

# Using a Chicken Tractor to “Uppen” Your Soil

by Andy Lee

In one of its many manifestations, permaculture it is about taking back responsibility for feeding and sheltering ourselves, and for our own individual welfare and physical and mental well being. We can be of service to others only if we first learn how to care for ourselves. If we can use the precepts of permaculture to help us learn to feed, house and employ ourselves, then we can provide for our families with far less strain on the community and our environment. Then we can begin providing a service to others in our community by growing food for them or by showing them how to grow their own. We can also teach them how to build their own shelter and even how to create their own at-home cottage industry or micro-enterprise employment.

Opening permaculture to a wider audience often requires a hook—an attention grabber—that will nab their imagination and reel them in for a closer look. Lots of people get hooked on permaculture because of some small permaculture trick or technique they’ve learned or heard about. It was fish traps that caught and held Lea Harrison’s attention long enough to let the bigger picture develop and seep into her awareness. Other folks I’ve talked to gravitate toward swales, water harvesting, gabions, herb spirals and so forth. All of these things hold a fascination for me, too, but the one that stands out clearly in my mind as the brightest example of a successful tool for developing permaculture systems is the chicken tractor.

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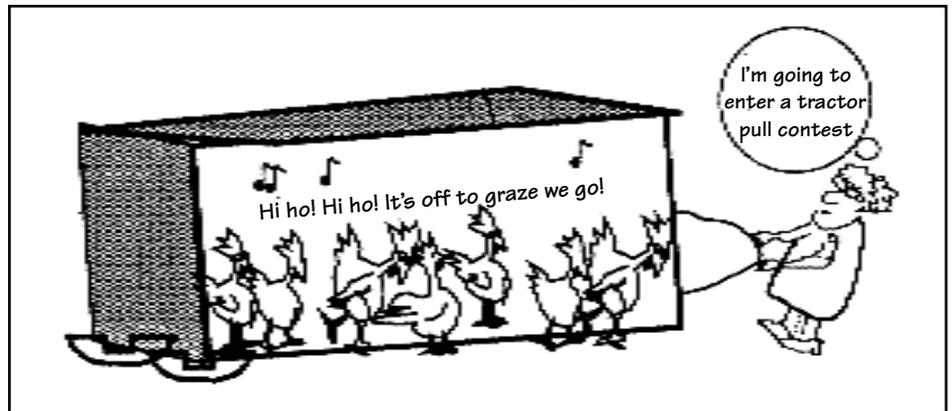
A “chicken tractor” is some form of portable pen you use to keep chickens in or near your garden where they are most beneficial. The portable pen serves to protect them from weather and predators, while containing them in the area you want to improve. In exchange for your care and feeding, they are more than happy to provide weed and pest control and fertility for your lawn, garden or orchard. Even without the final product of meat or eggs, the chickens have paid for their keep.

I first heard the term in 1991 from Jerome Osentowski who reported that he was using a “chicken tractor” to control weeds around his greenhouse in the central Rocky Mountains in Colorado. It is, of course, a term used frequently by Australian Bill Mollison in his writings and teachings about permaculture. Right away, I began to imagine all the possibilities inherent in the very idea of tractoring land with chickens.

The chicken-tractoring concept has little to do with tractors, really, but more to do with being “in traction” or being pulled in the direction of soil health and food self-sufficiency. Chicken tractor is a multi-use, multi-

optimal yields—you will want to supplement their forage with grains or mixed poultry rations. You can grow poultry feed in your garden or buy it at your local feed store.

Chickens are amazing feed-converters. During good weather, they are able to change two pounds of feed into one pound of live-weight. Even during the worst weather—cold winters and hot, hot summers—they will require less than four pounds of feed to grow one pound live-weight or to produce a dozen eggs. What chickens are not good at, however, is extracting the available nutrients from their feed. In fact, they excrete about 75% of the nitrogen, 80% of the phosphorous and



(illustration from Andy Lee’s *Chicken Tractor: The Gardener’s Guide to Happy Hens and Healthy Soil*; see book review, page 22).

benefit project that is do-able at almost any level of skill and knowledge. You can build a simple pen today and start using it tomorrow. Perhaps you have just one or two hens to provide a limited supply of eggs for your table. Or, on a larger scale, you might be raising poultry for sale to earn part of your living. Either way, and at many levels in between, you can utilize chicken tractors. Even if you don’t eat eggs or poultry, you can still enjoy the benefits of the system by growing pullets (young egg layers) for sale to your friends who do eat eggs and poultry.

All across the continent—especially in dryland areas—chicken tractors can be amazingly useful in helping to create soil. Poultry digestive systems serve as translators, turning grains, weeds and insects into manure that can be used in lots of different ways to fertilize soil for growing crops for people and for livestock. It is possible to grow poultry simply by letting them free range on your property, living off what they can scrounge from the land. However, to maintain a healthy, well cared for flock—and to achieve

85% of the potassium along with about 40% of the organic matter that is in their feed.

In conventional systems of course this nutrient rich by-product becomes a waste, often toxic and difficult and expensive to dispose of. In permaculture though, the excrement is highly valued, so much so that we build appropriately scaled catchment facilities to preserve it. In a sense you are importing fertility in the form of chicken feed, which unfortunately is usually grown somewhere else. However, as your land becomes more fertile and your own food needs are being met from your gardens, you can then turn your attention to growing chicken feed in the soil that is enriched with chicken manure—sort of a perpetual motion scheme if you will. Unlike chemical forms of fertility, you are achieving broader yields via eggs and meat as well as manure for your soil.

While free ranging chickens might appear to be the ultimate in “natural” food production, you will encounter certain problems that make portable pens seem more attractive. For one thing, predators such as foxes,

coyotes, possums, raccoons and dogs are all “free-rangers” too. It’s hard to protect a loose flock from depredations. Additionally, it is difficult to keep a loose flock from devastating your garden, and it’s all but impossible to train them to drop their manure right where you need it.

It is understandable, then, why a portable pen can be so important to the health and welfare of your flock and to optimizing yields from your permaculture system. The portable pen “chicken tractor” serves first of all to house and shelter your chickens. The covered lid and sides protect them from rain and snowfall, from intense sunlight, and from attacks from airborne predators such as eagles, hawks and owls. The screened sides of the pen allow ample sunshine to warm them, and ventilation to carry off heat and moisture. The screened sides also protect the poultry from earth-bound predators such as dogs, foxes and possums.

The chicken tractor does not have a bottom, so the poultry can walk on soil and forage grass, weeds and bugs that come in their path. As manager of this system, your task is to provide them with fresh water and supplemental grain on a daily or twice-daily schedule. You also provide the motive power to advance the pen from one position to another to accomplish your land-development goals, be they grass, weed and pest control, soil fertility, or enhanced graze for the poultry. In exchange for your kindness, the birds are only too happy to graze the grass, manure the garden and give you plenty of rich, flavorful eggs or meat to eat.

My favorite use for the chicken tractor is to build raised garden beds. In my hilly, upper Piedmont region, the soil is quite thin, often gravely with very little grass for the birds to eat. I must rely—at least in the beginning—on imported feed and waste hay or straw to build soil above the gravel. I simply move the chicken tractor where I want to create a garden bed and leave it there for whatever length of time it takes to lay down enough manure to fertilize the spot for garden crops.



Uh, oh. Too much poop is yukky! (Illustration from Chicken Tractor by Andy Lee)

As you know, putting down too much chicken manure can be devastating to the soil. In some cases, leaving the chickens in one place too long will create a hardpan on the surface and overload the soil with nitrogen and other nutrients to a point of toxicity. This is the kind of mess you will find in the typical hen-house yard. We overcome the nutrient-overload challenge by adding straw or hay bedding on a daily basis. As soon as the chickens have laid down a good dose of manure, we add a thin layer of carbonaceous bedding, just enough to cover the manure. Doing this daily creates a perfectly layered shallow compost pile.

The hay we use for bedding is usually free. It is either too old and dusty for livestock feed, or has gotten wet in the field making it unsuitable for feed. It has a carbon-to-nitrogen ration of about 60:1, compared to the chicken manure that has a carbon-to-nitrogen ratio of less than 10:1. When we mix the two components together we achieve a nearly perfect carbon to nitrogen ratio of 30:1, ideal for creating compost. Additionally, the hay or straw acts as a sponge, literally, to soak up and hold rainfall or surface runoff.

This “sponge factor” makes the raised bed method especially rewarding on slopes that are otherwise susceptible to erosion, and in drylands areas with low precipitation. It holds the surface water on the site long enough for it to percolate downward to replenish the ground water.

An added benefit on slopes is that the chickens will automatically scratch and shuffle through the bedding inside their pen, leveling and moving it against the downhill wall. When we remove the pen, we have a raised bed mini-terrace. As these raised beds mature and decompose, we are left with mini-dams that control our run-off. These new mini-terraces are places in which we can grow abundant crops, all without laborious digging, or turning of the soil, or earthworks to build up lower terrace edges.

Earthworms are delighted to hang out beneath the raised beds at the interface between the soil and the organic matter. As they consume bits of hay and manure, they carry it with them into their burrows for digestion. This opens air pockets in the soil that also serve as water reservoirs during rains. The earthworms leave their castings at the surface where they quickly become new nourishment for plants. In this system then, the

earthworms, the chickens and the humans are working cooperatively to build soil fertility and a water reservoir.

The accepted “conventional” way to build new soil today is to rotary till or plow the topsoil and subsoil, mixing it to create a deeper topsoil. That doesn’t work. We cannot “deepen” soil with mechanical manipulation. All we accomplish in that pursuit is to destroy soil tilth and structure; the soil then tends to blow away and wash away. We also

kill off the soil life that has—up until now—turned organic matter into humus, enriching the soil and feeding the crops that grow there.

Instead, use a chicken tractor to help you “uppen” your soil. A cranky old fencepost in a Montana wheat field first told me about

“uppening” many years ago. At the field edge, I had to step up to reach the fenceline. Seeking to understand this phenomenon I sat down over there and asked the fencepost why that was. “Why is the field lower than the fence row?” I asked. “Well” grouched old mister fencepost, “You folks plow this soil so much that it gets real fine and blows away. And the rains just wash a lot of it away. After 50 years of that kind of treatment, all the fine topsoil is gone, the field surface is several inches below the fencerow, and what you see mostly in the field is gravelly and sandy sub-soil. And I don’t mind telling you I’m sick of the whole damn mess!”

“And, that’s only half the story,” the old fencepost went on to say. “At the same time you humans are so busy lowering the field, other natural forces are at work raising the fencerow. What you ought to do is look here in my fencerow and see a better way. Don’t plow the ground. Instead, let the birds and animals and insects feast on the plants. They will thank you by leaving their manure as payment in kind. When the plants die back for the winter, the ground-dwelling insects and worms eat the organic matter and convert it to humus. That humus in turn provides nutrition for next years’ plants and builds up the organic matter in the soil, thereby further developing your soil moisture reservoir. In this way, soil uppens.”

So, here’s how we can use chicken tractors to help uppen soil. Just move the portable pens along in a rotational pattern that will give your chickens fresh graze each day. Or, if you don’t have anything for them to graze, just use the system as a sheet mulcher. Either way, they leave behind their manure

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and bedding that will, in turn, feed the soil organisms that can convert the roughage to humus.

That, really, is the major precept of successful chicken tractoring. All that remains is to explore the many different ways to make it work.

Table 1 summarizes the seven variations on the central theme. Probably the most successful scheme is the simple garden rotation. Design your garden with half in vegetable beds and half in chicken tractors, then rotate them each year. For example, this year, the chickens (along with the humans and the soil organisms) will prepare garden beds for next season. Next year, we put the chickens where the garden beds used to be and let them glean and consume weeds, grasses and bugs. The garden will be clean and well fertilized for the following year's garden crops.

We've always referred to these pens as chicken tractors, but with proper design modifications you can make tractors for turkeys, pheasants, sheep, pigs, goats and even dairy or beef cattle. With some restrictions it could even be useful for corralling recalcitrant children. The guiding design precept is that you want to end up with a pen that is:

- large enough for the livestock,
- small enough to move by yourself or with limited mechanical help, and
- fitting for the landscape conditions at your site.

This is high-density, short-duration, rotational grazing is somewhat akin to Holistic Management and Management Intensive Grazing. You can make it as simple or as complex as you need to attain your goals—from a very small pen that you move a few times a month, up to miles of portable electric fencing.

Design your pen size based on the physical strength and production interests of the operator, and the hoped-for outcome of the chicken-tractor project. For someone who is relatively small, a chicken tractor that is 8' x 4' x 2' high is a good choice. This small pen is easy to slide on the ground using ski tips or "scoots," or make it even more portable with a set of wheels from a junked lawn-

**Table 1: Chicken Tractor Systems**

<b>System</b>	<b>Characteristics</b>	<b>Comments</b>
1. Rotational Garden	Uses bottomless shelter-pen that you move daily in the garden.	Need room to move pens around the garden.
2. Deep Mulch	Stationary bottomless shelter-pen. Add fresh bedding daily.	Creates a raised garden bed.
3. Sheet Mulch	Bottomless cage that stays on garden beds longer than one day, but shorter than life of chickens.	Puts a sheet-mulch on top of beds.
4. Intensive Grazing in Paddocks	Fixed or movable hen house for rotating grazing in paddocks. Egg mobiles are a good example.	Must clean hen house regularly, but still gets most of the manure on garden. Good for layers.
5. Polyface	Mixes species (e.g., chickens follow cattle in field). Good application for egg mobiles.	Great parasite control.
6. Hens on wheels	The hen house is mounted on wheels for easy mobility around the garden.	More costly to build; harder to keep clean and maintained.
7. Greenhouse	Creates ecosystem; balances oxygen from plants and carbon dioxide from chickens.	Can protect chickens through winter season.

mower. If you have a helper and a furniture dolly, it's no problem to move pens as large as 10' x 12' x 3' high. That is the largest, suitably portable pen I've ever built. The smaller pens are ideal for six or eight layers, or up to 20 broilers for a short time. We use the larger pens for growing out turkeys.

Pen design relies on using the fewest possible materials, lightweight yet strong, and

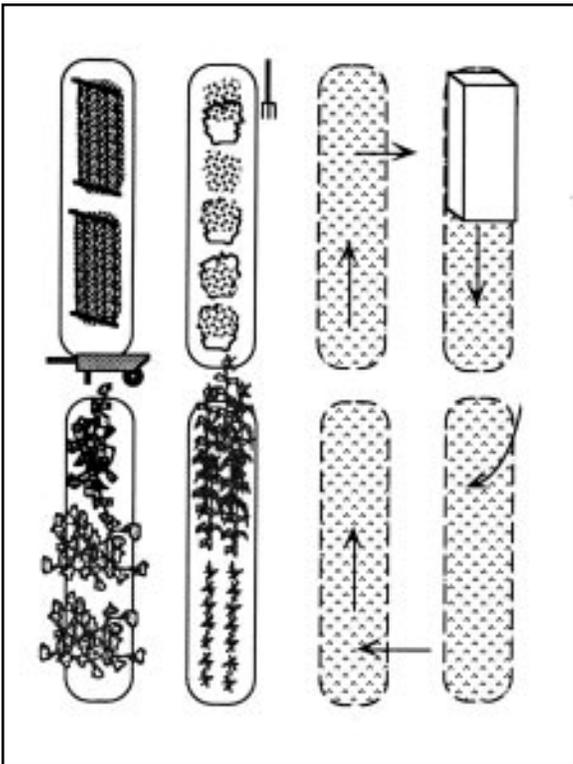
able to withstand weather and varmints. Generally, we wrap our pen walls with one-inch galvanized poultry netting. For longevity, you can use the more expensive poultry netting that has a plastic coating to resist weathering. We hinge our pen tops as a lid for access to the birds and their furniture. When we first started out, we used blue polyethylene tarps installed over chicken wire for the lid of the pen, but the tarp fades, rips and leaks after the first year. Now we use plastic roofing panels that cost a little more but last indefinitely. They are also easier to install, since we don't have to put chicken wire on the roof, and the panels help to stabilize the structure.

In rougher weather, we can also install plastic roofing panels to the ends and sides of the pen to shield the birds from wind and rain. Where I live in the foothills of the Blue Ridge Mountains, it is possible to keep chickens year round in this type of pen. But in

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In this growing season, the chicken tractor will rotate many times through half the garden (illustration from *Chicken Tractor*).

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colder climates, you'll want to insulate the pens for winter use. One time, we tried putting Styrofoam panels for insulation, but the chickens pecked it to pieces. Another time, we used the radiant barrier material that builders use for reflecting sun heat in attics and it worked just fine. Another thing that works well for insulation and weather protection is to simply stack old hay bales around the windward side of the pen. Then in the Spring, just use the hay bales for garden mulch.

It was after we used the old hay bales to protect our pheasants in their pen that we came up with the idea of winter housing our hens in a hay-bale house. This hay-bale house is simple and straightforward. We stacked three bales to a side to form a square, and pegged the bales to the ground and to each other with wooden rods for stability. We stacked the bales four courses high to give a wall height that allows us go in to collect eggs and fill waterer and feeder. On one side, we left an opening for a simple chicken-wire covered door. The flat roof is a simple square made with 2x4 boards that are 12 feet

long. The rafters are two-feet on center. We then covered the frame with plastic roofing panels and set it on the hay-bale structure. The roof is broader than the hay-bale square, which helps keep rain from falling directly on the bales. The ground is sloped just enough so the flat roof sheds water very nicely. To build a "pitched" roof is more expensive and time consuming and not necessary according to our experience.

To hold the roof in place, we set a steel post at each corner and wired the roof to it. The weight of the roof is supported by the hay bales, though, and they tend to slump as they decay. Our hay-bale house is now eight months old in a climate where we get 65 inches of rain per year, and it's still doing fine. In a couple of months as gardening season nears, we'll tear the house down and use the hay for garden mulch. Next fall we'll use the same roof and build a new winter shelter for our hens.

We'll make our next hay-bale henhouse a little more stable by laying landscape ties on the ground under the bales to keep them from decomposing and settling so fast. And we'll set 2x4 posts at each corner, set the roof directly on the posts, and fasten it against the wind. This way, the heavy roof won't be pressing down on the bales and causing premature settling.

In our current hay-bale hen house, we have five Buff Orpington, five Buff Brahmin bantams, five bronze turkeys and two guineas. We call them the Tur-Gu-Chi gang. We shut them up at night to protect them from coyotes and dogs, and let them roam around

the yard in the day. They are more fun to watch than TV, and so far they've kept ticks, fleas and snakes away from our little homestead. We've added two of our 6' x 12' chicken tractors as portable runs next to the house so they have lots of room to hang out.

We presently have five chicken tractors measuring 6' x 12' and 3' high. This past year, we raised 50 turkeys for sale to our friends, 25 pheasants to release on our farm, 30 broilers for our freezer, and 10 pullets for our friend David—as well as the aforementioned Tur-Gu-Chi gang. We didn't lose any poultry from the chicken tractors. From the hay-bale hen house, though, we lost three pullets to a possum, one pullet to David's dog Beau, and one pullet to a hawk. To prevent more losses, we installed an electric poultry-net fence around the structure and charged it with a solar charger.

There are a whole lot of new techniques and methods emerging in chicken-tractor parlance. So this Spring, we're bringing out the second addition of our book *Chicken Tractor, The Gardener's Guide To Happy Hens and Healthy Soil*. We're adding four new chapters, more of the wacky cartoons, and a dozen or so good photographs. If you have an experience or anecdote you'd like to share, please send it along, we'll be delighted to mention you in the book. We're all tinkers, and the ultimate "living machine" has yet to be designed, so feel free to share your ideas and questions.

Until then, Happy Hen Tracks!

*Andy Lee and his wife Patricia Foreman are slowly developing their 47-acre permaculture farm and cluster community in the foothills of the Blue Ridge Mountains near Columbus, North Carolina. Andy is the author of two books, Backyard Market Gardening (\$23.50 ppd.) and Chicken Tractor (\$19.50 ppd.). These are available from Good Earth Publications, RR2 Box 1875, Columbus NC 28722 (704/863-2288).*



Joel Salatin's "pasturized poultry" tractors in Swoope, Virginia are moved each day.