



Ready for Challenges

In this issue of ATTRAnews, we look at ways farmers and ranchers can strengthen their operations and prepare for the unexpected.

Change—A Way of Life

By NCAT Program Specialist Rex Dufour

This year brings many challenges and opportunities for farmers and ranchers. Marketing, soil management, energy use, access to government commodity and conservation programs, and even the changing climate all present opportunities for positive change. And change we must. There are more and more of us using a larger share of this planet's limited resources. We can't continue on this path of unthinking consumption without expecting some nasty ecological—and economic—surprises. Economic health cannot be separated from a healthy ecology for very long.

Because the intensity and speed of many of the coming changes will be difficult to predict, the best thing farmers and ranchers can do is look at their own operations for weak ecological and economic links. It's time to find the problem areas of your operation—single buyer? depleted soils? high energy costs?—and strengthen them.

Diversify and Consider Local Markets

If you market through only one venue, be it a farmers' market, a contract buyer, or a large "grocer to the world," think about diversifying or adding value to your crops. See ATTRA's



Cover crops and conservation tillage help create soil that grows healthy crops and holds moisture in drought conditions. Photo courtesy of NRCS.

Adding Value to Farm Products: An Overview as well as *Keys to Success in Value-Added Agriculture* for more information.

People are demanding more local food, and there may be some interesting opportunities in the coming year. Consider selling some of your crops closer to home. See ATTRA's *New Markets for Your Crops* to learn more about how to market to local schools and institutions.

Be Kind to Your Soil

Over-reliance on fossil-fueled fertility has blinded some farmers to the fact that healthy soils need organic matter to function well. What would happen if farmers went one year without applying any fertilizer? In a lot of places, there wouldn't be a crop. But the soil didn't start out in such a degraded state. It has been mined of its nutrients and organic matter, and it's time to start putting them back.

Many farmers could (and should) treat their soil to a cover crop, some compost, a green manure, or maybe a bit more diversified rotation—along with some conservation tillage. These investments in your soil will yield much better results than the stock market has been providing, though that's not saying much these days. It's time to visit your local USDA service center. Find it in the phone book under U.S. Government. Ask the folks at the Natural Resources Conservation Service (NRCS) how they can help you better conserve your on-farm soil and water resources. See ATTRA's *Sustainable Soil Management* for tips about excellent soil stewardship.



Container plants at a farmers' market. See page 4 for information about sustainable small-scale nurseries. Photo by Jim Lukens.

Inside:

 www.attra.ncat.org

<i>Ag and Climate Change</i>	Page 2
<i>Reducing Climate Change</i>	Page 2

<i>Climate Change Resources</i>	Page 3
<i>New and Updated Publications</i>	Page 3

<i>Small-Scale Nursery Production</i>	Page 4
<i>Producing Plants in Containers</i>	Page 4

Agriculture, Climate Change and Carbon Sequestration

This article is adapted from ATTRA's new 16-page publication, which was written by NCAT specialists Jeff Schahczenski and Holly Hill. The new guide offers information about the developing market for carbon sequestration services from farmers.

The Earth's average surface temperature increased 1.3 degrees Fahrenheit over the past century, and is projected by the Intergovernmental Panel on Climate Change to increase by an additional 3.2 to 7.2 degrees F over the 21st century.

These seemingly slight changes in temperature could have profound implications for farmers and ranchers. According to the U.S. Environmental Protection Agency, an increase in average temperature can have the following effects:

- lengthen the growing season in regions with relatively cool spring and fall seasons
- adversely affect crops in regions where summer heat already limits production
- increase soil evaporation rates
- increase the chances of severe droughts

Innovative farming practices such as conservation tillage, organic production, improved cropping systems, land restoration, land use change, and irrigation and water management are ways that farmers can address climate change. Good management practices have multiple benefits that may also enhance profits, improve farm energy efficiency, and boost air and soil quality.

The Science of Climate Change

Natural shifts in global temperatures have occurred throughout human history. The 20th century, however, saw a rapid rise in global temperatures. Scientists attribute the temperature increase to a rise in carbon dioxide and other greenhouse gases released through deforestation, agriculture and other industrial processes, and the burning of fossil fuels. Scientists refer to this phenomenon as the enhanced greenhouse effect.

The naturally occurring greenhouse effect traps the heat of the sun before it can be released back into space. This allows the Earth's surface to remain warm and habitable. Increased levels of greenhouse gases enhance the naturally occurring greenhouse effect by trapping even more of the sun's heat, resulting

in a global warming effect.

The primary greenhouse gases associated with agriculture are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Although carbon dioxide is the most prevalent greenhouse gas in the atmosphere, nitrous oxide and methane have longer durations in the atmosphere and absorb more long-wave radiation. Therefore, small quantities of methane and nitrous oxide can have significant effects on climate change.



Research is showing that organic production systems are some of the most climate-friendly systems of food production.

How Does Agriculture Influence Climate Change?

Agriculture's contribution to greenhouse gas emissions

Agricultural activities serve as both sources and sinks for greenhouse gases. Agricultural sinks of greenhouse gases are reservoirs of carbon that have been removed from the atmosphere through the process of biological carbon sequestration.

The primary sources of greenhouse gases in agriculture are waste management, the production of nitrogen-based fertilizers, and the combustion of fossil fuels such as coal, gasoline, diesel fuel, and natural gas. Methane emissions result from the fermentation that takes place in the digestive systems of ruminant animals.

Carbon dioxide is removed from the atmosphere and converted to organic carbon through the process of photosynthesis. As organic carbon decomposes, it is converted back to carbon dioxide through the process of respiration. Conservation tillage, organic production, cover cropping, and crop rotations can drastically increase the amount of carbon stored in soils.

Carbon sequestration

Carbon sequestration in agriculture refers to the capacity of agricultural lands and forests to remove carbon dioxide from the atmosphere. Carbon dioxide is absorbed by trees, plants and crops through photosynthesis and stored as carbon in tree trunks, branches, foliage, roots, and soils.

Forests and stable grasslands are referred to as carbon sinks because they can store large amounts of carbon in their vegetation and root systems for long periods of time. Soils are the largest terrestrial sink for carbon on the planet. The ability of agricultural lands to store or sequester carbon depends on several factors, including climate, soil type, type of plant, and management practices.

Farmers may be able to slow or even reverse the loss of carbon from their fields if they will minimize soil disturbance and encourage carbon sequestration (see box). In the United States, forest and croplands currently sequester the equivalent of 12 percent of U.S. carbon dioxide emissions from the energy, transportation and industrial sectors. For more information, see Climate Change Resources, page 3.

Agriculture's Role in Reducing Climate Change

These farming practices and technologies can reduce greenhouse gas emissions and prevent climate change by enhancing carbon storage in soils, preserving existing soil carbon, and reducing carbon dioxide, methane and nitrous oxide emissions:

- Conservation tillage and especially cover crops
- Organic production systems
- Land restoration and land use changes
- Irrigation and water management
- Efficient nitrogen use
- Methane capture
- Biofuels and other renewable energy options

Climate Change Resources

Climate and Farming.org — www.climateandfarming.org
 Climate-Friendly Farming, Washington State University Center for Sustaining Agriculture and Natural Resources — <http://cff.wsu.edu>
 Consortium for Agricultural Soil Mitigation of Greenhouse Gases — www.casmgs.colostate.edu
 Pacific Northwest STEEP (Solutions to Environmental and Economic Problems) — <http://pnwsteep.wsu.edu>

Pew Center on Global Climate Change — www.pewclimate.org
 Soil Carbon Center at Kansas State University — www.soilcarboncenter.k-state.edu
 U.S. Environmental Protection Agency – Carbon Sequestration in Agriculture and Forestry — www.epa.gov/sequestration
 U.S. Environmental Protection Agency – Global Warming Impacts on Agriculture — <http://epa.gov/climatechange/effects/agriculture.html>

New & Updated ATTRA Publications

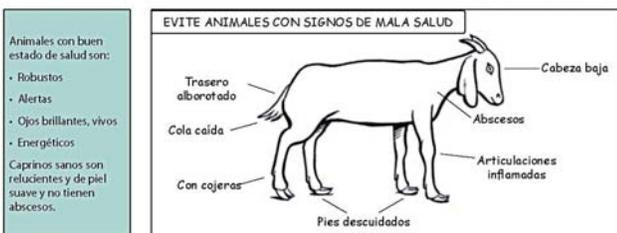
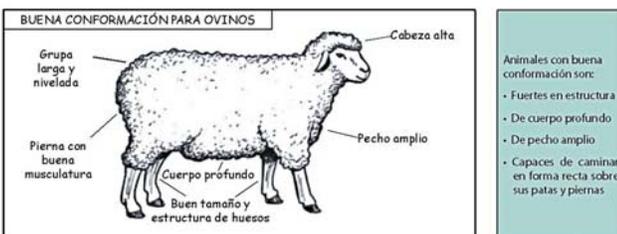
In addition to the publications listed here, ATTRA offers hundreds more that provide general information and specific details about all aspects of sustainable and organic agriculture. They are available to download for free from ATTRA's Web site, www.attra.ncat.org, or call 1-800-346-9140 to order a free paper copy.

- Agriculture, Climate Change and Carbon Sequestration IP338
- Draft Animal Power for Farming IP335
- Organic Poultry Production in the United States IP331
- Oilseed Processing for Small-Scale Producers IP134
- Pasture, Rangeland, and Grazing Management IP306
- Sustainable Small-Scale Nursery Production IP104
- Sweet Corn: Organic Production IP336

Spanish

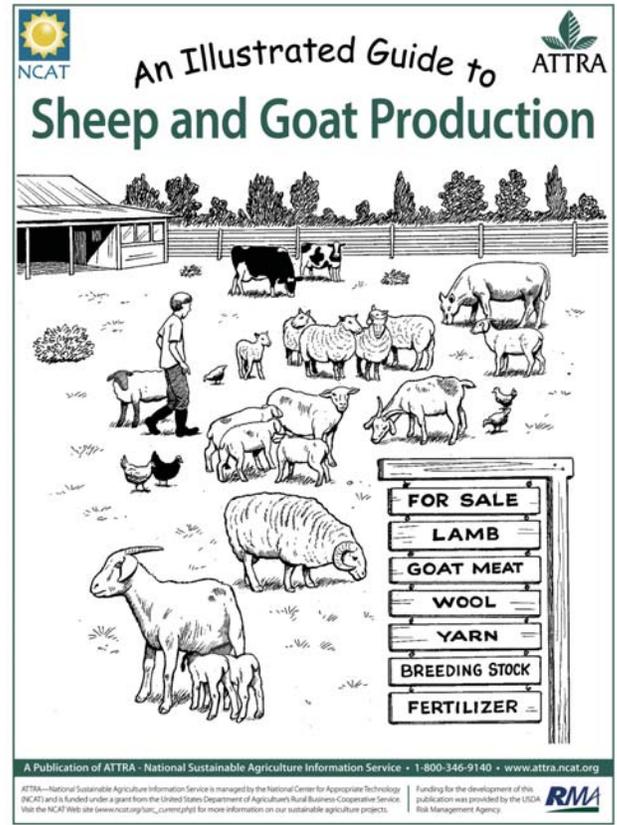
- Equipo Para Producción Aviar Alternativa SP295 (Spanish translation of *Poultry Equipment for Alternative Production*)
- Guía Ilustrada para la Producción de Ovinos y Caprinos SP330 (Spanish translation of *An Illustrated Guide to Sheep and Goat Production*)
- Nutrición para Rumiantes en Pastoreo SP318 (Spanish translation of *Ruminant Nutrition for Graziers*)

Su negocio de caprinos u ovinos va a ser mucho más entretenido y exitoso si usted comienza con animales sanos de apropiada conformación. Estas son características que usted debe buscar cuando seleccione sus animales.



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Página 3



An Illustrated Guide to Sheep and Goat Production is available in separate English and Spanish editions.

- Planeando la Plantación de Vegetales para una Cosecha Continua SP323 (Spanish translation of *Scheduling Vegetable Plantings for Continuous Harvest*)

Spanish-Language Community Food Security Flyers

These attractive, full-color flyers are designed to inspire people to learn more and take action. They were produced in collaboration with the Community Food Security Coalition. The flyers can be downloaded for printing at www.attra.ncat.org/espanol/mercadeo.html. English versions of the flyers can be found at www.foodsecurity.org/handouts.html.

- Buenos Alimentos que Podemos Costear Hoy y Mañana (*Good Food We Can Afford Today and Tomorrow*)
- Seguridad de Alimentos de la Comunidad: Cultivando Granjas, Personas y Comunidades Sanas (*Community Food Security: Cultivating Healthy Farms, People, and Communities*)
- Su Comunidad, Sus Alimentos: Siete Maneras de Ingresar Alimentos Sanos a Su Comunidad (*Your Community, Your Food: Seven Ways to Bring Healthy Food into Your Community*)

Sustainable Small-Scale Nursery Production

Here is one of many enterprises that might help producers diversify their operations and supplement their incomes. This article is adapted from the 28-page ATTRA publication recently updated by NCAT program specialist Katherine Adam.

Small-scale defines a nursery with fewer than five acres in container production and fewer than 15 acres in field production. A nursery can be part of a diversification strategy to make a farm more profitable or a nursery can be a sole enterprise. In either case, it is important to start small and expand later.

Sustainable nurseries aim to reduce levels of synthetic fertilizers and pesticides. These nurseries use integrated pest

management systems and focus on building the soil to promote plant health.

The most important things to consider before starting production are what crops to grow and how to market them. Marketing starts with deciding what to produce and at what volume.



Potted herbs at the USDA Farmers' Market in Washington, D.C. Photo by Bill Tarpinning, USDA.

1) Determine what kind of customer the nursery will attract and what size of plants those customers want. Mass merchandisers, for instance, want large volumes of a few popular plant species in small sizes. These customers want instant shipment, pay the lowest price for plants, and often do not take care of plants

after receiving them, which can reflect poorly on a nursery.

2) Keep up with trends in buyer preferences and the industry.

3) Know what combination of plants will maximize profits. While most nurseries grow a range of plants, there is a trend toward specialization. Growing only native groundcovers or only daylilies are viable niche markets. The production of specialty crops, such as hardy bamboo and disease-free apple stock, are niche markets that even small growers can serve.

Producing Plants in Containers

Advantages of Container Production

- Achieve high plant densities
- Use land unsuited for field production
- Plant independent of the weather
- Lower transportation costs because of lightweight media

Disadvantages of Container Production

- Small containers need frequent watering
- Nutrients deplete rapidly
- Plants require winter protection
- Plants easily become root-bound
- Wind can knock over tall plants
- Containers are costly
- High labor costs to pot up plants
- Temperature extremes stress roots

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