scraps have to be blended with other materials to support the biological diversity. To support fungal growth you need more carbohydrates, especially the lignins."

His recipe requires food scraps, wood chips, hay, horse bedding -- which is basically wood chips with horse manure and urine, and sawdust. The sawdust comes in mixed with the food scraps. Gilbert delivers sawdust to the food scrap generators to add to the containers for odor control. For every container there are about 4 inches of sawdust, about a 9 to 1 ratio. The sawdust comes from wood working operations around Stannard. He collects 2 to 4 cubic yards of sawdust a week, getting it free but they do have to pick it up. He used to deliver the sawdust free but thinks now he will need to start charging for it. The wood chips he either buys from a sawmill or gets from municipalities. Their crews can unload town dump trucks right at the farm. The hay and horse bedding come from Black Dirt Farms other operations.

photo courtesy Tom Gilbert

The worm bin at Black Dirt Farm is being moved to a new building.

At the end of the daily food scrap route Tom's truck and trailer come home to the farm and back onto a homemade ramp. Then the driver will tip the load into a bin that Gilbert has prepared with layers of active compost, wood chips, and hay. The chickens forage on this for about a month, receiving a succession of four different weekly batches. The stuff further to the back of the bin has been in it the whole four weeks, so it is in a different microbial phase than the stuff most recently dumped, which is all fresh food scraps.

The hens are excluded from the bin until after the dump, when they are turned in to the bin by opening a gate. A second gate swings open to allow the trailer to dump, and a third allows the tractor to enter to remove the material after a month and to prepare for each new load with a bed of compost, wood chips and hay.

You might think the chickens would prefer fresh food scraps to that which is composting. But you would be wrong!

"The hens actually like the active material in the back of the bin," reveals Tom. "They like a diversity in their diet, not just the material but the ages of it, too. They spend a ton of time foraging in locations where you don't see any visible food material. This is mostly microbial and they are not getting maggots. But they are ekeing out whatever is there. An apple is nutritious, but it is mostly water. What we want to do is grow bacteria all over that apple."

The system Gilbert uses now is all a prototype, not his long term system. They are at 170 hens right now, and the idea is to scale it up to about 2000 hens. He is constantly making changes.

"This bin will have a roof in a few days," he promises. "We have enough water coming in with the scraps and wash water. We don't need precipitation in there as well, especially in the winter. The hens don't like to go out when the snow is deep. Up here we are zone 3, so in January and February things pretty much stop. To make this system work the hens have to work hard then for their diets. We can make it easier with a roof on the bin. The roof will be between the housing and the composting bin too, so they basically won't have to go outside.

"This system doesn't really retain the material as long as I would like," he continues, "so they aren't getting the full benefit of that fermentation process. It is so dense that the chickens can only forage the surface of that back material, not turn it over. So eventually we will have four bins side by side and be able to work this stuff during the natural fermentation stage. That will let them forage that a lot more."

Once the food scraps are mixed and fed on by the chickens for a month they are removed and piled to bring them up to the thermophilic seed and pathogen killing temperatures and meet the organic standards. The material is then windrowed so that Tom can sell it as bulk compost or use it himself.

A small amount of the compost, however, once it cools is routed to the worm bins. These are large metal containers to which new batches of compost are added on the surface. The worms come up through the material, digesting it and leaving castings. Once a week a small motor will pull a blade across the bottom and cut off the bottom half inch of castings. Gilbert feeds an inch each week on the top and cuts off a half inch from the bottom.

Tom feels vermicomposting can disable pathogens in ways that are not yet generally recognized.

"Worms have an amazing ability to reduce the pathogen load," he says, "but that is not recognized by the feds at this point. The slime on a worm, when it comes in contact with E. coli or salmonella or other pathogens, transforms that material by breaking down the pathogen and reinoculating it with beneficial organisms. The worm's gut works the same way. If you put a worm in a petri dish without any food but inoculate it with salmonella, pretty soon there won't be any salmonella left. But from a regulatory point of view you can't be sure that worm has touched every pathogen in the bin so you can't say the material is pathogen-free."

Because health regulators don't recognize the value of this ability Gilbert still has to meet a composting time/temperature requirement just like a chef. He has to get the pile to 131° F for sixteen days straight. One regulator that they have to comply with is NOFA –VT itself, which certifies the whole farm except for the eggs, whose feed can't be certified. Even the worm castings are certified for use on organic farms.

Tom produces about 25 yards of worm castings a year. As one of his operation's 'Girl Scout Cookies' which makes a reliable income, he plans to expand production of the castings. But he doesn't make tea from them because it has a shelf life. Bottled compost tea has aerobic organisms in it that need air to live. Water is a reasonable delivery method, he feels, but the microbes won't survive in water longer than about 3 days.

He is very proud of the worm compost he makes.

"Our homemade mix with the castings," he says, "when compared it to the commercial ones, typically give at least three days faster germination. It encourages cell division, cell elongation and root elongation. In terms of organic nutrients, generally castings have a high nitrogen content and a lot of soluble nitrogen. So that is a good thing for organic growers. That is a hard thing to achieve organically.

"But probably the hormones and enzymes in the castings," he continues, "are the most intriguing part of them. The Plant Growth Promoting Hormones are very relevant from a container media point of view. I think eventually we will be able to grow out specific organisms that prevent specific plant diseases, rather than just use the buckshot approach we have now. Trichoderma is a fungus that kills Rhizoctonia, for instance. It grows on hardwood bark, so we could grow it. But we don't yet know at what concentrations you need that in your compost."

One of the nice things about worms is that you can use them to make compost without fossil fuels for turning equipment. If you go to Mexico or Ecuador or Cuba, where people don't have easy access to power and equipment, it is a good strategy to use worms.

"In Central and South America," Gilbert adds, "where vermiculture is a pretty big thing, and you typically have more human labor than you do capital for equipment, they don't turn and cause the material to heat up and kill seeds. The labor used to weed because of those seeds is not as much of a significant cost there as here."

Right now Tom is trying to get to a point where he uses the compost he makes to grow produce and sell it, plus eggs, back to the same groups he picks up food scraps from, but he's not there yet.

"We are putting the greenhouse up now," he explains. "That will help in the short term until we stabilize everything. We'll just focus on cucumbers and tomatoes right away. But our goal is to build out a whole gang of greenhouses. If we could serve the April-May market with tomatoes we'd be thrilled. We don't really want to be coming into a flooded market in July."

The greenhouse he is building will be heated with heat from the composting process, and topped off with wood heat on colder nights.

"Like grain going into your hens," he says, "which is 70% of the cost, for greenhouse production it is heat which is the limiting factor. The idea with the greenhouse is that on the north end we will build a compost bin with a recessed floor and air channels in the floor. We will be able to pull air through the pile with a fan and draw it through a bin of wood chips. The wood chips will scrub out the ammonia from the compost but not absorb the carbon dioxide. Then ducts will deliver the carbon dioxide and warm air to the plants. Right now the plan is to build a small hoophouse within the north end of the greenhouse.

"When I was at High Fields," he continues, "we were trying to work out the details of engineering how big the bins have to be to heat how much of a greenhouse. There are so many variables, but we should be able to handle 25 to 30 yards of food waste there."

Gilbert's years of experience handling food waste have given him a well developed consciousness of the amount of this material which is available.

What a wealth of community resources we are all sitting on," he sighs. "What an irony that we send most of that carbon into the atmosphere to make the idea of life on earth more difficult! We're sitting on enough food scraps in Vermont – a small community of 640,000 people – that if we were to capture it instead of throwing it in the landfill we could grow about 20,000 acres of mixed vegetables organically. That would feed about 450,000 residents. So the contribution of this material to the food sovereignty of any community is pretty significant!"

Before he went to college, Tom says, he thought he'd go into wilderness education. But he'd always been involved in social activism, too. When he went to Evergreen he realized that farming is one of many doors that lead to social change.