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# Research shines light on farming, its effect on the environment

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Zach Long  
Texas Tech's research farm west of New Deal has nearly 100 cattle that are used to graze a variety of forage that is used for sustainability studies.

By Alyssa Dizon

A collaboration of research efforts spanning more than a decade takes a closer look at how West Texas producers farm and how farming affects the environment.

The shared goal of finding methods that would keep agriculture profitable for producers and preserve natural resources linked Texas Tech with the Texas A&M AgriLife Research and Extension, farmers, the High Plains Underground Water

Conservation District No. 1 and the

USDA, among other agencies.

In 1997, the group organized a sustainability research project in the South Plains because of the area's thriving agriculture industry and declining water resources, said Vivien Gore Allen of the Texas Tech Department of Plant and Soil Science.

The Texas Coalition for Sustainable Integrated Systems (TeCSIS) research project compares the traditional cotton-only - or monoculture - farming system with one that combines cotton, grain crops, grass seed and livestock production.

Since the region is so "cotton-concentrated," there was little integration of the cotton and livestock agriculture systems, said Philip Brown, senior research associate in forage/livestock systems at Texas Tech.

"With cotton in a monoculture situation, you've got more risks involved," he said. "We were just looking at some possibilities ... to diversify the risk from a monoculture cotton but also find ways to reduce the water being used from the Ogallala (Aquifer)."

### Project Breakdown

The group of researchers established TeCSIS with a \$222,125 grant in 1997 from the USDA's Sustainable Agriculture Research and Education (SARE) program.

The project began on about 35 acres at the Texas Tech Research Farm in New Deal and expanded to more than 100 acres through two additional USDA-SARE grants.

Including investments from Texas Tech, industry, state and community, TeCSIS

received more than \$1.8 million for equipment and supplies. From those grants, three phases were established to determine the profitability, productivity and environmental impact of various agriculture systems.

Phase I consisted of cotton monoculture and an integrated cotton/forage/livestock system.

Phase II, in its sixth year, compares cotton monoculture with a dryland integrated cotton/forage/livestock system and an all-forage system for stocker steers.

Phase III started this year and added an integrated crop/forage-finished beef cattle system and a forage sorghum monoculture to the project. Both systems use sub-surface drip irrigation and dryland components.

"It's a very complex, very focused project to understand how these systems work," Allen said. "From that understanding, we are then able to design systems that are more sustainable, have a far less negative impact on the environment and use less resources but remain profitable."

She said other parts of the world where water is scarce could learn from the research obtained from TeCSIS and start similar projects.

While each agency in TeCSIS focuses on a different subject, the long-term research has benefits for everyone involved. TeCSIS may even be the largest research project of its kind in the country, she said, because it connects producers, policymakers, scientists and the USDA, and allows for a constant exchange of information.

#### Plant and Soil Science

Making the change from a monoculture system to an integrated crop/livestock system will be difficult for those accustomed to monoculture farming, Allen said, but the long-term research appears to favor diversification.

After 10 years, researchers found the integrated crop/livestock system used less water and nitrogen fertilizer than cotton monoculture, improved soil health and brought in added income.

Although diversification equates to more work for the producer, Schur said it leads to more income in the long run. Should the crop have low yields or the weather ruin the cotton crop, there will still be other means to earn money.

This year on the research farm, Brown said, 99 black Angus cattle were added to feed on a variety of native and perennial grasses for Phase III.

In the coming years, he will study the effects of the grass types and a mostly forage diet on the cattle's weight and nutrition.

He and research farm manager Paul Green will also experiment with new technologies and monitor irrigation, fertilizer and energy usage to find more efficient, economical farming methods.

#### Texas Alliance for Water Conservation

The results of TeCSIS and funding legislation sponsored by Sen. Robert Duncan, R-Lubbock, led to the Texas Water Development Board's \$6.2 million grant in 2005, which established the Texas Alliance for Water Conservation.

TAWC, a project separate from TeCSIS, has a nine-member producer board that directs the 20 producers and 27 diverse producer-managed sites, which covers about 4,000 acres in Floyd and Hale counties.

Rick Kellison, project director, said TAWC is in the sixth year of the eight-year project and, like the project in New Deal, TAWC intends to make producers aware of the need for conservation.

While market prices and weather have significant roles in the final result, Kellison said, producers know how to factor in each variable, especially when it comes to using natural resources and developing realistic yields. However, in recent years, he said, producers have been heavily scrutinized for their farming practices.

"We have so many generations removed from agriculture that they don't have a clue of

how intense it is, how modern it is and how technical producers have become," he said.

Scientists monitor the 27 sites for water usage, amount of soil moisture, productivity and economic yields, and producers keep a detailed record of how they farm. A database holds all the information and provides access to all producers involved.

The data collected from the sites is compiled into annual reports, which are shared in industry presentations and researchers, including Allen.

Allen said the combination of results from the research farm and producer sites allows for added learning and communication between the two projects.

#### Agriculture Communications

Another Texas Tech department assists those involved in both TeCSIS and TAWC while doing some research of its own.

David Doerfert, associate professor in the Department of Agricultural Education and Communications, leads a team of faculty and graduate students that produces and delivers materials about those projects to the public.

Since the start of TeCSIS, Doerfert said his team put the research into various media such as pamphlets, videos, websites, workshops and field days.

TAWC's biennial field days have garnered the most success, he said, because of the face-to-face interaction between the producers involved and the public. That direct communication allows for interested individuals to see exactly what conservation and farming strategies are being used on the producer-managed sites and how they affect crops.

With so much data available on the Internet, Doerfert said, it is difficult for farmers to harvest the good, honest information.

"They want trustworthy information quickly and efficiently," he said. "We want to provide that one-stop or one of the stops that can save the farmer time."

He intends to expand his outreach efforts with more videos and face-to-face communication so more people in the region and beyond may learn how to conserve their water.

#### Producers

The purpose of the research is to uncover what effects these various systems have on the land and producers' wallets, but that does not mean producers must drastically alter their methods.

"We don't have a magic bullet. We're not saying this specific thing will save you," Brown said. "The systems we're looking at are an integration of pieces - what works in one spot may not work in another spot."

Instead, producers may try new methods or make small changes to their existing systems.

Glen Schur, a Plainview producer who has been in TAWC since the beginning, joined the project to find ways to conserve the lifeblood of the land for future generations.

"We're all going to have to start using better irrigation management practices, be better irrigation schedulers and do a better job on educating farmers on how to conserve water as much as possible," he said.

His 120 irrigated acres are dedicated to a rotation of wheat, cotton, sorghum and hay, as well as an integration of a forage/livestock system. Over the years, Schur has conserved water by doing little to no soil tillage and using the latest irrigation technology. So far, he said he has seen an improved net return from his efforts.

#### Future Goals

Eventually, Allen said, she wants the research farm to become a permanent, federally funded, long-term agro-ecosystem site as part of a nationwide network of agro-ecosystem sites. With this string of sites, sustainability research could be conducted in every ecosystem to see how agriculture differs across the country.

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There is a need for long-term research and the continuation of TeCSIS, she said, to evaluate how components relate to each other and collect more quality sustainability information.

The ongoing research could also address issues such as climate change, rural community development and bioterrorism, Allen said.

"Sustainability is not a point; it's a target you keep moving toward," she said. "If we don't protect our resources, we won't have a future."

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Integrated crop/forage/livestock research (1998 to 2008)  
 The system:

- Decreased irrigation water use by about 25 percent.
- Reduced nitrogen fertilizer by 40 percent.
- Increased organic carbon in the soil.
- Reduced soil erosion.
- Lowered chemical use.
- Improved soil microbial activities and kept soil-borne disease potential low.
- Surpassed cotton monoculture in profitability at yields typically seen in the High Plains.

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#### I don't know, from a

By [justcurious](#) | 06/19/10 - 05:13

I don't know, from a windshield farmer's perception , this seems like an awful lot of work.



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#### I Hate the Word Sustainability.....

By [Oldnetter](#) | 06/19/10 - 07:18

I hate the word sustainability when describing the operation of a farm. It seems to describe the economics of a farm of just getting by. Making enough to keep the banker happy thus heading off foreclosure. What's wrong with the word "profitability."



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#### Misperception

By [jeffross](#) | 06/19/10 - 08:07

I think the difference is that with just "profitability" one looks at the short term profit without taking into account long term loss. Use water and fertilizers now, without caring that our grandchildren will not have water to farm



with or that the fertilizers harm the environment.

Sustainability would, possibly, allow our grandchildren, and their grandchildren to farm.

With 50 years worth of water as the current goal, sustainability will become the mantra, or farming in this area will cease. We can do it, or, like oil dependence, or the national debt, we can act like it's not our problem, and pass it on to future generations, or we can gird our loins and start dealing with it ourselves.

I think it will be more work. Fifty years ago, farming was hard. Twenty years ago, with technology, farming was/is "easy". Fifty years from now, farming may be hard again.

Does that mean that there won't be farmers?

"I'd take the awe of understanding over the awe of ignorance any day." Douglas Adams

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### It would seem I agree with

By [vitasacri](#) | 06/19/10 - 11:45

It would seem I agree with jeffross on this issue. The problem though is that the few of us who wish to help the environment and sustain our resources for future use get the short end of the stick. The "big" farmers who use all the water and chemicals they want get the government help that we don't qualify for. Go figure! The endless taunts and low opinions of those who shouldn't matter, were it not for the fact that they own the farms those of us need to lease, spread the ignorance of their uneducated and closed minds to the whole of the community, thereby making it almost impossible to farm in a way as to ensure continuity of farming as a way of life in our area.

While studies such as this can be of great benefit, it doesn't do any good as long as the government continues to aid those who degrade the land and her resources. "Because it's how it's always been done" has to stop being the reason why farmers continue to do things. Once we get over that hurdle, then we can start tackling the issue of unqualified 'city folk' opinions setting a standard in farming politics and economy.

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### I See

By [Oldnetter](#) | 06/19/10 - 09:28

I see neither of you farm. Farmers don't farm for the moment. It is apparent farmers are more sophisticated than you realize. Most take pride in being stewards of the land with plans of handing productive, profitable land to future generations...most likely family members. It requires a profit for one to maintain the proper stewardship of the land.

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## Oldnetter

By [jeffross](#) | 06/19/10 - 10:36



So, there's not a way to sustain and profit? How often does the profit depend on government subsidies? Can you make the water last more than the 50 year goal currently being set?

There's more than one way to farm. Are the farmers in the area farming the best way for the area?

Aren't some of the folks in this program farmers who want to figure out the best way to farm?

I know farming has come a long way, but is this as good as it gets? If we keep doing it the way it is being done, will there be any farming for your grandchildren or their children?

Just a quick question. How many farms are now owned by the grandchildren of the people who farmed them, and how many are owned by corporations and leased to the grandchildren of the people who used to own and farm them?

Just some questions from someone who has farmed, but doesn't any more.

"I'd take the awe of understanding over the awe of ignorance any day." Douglas Adams

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