During the winter, I get a few calls from fellow farmers asking me what I think about a particular piece of equipment. The farmers call me due to my reputed ownership of lots of toys/equipment. Our farm is a combination of the talents that Jody and I bring to it, and the natural resources it has to offer. Equipment is a means in getting the full potential out of the land and us, in order for the farm to become a successful enterprise. Sometimes our gut tells us if a piece of equipment will benefit our farm or not. Other times we need more guidance. In considering all the factors that determine if a significant piece of equipment is appropriate for our farm or not, we ask ourselves a number of questions. This article is an attempt to let you in on the process on how we get there.

**Can nature do anything that you want your equipment to do?**

Farming is about transforming nature into food. Sometimes we cooperate with nature and other times we manipulate her to our advantage. Early in my farming career, I learned an important lesson from an older farmer. He said if I wanted to grow old farming, I needed to learn to stop lifting anything. He advised that it is easier to go down and that we should try to avoid bringing anything up.

Working with or against nature comes up with almost every decision we make:

- Irrigation is just one option to deal with drought, raising sweet potatoes or alfalfa, instead of spinach or grass is a lot less expensive than pumping water.

- When the soil suffers from deep compaction, it can be shattered with a sub-soiler or you can opt to seed it down with a crop of Sweet Clover. Sweet clover roots can break through a hard-pan unlike any other plant.

- Instead of cutting grass, the animals can graze it off. Grass, yields higher when mowed, but cutting it on a daily basis requires large equipment and is very costly.

- Within the new organic regulations, vegetable growers are required to create aerobic compost. Instead of purchasing a turner, we can chose to get a few pigs and bury some corn in the manure. The pigs will do an excellent job of getting the aeration process started. After this, the turning becomes a piece of cake, and can be handled with much smaller equipment.

- We have seen a dramatic decrease in weed populations by increasing our land base, allowing for better rotations, bare fallow periods and long periods of cover cropping. We already have the equipment needed for weed control but we use it less frequently, reducing the number of trips we make going back and forth over our crops, and therefore reducing compaction as well.

- Incorporation of large amounts of organic matter often demands the use of larger tractors and tillers developed to do a good job. A spader does an excellent job in mixing a cover crop into the topsoil. Many small vegetable growers stay away from letting cover crops mature, due to their inability to incorporate them. By making a change in your farming system, you might see that you do not need expensive tools to incorporate the organic material. One farmer allows his crop of rye and vetch to mature, and leaves it on the surface for a full summer and winter. In the spring, the rye and vetch have partly broken down through decomposition, and only a light tool is needed for incorporation. The advantage is that the organic matter feeds the microorganism where they are most active. The disadvantage is that there is no time for a bare-fallow period, which increases the weed problems, unless it is done in the same year as the cash crop.
At times, we decide to use equipment instead of what nature has to offer us. When we make that decision, our dependence will shift from relying on nature to using technology. Dairy farmers in Holland, short of land, feel that mowing allows them to stay at the scale they need to be. For vegetable & flower growers, early crops always pay a premium, but it involves laying plastic, creating raised beds, applying row-covers etc. When it became clear that lifting at our operation was hard to avoid, we first built a loading dock, and later purchased a forklift to defy gravity.

**What is your personal goal with this farm?**

We all have a dream of what we want our farm to be like. Creating a crystal-clear picture in our mind will help us in deciding if a particular piece of equipment fits our life style. Operating equipment can mean that you spend hours, each day in isolation with a machine that can be noisy, spew smoke, etc. There is not much socializing going on when you plow a field. A spader is a tool that replaces a great number of people doing the same job by hand. Some people love the isolation and others feel cut off from their experience in being with nature and people. Others want nothing to do with petroleum-powered technology. For these folks there is the opportunity to develop bio-diesels tractors and equipment, fired and lubricated with natural oil compounds. Some farmers have reservations about owning any powered equipment at all. They will chose human and or horse powered equipment.

When you are not quite sure you want to go down the road of owning any equipment, consider asking neighbors to perform certain tasks on a custom basis. They might be surprised to find that it is more profitable to perform custom work than raising crops.

At Roxbury Farm, our goal is to raise vegetables with the lowest possible financial input without compromising soil health, the worker’s standard of living, and the quality of the produce. Jody and I raise 30 acres of vegetables and 40 acres of soil improvement crops, with the help of 4 apprentices and 2 seasonal workers. That is close to four acres of vegetables or nine acres of land per worker. We do not like to work more that 45 – 50 hours a week during the peak season or 40 hours during the other months. As a result, we have replaced a lot of manual tasks with a mechanized version. Has our farm become more profitable because of it? I do not think so, but we have attained our goal in reducing our hours on the farm, and created a work environment that does not strain our bodies.

**Do you enjoy fixing and maintaining equipment?**

Before you buy, research the different makes & models. Call farmers who use the equipment to find out the pros & cons of its operation. Make sure there are dealers in your area that stock or order replacement parts for your particular equipment. When something breaks down and you have to wait weeks for the parts, you can end up losing a lot of income.

If you are unfamiliar with a new piece of equipment, have a farmer or a dealer come to your farm & teach you how to use it. Even new equipment will break down very quickly unless someone takes the time to make sure everything is in working order and knows how to operate it.

At our farm, each apprentice maintains one tractor, and is responsible for the upkeep of other specific pieces of equipment. The only way a machine stays in good working condition is because we maintain it and replace worn parts. Before you take the equipment out to the field, look it over, check the fluids, the belts, the bearings etc. When you operate it, listen for any noise that sounds unfamiliar. Operating equipment can be fun. Fixing and maintaining it means getting your hands full of grease, and busting your knuckles on hard steel. Some people have so much fun doing it; they love hunting for bargains at auctions so they have something to fix.

**Is the new piece of equipment part of the total system of the farm?**
Deciding what the ideal system for your farm is something you must make before you spend a nickel. Purchasing any equipment narrows your options for future purchases. For a dairy farm, this might be the choice between making haylage or hay bales (and then square or round bales). It is important to be realistic about the scale you will be operating at and allow for improvement. Every time you increase the scale of your operation, you will experience growing pains, unless you allowed for improvements. Questions you might ask when you want to increase your production:

- Do you have the ability to move more produce through your washing and packing facility?
- Do you have enough space in your cooler, delivery truck, etc?
- How many more people do you need to employ, and do you have the management skills to handle the larger crew?
- Do you have a good system for your farm administration since this will become more complex and stricter requirements for taxes and insurance will start applying to larger operations?

Buying the right tractor depends a lot on what you want to pull, or carry with it. Four wheel drive tractors can pull 30 to 50% more per HP than two wheel tractors. Your equipment dealer will be able to tell you how much power, and or weight, you need to pull a certain piece of equipment with, which can varies with soil types. Many farmers fill their tires with CaCl, to gain weight and increase their pulling power.

Once you decide on the right size tractors, you determine what wheel spacing you will operate your farm under. The ideal row and wheel spacing is one that suits your particular crops. Check if the harvesting and cultivating tools of your choice are made to fit your system (i.e. can they be set up to cultivate & harvest your bed width & the row spacing of all your crops and fit on your tractors). At Roxbury farm, we have a raised bed system. All tractors have a wheel spacing of 72 inches, allowing for a bed top of 54 inches.

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This bed allows:

- One row of squash, tomatoes, melons, etc with 72 inches between each row.
- Two rows of potatoes, corn, cauliflower, celery, fennel, etc with 36 inches between the rows.
- Three rows of beets, onions, carrots, broccoli, cabbage, kale, etc with 18 inches between each row.
- Five rows of spinach, salad mix, culinary herbs, arugula, radishes etc with 9 inches between each row.

The beauty of this system is that you can plant and weed many different crops all within one cropping system, saving you time and money. We never take away a seeder, we just don’t fill one of the hoppers, neither do we change the cultivating tools for each row setting; we just add a beet knife for each row that did not get seeded or planted.

Another successful row system is where the cultivating tractors have a wheel spacing of 40 inches with the larger tractors set at 62 inches. The 42-inch wheel spacing allows for one row with 40 inches between the rows; two rows with 18 inches between rows; and three rows with 9 inches between rows.

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Tillage equipment is a reflection of your soil fertility plan. If it involves mature cover crops and bare fallow, it needs to include equipment that can incorporate organic matter and others that harrow the soil to eliminate weeds. At Roxbury Farm, we use a chisel or a spading plow depending on the total plant mass on the surface. A chisel plow can get clogged up when there is too much plant matter on the surface. In both cases, we flail-mow the cover crop first to reduce any long stems. After incorporation, we use a Perfecta II harrow to reduce weed pressure.
Farmers that are mostly dependant on granular fertilizers need a tool that creates a seed bed that only works the top four inches of the soil.

**When do you buy equipment?**

Try to discover what the weakest link on your farm is. The chain breaks at the weakest link. Out of this you create a list of priorities of equipment to purchase. At our farm we are very dependent on a good plant establishment from transplants. For years we set our plants out with a water-wheel planter. As we grew in size, this method developed problems: it was time consuming, the planter was not ergonomically well designed for long periods of work, and plants would not get into the fields when we had only small windows of opportunity. Our field production suffered, so the process of transplanting became our weakest link. Reducing the number of transplants was in our case not an option. We bought a high-speed carousel planter that allowed us to increase the efficiency of transplanting by 300%

Buy a piece of equipment before you really need it. If you are desperate for something, most likely you will end up paying too much for it or buying something that does not quite do the job.

**How much value does the equipment generate?**

Some of you might have heard about the rule that you have to put at least 500 hours a year on a tractor to justify ownership. How about setting the rule for each tractor to pay for itself by increased production, never mind how many hours it takes. When you figure the cost of equipment you figure the total cost divided over its life. From this perspective a $20,000 tractor gets divided by the number of years it will operate on your farm. The larger the engine the higher the number of hours you can put on it without having to overhaul the engine. Every make has its own life expectancy, given that you do not work it harder than the manufacturer's specs. If you work equipment too hard, you end up spending more money on repairs and actual depreciation, than acquiring something that fits your scale, or is just a hair bigger than what you need.

How you decide when it is time to replace the hand hoe with a cultivating tractor is another issue. One factor might be that you lost money and crops during your last season because you did not have the labor available to weed your crops. Another reason might be that your available labor is more valuable harvesting your crops than weeding them. In any case, each acre of vegetables can require up to 200 hours of hand labor to keep clean. A cultivating tractor will be able to weed 80 to 100% of that in a matter of hours or minutes depending on the crop and the cultivating tool.

A more difficult example is the choice between direct seeding and transplanting crops. Buying transplanters can be very costly, and raising plants is time consuming in the greenhouse. From a clinical cost-analysis perspective, planting can only be justified when we receive higher prices due to earlier crops and the reduced cost of labor in weeding and thinning. But other deciding factors are the real life situations you deal with like the quality of your land and the unpredictable weather factors. The more uniform your soil, the higher the rate of success with direct seeding of vegetable and flower crops. When your land is okay, but not the best, and you add the loss of crops due to bad weather conditions, the cost of transplanting pays for itself, and more, when we spread the cost of fertilizer, irrigation, land taxes, etc. over a guaranteed plant establishment.

**How do you pay for the equipment?**

If possible, reserve loan money for land and buildings. Making payments on a piece of machinery might influence your business decisions. Before you realize it, the equipment ends up dictating what you grow, instead of having the freedom to respond to changing markets and opportunities. Once you buy the larger tractor and equipment with a loan, you can’t back out of your decision to
increase your scale. Are you ready to employ more workers to handle the increased production? Can your washing facility handle the increased production? If you are free from debt, you have the ability to modify your farm systems as needed.

If your intention is to invest, equipment is a terrible choice to make. Its value is in its use. The moment you take it off the lot, its value has decreased. An exception is some of the much older tractors. My first tractor was a Farmall Super C. I bought it in 1989 for $1,500 complete with a set of cultivators. Five years and a new hydraulic pump later, I sold it for $1,800. It had worked hard for me during the five years I had it. Due to its age quite some time was spent to keep it running, which was one reason I sold it, but I regret it ever since. The tractor would have been able to semi-retire, which would have reduced the maintenance bill. These days a fully equipped Super C can cost up to $3,000. Having held on to it, I would have had the use of it, and made a better return than most people have had during the last three years investing in the stock market.

The IRS allows you to itemize $25,000 worth of equipment through filing schedule 179. If at the end of the year you want to reduce your taxable income you can decide to make an equipment purchase which can be qualified as a farm expense. The other advantage is that dealers often offer large discounts at the end of the year. For example, if you happen to have $20,000 in your bank account, and you do not need it for living expenses, just letting it sit there will make you bring at least 30% of it to the IRS. Figure in to that an additional 10% discount from the dealer and you have saved $8,000 (30% + 10% x $20,000) on this purchase.

Is the equipment in good working order?

Check the bearings, belts, shields, bolts, etc. When buying a tractor, get a decompression test done at your local tractor dealer, and have them check it. Even better, buy a tractor from them. Sometimes jumping on a “good deal” can cost a lot of money. I once bought 4000 feet of six-inch pipe for $5.00 per twenty-foot length. The pipe was in great shape but old, and not part of a big brand, so it took a year to find a supplier that understood which gasket was needed for this particular pipe. During that year, a lot of time was wasted, trying to make the pipe work with the faulty gaskets it had come with.

Another mistake can be assuming something is a minor repair. When I bought a Case 5140, a 100 hp high clearance tractor, it was checked all through, and a leak in the wheel bearing and some other minor things were discovered, which the dealer fixed. The local Farm Credit loan officer looked up its book value, and I negotiated a price $4,000 below that. When I picked up the tractor, I noticed that the emergency brake was still not working properly and asked about it. He explained that he took care of all the other things and complained he was already losing money on this deal (I’ve heard that one before). He said there was nothing he could do at this point. I let it go, not fully understanding why he made such a fuss. I should have called my local Case dealer to ask how much it would cost to fix it. When I finally inquired, I learned that they had to break the tractor apart to get to it. The cost of the part was minor compared to the labor it took to replace it. If I had bought this tractor at a local dealer, this would never have happened. Unfortunately, high clearance tractors are a rarity in our part of the country, so the repair cost was acceptable due to the value of the tractor.

Conclusion?

In the end one might ask, “How did I end up with all of this equipment?” Answering this question is not unlike answering a more basic question, “Why do we love to farm?” Some of us love to grow vegetables; others love to work with animals, some like both. Working with equipment is a personal choice and a reflection of who you are. So the answer is not just about “how” but if all that equipment is still a true reflection of whom we are.