

A Profitable, Sustainable Ranch

Walt Davis, Davis Ranch, Bennington, Oklahoma

We now expect to be profitable every year, and the condition of our land has steadily improved.

Davis Ranch is a commercial ranching operation located in southeastern Oklahoma. Founded in 1950, it was operated until the mid-1970's as a high-tech cattle and pecan production unit. Management decisions were made based upon the recommendations of the land grant college system and were aimed at maximum production. A system of production evolved using the "best" practices of soil fertilization, pasture production, animal breeding, animal health, supplemental feeding and pecan production. Pecan production was a constant fight with some new pest exploding as soon as we finished spraying for the last pest. Beef production was very high with large numbers of cattle carried with high individual performance. The inputs required to achieve this level of production were also extremely high and the operation was profitable only when beef prices were at the high point of the cattle cycle. The cattle market crash of 1974 served as a wake-up call to emphasize just how out-of-balance cost of production was, relative to realistic potential returns.

We realized that if we were to remain in business, cost of production had to come down. The obvious place to start was where expenses were highest. The farming operation, intended to provide year-round quality grazing for the cattle, was phased out, greatly reducing machinery, fuel, and labor costs. Nitrogen fertilizer was replaced with forage legumes, which also had the effect of reducing weed pressure. Supplemental-feed costs were reduced by adjusting calving season and thus nutritional demand to more closely fit the season of best forage production. Animal health and nutrition were improved by closer attention to providing forage at the proper stage of growth and "on a clean plate" through good grazing management. The need for toxic pest control materials dropped and general

animal health improved dramatically after a program of planned high-stock-density grazing was established. Part of this was due to better hygiene and to leaving the pest organisms behind as the stock moved.

The major benefits came when life in all of its diverse forms returned as the effects of years of poisoning and tillage began to be healed. Pests such as horn flies and internal parasites, which spend part of their life cycle in dung, were greatly reduced when exploding populations of dung beetles quickly buried the dung. All of the predator species from spiders to sand wasps to carnivorous nematodes returned to control their prey species and the populations of pest species from horse flies to heel flies to pecan case bearers dropped and stabilized.

What began as a cost-cutting program became a fascinating learning process that continues to this day. The program has been successful by all standards. Profitability has increased dramatically, labor requirements are reduced, and most important, the health of our soils, our animals, and ourselves continues to improve.

Changes Made in Program

I. Get our production schedules in harmony with the natural cycles; to work with nature instead of against her. This led us to make such changes as:

1. Moving our calving season from fall and winter to late spring-- to calve when pasture conditions are best and reduce the need for supplemental feed. Since late calving meant light calves, we started to carry our calves through the winter and market them as heavy feeders the next summer.
2. Changing our wheat pasture-based stocker program to one based on maintenance-only gains through the winter and cheap gains during spring and summer.

II. Lengthen the quality grazing season by replacing monoculture pastures with mixtures of grasses and legumes both warm and cool season. At one time we had over 1000 acres of hybrid Bermuda that we fertilized annually with 100-150 pounds of actual N per acre. This gave us a tremendous amount of pasture from about May 15 to July 15 and 10 months of junk. We needed to flatten and lengthen our pasture production curve. Cows eat every day and the cheapest way to provide that daily feed is with pasture.

III. Replace nitrogen fertilizer with forage legumes and a functioning nutrient cycle.

This gave us a pasture sward that is cheaper, higher quality, and longer lasting. When high levels of extraneous nitrogen are stopped, soil life increases and the natural processes that supply nitrogen to a healthy soil-plant complex again become active. High biological activity in the soil is the foundation of soil productivity. We know that an area is coming around when we see earthworms in quantity. These are the elephants of soil life and good indicators of a healthy soil. At times some of our pastures will have a layer of earthworm castings three-quarters of an inch thick on the surface.

IV. Improve the production of our pastures and our cattle through good grazing management.

To do this we must understand the relationships between forage plants and grazing animals and manage our grazing so that both plants and animals benefit. The stage of growth when grazing least damages forage plants is also the stage when these plants are most valuable to the animals. We need to be able to tightly control the physiological age of the forage that is presented to our animals at all times and to do this in a manner that is not stressful to the animals. In humid areas like Bryan County we would like to have 24-30 paddocks available for each cow herd and 30-40 paddocks for each stocker herd. We started out thinking that 12-16 paddocks per herd were enough but find that results are much better with more subdivisions.

V. Use as little toxic material as possible and instead manage around the need for these materials.

Herbicides, insecticides, wormers, fungicides, and antibiotics all have effects beyond the ones we expect from them. These materials are the tools of crisis management and seldom needed if we manage to avoid the crises. Good grazing management can greatly reduce both internal and external parasites. Moving stock regularly to clean pasture, keeping pasture height above the level of most infection by stomach worms and providing clean water are practices that reduce parasite problems. Beneficial insects can be a tremendous help if they are allowed to flourish. Dung beetles bury or desiccate the majority of the manure from our cattle within 48 hours from June through October. Sand wasps reduce horse fly and face fly populations to low levels by early June. We still have horn flies but not as many as when we were spraying every 21-28 days and we don't have a "horn fly problem" very often. We no longer routinely worm our grown cattle after years of worming everything twice a year. We check for worm load with fecal samples and have not found a need to worm for several years.

VI. Improve our stockmanship in order to reduce stress on our animals.

This may be the most overlooked of our management tools. Stress causes poor animal performance, sickness, and even death and most of the time can be reduced or prevented with changes in management. We now wean our calves with only a hot wire between them and their mothers. The trauma of weaning is mostly because both cow and calf are terrified and unable to locate each other in the bawling turmoil that usually takes place around a weaning lot. If both cow and calf can see and more important smell each other just across the fence, the weaning process is much easier for both. We usually wean now with no sickness and no weight loss on the calves. We look on our job as being able to make our stock as comfortable as possible at all times.

What began as a cost-cutting program became a fascinating learning process that continues to this day.

Results of Changes in Program

1. Production per acre of pasture, measured as animal unit days per year, has increased 50 to 150 percent while the cost to produce this pasture has been greatly reduced.
2. Production per mother cow has gone down due to weaning at younger ages, but the cost to maintain a mother cow has gone down so that profit has increased.
3. The season of quality grazing has lengthened on both ends so that the need for supplemental feed has decreased. We no longer plan to feed additional protein to the cow herds. The stability of our pastures is much higher, and we are less affected by bad weather. Production holds up longer into dry spells and recovers quicker when conditions improve.
4. Production both per head and per acre has gone up for our stocker cattle while costs have gone down dramatically.
5. We now expect to be profitable every year and the condition of our land has steadily improved.
6. Maybe most important, ranching is a whole lot more fun than when we were "doing it right."

Permanent Cover: A New Generation Cropping System

Steve Groff

Cedar Meadow Farm, Holtwood, Pennsylvania, www.cedarmeadowfarm.com

SOIL IS
MEANT TO
BE COVERED!

I started no-tilling in the early '80's on about fifteen corn acres because we had some erosion problems. I didn't like having to fill in gullies before harvesting corn; I felt that wasn't right. In 1991 I began using a rye cover crop as another soil conservation measure. In 1994 we started no-tilling tomatoes and in 3 years, all of our 175 acres of fifteen different crops were no-tilled. This "Permanent Cover Cropping System" is done successfully by using cover crops, intensive crop rotation, and maintaining a permanent mulch cover. No-till is not the "magic bullet." It is an equal partner with cover crops and rotation. It is a "system" and has to be managed as a system. I use this system for 3 reasons:

- **Increase profits**
- **Enhance soil quality**
- **Reduce pesticides.**

Increase profits

The economics of this system are positive. Total savings when no-till transplanting tomatoes amounts to \$675 per acre. Nearly \$500 of the cost reduction is from material, labor, and time savings when eliminating the use of plastic mulch. Bear in mind that plastic mulch would still be needed for early-season tomatoes, but I'm experimenting with the use of row covers to get the earlier plantings off to a good start. A saving in tillage is \$50/A and \$125/A for pesticides (average of the last 4 years). Increased costs are \$50/A for establishment and seed of a cover crop, and \$10/A for controlling the cover crop.

It's hard to put a dollar value on the other benefits cover crops give, such as erosion control, better soil quality, and increased organic matter, but it has to be factored in at

least indirectly. On my farm I've been able to grow my own cover crop seed and use a rolling stalk chopper to control the covers. This allows me to further reduce expenses. Our yields have increased the last several years and this adds to the profit.

Enhance Soil Quality

Soil erosion is the most detrimental aspect of agriculture. We can't turn our backs on soil erosion and call ourselves sustainable! No-till has some very attractive attributes especially when combined with cover crops. SOIL IS MEANT TO BE COVERED! Soil erosion on Cedar Meadow farm has been cut from 14 tons per acre per year to almost nothing. With the ground covered by plant residues and not loosened by vigorous tillage, the soil stays rather than getting washed away during heavy rainfall. We are growing vegetables in a way that is comparable to a well-managed pasture system!

The combination of cover crops and no-tilling does more than cut erosion -- it improves soil tilth, increases organic matter levels, enhances water infiltration and lessens pest problems. Organic matter has gone from 2.7% to 4.3% in the last 11 years. Soil aggregate stability in fields tilled recently (less than 10 years) is 16% and fields that have not been tilled for over 10 years is 67%. Soil microbial biomass has tripled. These results are proof to me that this system is working. Yields have increased 10% over the last several years.

Reduced Pesticides

Total pesticide use on tomatoes has dropped from \$200/A to \$75/A. This is mainly due to fewer fungicides for early blight and insecticides for Colorado Potato Beetle. Consistent with what Dr. Aref Abdul-Baki (USDA Researcher) and Dr. Ron Morse have found, as well as others who have tried no-till tomatoes, the onset of early blight has been delayed. Penn State has a weather station

(FAST system) near Cedar Meadow Farm that forecasts favorable early blight susceptibility. The last three years I was able to wait 3-7 weeks to spray after the FAST system recommended a protective fungicide. We've experienced 4 years of extremely different weather conditions -- wet, dry, and near normal. In every year, early blight has been delayed with this system. I've also noticed healthier plants even to the end of the season. I've planted a cumulative total of 100 acres of no-till tomatoes the past 5 years and have yet to spray for Colorado Potato Beetles. Rarely do I use any insecticides on tomatoes. A good thick mulch helps control weeds as well and has really cut down on my herbicide bill. It's very important to have a consistent cover crop to make this work. Herbicide use for corn and beans has dropped from \$25/A to \$18/A. Total pesticide usage on the whole farm has decreased 50%. Beneficial insects have increased.

How the System Works

The foundation of this system is the establishment of a cover crop in the fall. I've gone mainly to a rye/vetch mix (25 lbs. vetch and 30 lbs. rye). After the average first fall frost date, I can no longer plant vetch because it might not overwinter. Two bushels of rye are used. I also plant spring oats in the fall that will winter-kill and provide a nice dead mulch to plant early crops into in the spring. I have successfully no-tilled vegetables into corn and soybean residue with excellent results, however more herbicides, fungicides and fertilizers are needed to control weeds and diseases. I credit rye/vetch giving #50 lbs. of N and straight vetch #75 lbs. of N. Vetch seed is expensive so I grow my own with rye. I now have seed to sell.

I wanted to control covers mechanically and in a way that flattens them near the soil to help their decomposition. I ended up buying a 10-foot Buffalo Rolling Stalk Chopper in 1996. It's designed to flatten and chop cornstalks, on

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a scale between a flail mower and a disk. The machine has two rows of rollers, four in front and four in back, with eight 23-inch blades per roller. The turning rollers crimp up the cover and push it right down. It can be run at eight to ten miles per hour, so it's fast and economical. I added parallel linkage so each roller floats independently.

The versatile machine has been used on 500 acres in four years. I roll the covers with it, and get good control of hairy vetch and rye if it has flowered. Vetch that hasn't bloomed yet will give some regrowth and needs a low rate of post-emergent spray. Then after the pumpkin harvest, I use the machine to chop and disperse the remaining pumpkins.

A customized Holland transplanter is used for no-till transplanting of vegetables into killed cover crops. Dr. Ron Morse, Virginia Tech., developed the No-Till Sub-Surface Tiller Transplanter. The transplanter has a spring-loaded 20-inch, straight-bladed coulter, followed by a subsurface tiller that gently opens a slot to place the transplant in. The package leaves virtually no soil showing after the crop is planted, giving good full coverage mulch for the whole season. Work is being done on making a new planter to further improve the performance.

Fertilizer management evolves, as you become more committed to the use of no-till, cover crops and the overall concept of sustainable ag. Any synthetic N I use is mainly ammonium sulfate. I need the sulfur it supplies, as well as its low volatility. I side dress and have gone back to broadcasting dry rather than dribbling liquid N. I tend to credit my higher organic matter soils for giving me 25 lbs. of N or so from release of additional N. Manure is all surface applied and is spread as fine as possible. I have the manure tested and use that as a guide to determine additional fertilizer needs. I do some foliar feeding as well.

Soil compaction is to be avoided at all costs! However, once you've no-tilled for

several years the soil becomes noticeably less susceptible to compaction. Cover crops are key to this in building soil structure. I'm real fussy about when lime and manure trucks can get on my fields. If you ever need to alleviate compaction, do so with as little surface disturbance as possible. I like the DMI no-till shanks with the berm tuckers to go through my field driveways after harvest.

Controlling perennial weeds can be a challenge in no-till, but I have found that with intensive crop rotation and occasional spot spraying, weeds can be managed effectively. Perennial weeds are not a problem on our farm.

In wet years, you might notice more slugs, but they haven't chewed our fresh-market tomatoes unless the crop is in contact with the soil. Aphid pressure has remained the same.

I have had success no-tilling pumpkins, sweet corn and peppers, as well as fall broccoli. Pumpkins, in particular, are a lot cleaner, because the soil doesn't splash up on them when it rains. The University of Maryland is doing all its pumpkin research using the no-till method. Eggplant, melons, and even snap beans can be no-tilled.

Some organic farmers are no-tilling tomatoes and pumpkins. In 1997 I left one acre of pumpkins unsprayed with herbicides and had excellent results. The cover crop of hairy vetch kept weeds from growing. Then in 1998 I did the same test and got unsatisfactory weed control. The problem was that the cover crop was not thick enough. This past year was another good showing for using no herbicides in pumpkins. I think no-tilling can be done organically on a small scale with a good cover crop and for later planted vegetables.

Field Day

We have held an annual field day at Cedar Meadow Farm since 1994. In 1999, 350 people attended to view the "Permanent Cover Cropping System" as well as see various agri-businesses and equipment dealers

demonstrate their machinery. This year promises to be even better as a soil pit, wagon tours, and soil health research results from Cedar Meadow Farm will be discussed on July 26th, 2000. Penn State University, NRCS, and University of Maryland are testing the soils and observing the changes that are taking place with this system.

Video and Web Site

We have produced a video titled, *No-Till Vegetables: A Sustainable Way to Increase Profits, Save Soil, and Reduce Pesticides*. It covers the basics of sustainable no-till vegetable production. Cost is \$21.95 plus \$3.00 S/H. To order call: (717) 284-5152, e-mail:

sgroff@epix.net, or web site: www.cedarmeadowfarm.com. Credit cards accepted.

These examples of the use of cover crops, crop rotation, and long-term no-till are what sustainable agriculture is all about. Don't try and adopt exactly what I have done. You need to adapt these principles to your operation in accordance with the resources, equipment, and experience you've attained. Start small. Learn as you go. Network with researchers, extension agents, and other growers who have been successful. Go to field days or research tours. At the very least, think of one idea you can implement on your farm to make it more environmentally friendly, yet still maintain profitability.

Less Tillage is Best

Max Carter, Douglas, Georgia

I started farming on my own in the 1950's on the 400-acre home place in Coffee County, near Douglas, Georgia. Coffee County is in the Southern Coastal Plain area of southeast Georgia. Timber was grown on the steepest 200 acres and row crops were produced with conventional tillage on the remaining acreage. At first I thought the main problems on the farm were dead batteries, bank overdraft, flat tires, etc. I then realized that my farm had a serious soil erosion problem. None of my farm is classified as being highly erodible (HEL) and there were no gullies on my farm, but I knew there was a big problem when I was able to step over 48-inch woven wire fences while bird hunting. One-half of the fence was covered with sediment, my valuable topsoil.

After growing tired of seeing my valuable topsoil wash and blow away, I decided to try no-till in 1974. Although we did not have the planting and weed control technology of

today, we were persistent in trying many different planting and herbicide methods. We purchased used equipment and gradually developed the right choices of coulters, subsoiler shanks, press wheels, etc., that will work well with large amounts of crop residue.

All of my crops are now grown with no-till. I now produce corn, cotton, peanuts, soybeans, and other crops all no-tilled and double-cropped with small grain cover crops, which are planted with a no-till drill. Soil erosion has been eliminated on my farm. My crop yields either meet or exceed those I was making with conventional tillage. Also, many unexpected advantages have occurred on the farm. Due to 25 years of no-till, residue management, cover crops, and double cropping, my soil has changed. We have increased the amount of soil organic matter, something that many say cannot happen in our sandy-textured soils. The increased soil

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organic matter has increased the amount of water infiltration and has basically eliminated runoff. The increased amount of soil water greatly benefits our crops. Also, the presence of crop residue throughout the year reduced the evaporation of the soil moisture. I sold my irrigation equipment many years ago.

We now have high populations of beneficial insects on the farm. The crop residue provides habitat for many beneficial organisms, including ladybugs, pirate bugs, big-eyed bugs, and fire ants. The beneficial insect populations reduces the need for insecticide applications.

Many of my neighbors complain that they don't have wildlife on their farms anymore. In fact, the state of Georgia is losing about three percent of its quail population each year. The reason for this loss is the lack of habitat. Many wildlife species are abundant on my farm, especially bobwhite quail. We have found that crop residue provides excellent nesting and growth habitat for bobwhite quail.

Time savings is also a great benefit of no-till farming. While my neighbors are busy plowing their fields in the winter and early spring, I am watching my cover crops grow, fishing, and playing golf. This also gives me adequate time to get my planting and spraying equipment ready for spring.

The key to no-till on my farm is crop residue management. You must start preparing for the next crop during the harvest of the current crop. If the crop residue is spread properly, the following crop can be planted without difficulty with a no-till row planter or a no-till drill.

All of this adds up to economics, the bottom line. If I can reduce costs, maintain or increase crop yields, and protect the soil, water, air, and wildlife, I will be better off.

Good topsoil is your best asset. Crop residue and cover crops mean improved topsoil, more organic matter, clean water, and less soil erosion from rain and wind. Keep your land covered with crop residue and cover crops.