobbyists don’t have ready access to. This is the granulated stuff that comes in 5-pound bags on

the Baking Goods aisle, with brand names like Domino and Dixie Crystals. The label says “Sugar”.

### Thin syrup (1 part sugar / 1 part water)

One-to-one sugar-to-water has several selling points, including:

1. It is sweet enough to be attractive to honey bees
2. It is similar to the average sugar concentration of many flower nectars that bees feed on
3. It is reasonably easy to mix and have the sugar remain in solution
4. Honey bees dilute honey to about 50% moisture before consuming it, so a 50/50 syrup is “ready to eat”

With regard to its effect on bees, thin syrup is reported to:

1. Stimulate the queen to lay
2. Stimulate workers’ wax glands to produce wax
3. Contribute to excellent carbohydrate nutrition, prevent starvation and facilitate carbohydrate storage for use during dearths

### Thick syrup (2 parts sugar / 1 part water)

Two-to-one sugar concentration is useful because:

1. It is just about the maximum amount of sugar that can be dissolved in water and have it remain in solution. Even if you can somehow coax more sugar to initially dissolve, at concentrations above 2-to-1 the sugar will, sooner or later, crystallize and precipitate out of solution.
2. It is twice as close to being dry enough for storage as thin syrup, saving the bees a lot of work.
3. By feeding twice as much sugar at once, you won’t need to mix up as many batches of syrup or make as many trips to the bee yard to end up with the desired poundage of stored sugar-syrup “funny honey”.

With regard to the bees, perhaps it isn’t quite as stimulative with regard to queen-laying and wax production, but it isn’t bad. It certainly

has the same benefits of contributing to excellent nutrition, preventing starvation and facilitating carbohydrate storage for use during dearths.

### All sugar

As long as we are discussing sugar formulas, we should mention 100% sugar such as is found in candy boards or even dumped loose, straight from the bag, on newspaper using some version of the so-called “mountain camp method”. Essentially this is one part sugar to zero parts water.

The advantages include:

1. It is easy for the beekeeper to store – it doesn’t spoil if not used right away.
2. It is fairly easy to feed to the bees.
3. It provides excellent carbohydrate nutrition and prevents starvation.

From the bees’ standpoint:

1. Solid sugar must be diluted with water before consumption.
2. Solid sugar isn’t stored in cells for later use or arranged in the comb to be convenient with respect to the needs of brood rearing, etc.
3. Sometimes solid sugar is viewed as trash by the bees and thrown out, or it is dropped and falls through screen bottom boards.

The fact that solid sugar isn’t moved around in the hive the same way as honey, nectar or syrup suggests implications for winter feeding. If a colony’s resources are scattered around the hive, a hard freeze in winter can force the bees to cluster over inadequate resources, resulting in starvation even if more stored sugar is available elsewhere in the hive. With deliberate feeding of syrup, the bees can fill in the gaps between scattered pockets of stores. But feeding solid sugar will not yield that same result.

Note too that “mountain camp” feeding, where dry or slightly moist sugar is dumped directly on newspaper on the top bars, makes subsequent inspections extremely difficult. That’s not such an issue in the dead of winter

when in-hive, invasive inspections are minimized but it would be extremely problematic in warm weather.

### So... what do I do now?

With all of that background, maybe we can now entertain the question, “What should I be feeding my bees now?” Different syrup formulas tend to support different objectives, although I’m not convinced that thin versus thick syrup matters as much to the bees as it does to the beekeeper. The adages, “The bees don’t care” and “It all pretty much works” certainly apply with respect to liquid syrup concentrations. However, the difference between solid sugar versus liquid syrup does seem to be significant in many ways, both from the bees’ and the beekeepers’ perspectives.

The key point is, why are you feeding? Is it spring? Look back at the supposed benefits of the three concentrations we’ve discussed... thin syrup seems to be best suited for a time when we want the bee population to build up rapidly and perhaps draw out lots of comb on foundation. Does that describe your goals in spring?

What about during the summer dearth? If you’ve still got comb that needs to be drawn out, then perhaps thin syrup may be more desirable. But if the main goal is to prevent starvation and store food away for the dry days ahead, maybe thick syrup is more efficient for both the bees and the beekeeper.

What about fall, approaching winter? Food storage is goal number one, not only quantity but flexibility with respect to storing food where it will be easily accessible as the location of the nest shifts throughout winter. In other words, we want wall-to-wall stores. Heavy syrup fits the bill. Would light syrup cause issues? No. It may not be quite as efficient with respect to quickly meeting our main goals but it certainly isn’t a problem.

What about the dead of winter? Ideally, we’ve liberally fed our colonies in fall, if they needed it, and they’ve got plenty of stored honey or sugar-syrup “funny honey” to carry them through to spring. But if not, we want

maximum bang for the buck with respect to feeding. Thick syrup is good as long as the temperature gets warm enough for the bees to travel to the feeder. Temperature isn’t often a limiting factor here in the Piedmont, at least not for long periods of time. But syrup must also be cured by the bees if they are going to store it without risk of fermentation, and they cannot effectively do that while in cluster. However cool/cold winter temperatures slow fermentation, so that is a mitigating factor. With all that in consideration, we can feed syrup in winter but don’t plan to do so – instead get your hives fat and winter-ready in fall.

Even so, “things happen”. Winter is the time that solid sugar in the form of candy boards or similar are useful for literally preventing starvation. Putting a candy board on top of a well-prepared hive can provide the beekeeper with a calming sense of anti-starvation insurance. And a colony that is light as a feather in January needs immediate access to abundant food, something that solid sugar, placed directly over the cluster, provides.

### Stay Calm

As discussed in “[A Few More Wintering Tips](#)”, there are seemingly infinite ways to feed our bees, and as we’ve shown here there are plenty of variations to exactly what we feed them. The essential point is that if we need to feed, we must feed. Everything else is more or less immaterial. The bees don’t care. Experiment and see what works best for you, the beekeeper. But as you do that, please consider the bees’ biology and the physics of sugar solutions as well as your own equipment, capabilities and priorities. Smush all of that together and do what makes the most sense for you at your bee yard. That’s what intelligent beekeeping is all about.

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