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NOBLE NEWS & VIEWS

LIVESTOCK

Knowing Your Ranch Can Promote Accuracy in Estimating Grazeable Acres

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Estimating grazeable acreage as well as forage availability is vital to understanding the carrying capacity of a ranch and accurately setting a proper stocking rate. Mapping software (i.e., ArcGIS) is a tool commonly used to estimate grazeable acreage for cattle, with minimal technical expertise required. With this tool, managers can use aerial imagery of their ranch to determine grazeable acreage quickly by subtracting wooded areas and large water features from the total acreage of the ranch.

However, when using this technique, it is important to consider all the factors that may limit grazeability. What a manager describes as grazeable acres when evaluating an aerial image may not always be graze-worthy or even accessible to cattle on the ground, as a multi-year Noble grazing study has shown.

Story continues on next page

MANAGERS CAN USE AERIAL IMAGERY OF THEIR RANCH TO DETERMINE GRAZEABLE ACREAGE QUICKLY BY SUBTRACTING WOODED AREAS AND LARGE WATER FEATURES FROM THE TOTAL ACREAGE OF THE RANCH.

NOT ALL OPEN CANOPY ACRES ARE CREATED EQUAL.

1

Certain forages are more palatable than others, and some may not even be worthy of consideration as forage for cattle. Cattle are not likely to select threeawn — a low seral grass stimulated by chronic overgrazing or poor, compacted soils – until everything else is gone. Though class of cattle (cows or stockers) should also be considered, threeawn is low in preference and palatability for most cattle.

In a six-year study on Noble Research Institute's Oswalt Ranch, we equipped stockers with GPS collars to learn about stocker cattle grazing distribution, resource selection and effects on vegetation communities. Image 1 shows fixes (GPS data collected on a programmed time interval) from cattle in that study near an area with primarily threeawn.

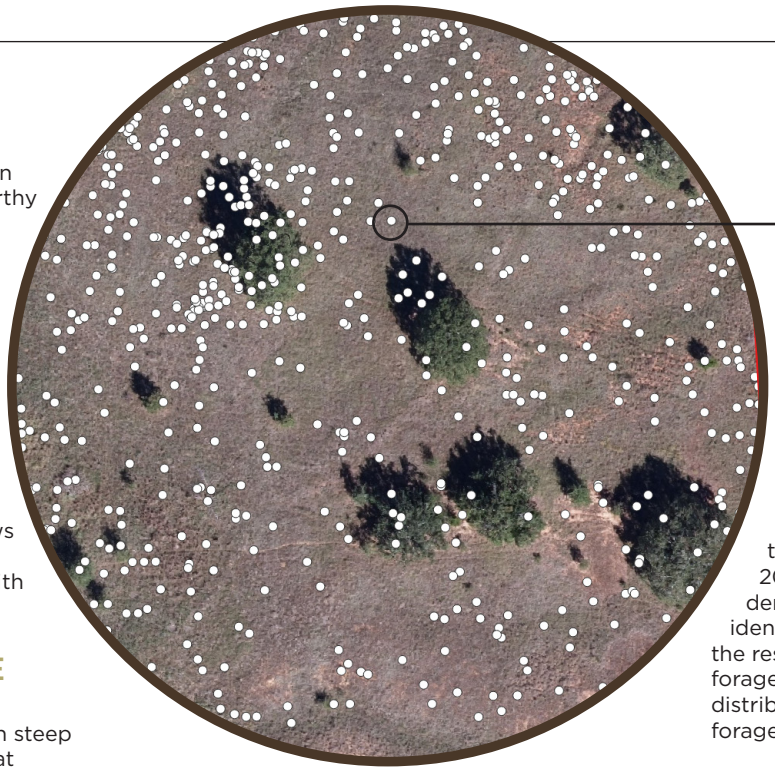

IMAGE ONE

Location fixes from stocker GPS collars on Oswalt Ranch in the spring (2011-2016). The lower density of points in the identified area may be the result of lower- quality forages affecting grazing distribution. The primary forage here is threeawn.

NOT ALL TOPOGRAPHY CAN BE CONSIDERED GRAZEABLE.

2

Limited utilization of quality forages on steep slopes can be attributed to the fact that cattle prefer to graze on flat areas or gentle slopes. In a GPS collar study cunducted by Texas A&M in the Davis Mountains of Texas, 95% of cow locations were located on slopes of 11% or less. Image 2 shows fixes from steers collared on Noble's Oswalt Ranch. Open breaks at the interface of shallow upland soils and sandy savanna were far less utilized by cattle because of the steep slopes.

IMAGE TWO

Location fixes from stocker GPS collars on Oswalt Ranch in the spring (2011-2016). The lower density of points in the openings identified on the map may be the result of topography affecting grazing distribution. The edges of the timber and small adjacent clearings represent steep slopes with heavy forage production.

WHAT APPEARS TO BE OPEN GRASSLAND IN AN AERIAL IMAGE IS NOT ALWAYS AVAILABLE TO CATTLE.

3

It pays to know your ranch. What appears to be open canopy grassland may be inaccessible to cattle because of brush encroachment. Technology is handy but no substitute for ground truth. On a first look at image 3, it seems strange that cattle did not use this open area more. However, inspection of the site from the tractor seat shows it would be tough for a rabbit to weave through the briars encroaching on this grassland. Where there's impenetrable brush with good grazing behind it, a manager can develop and maintain lanes or roads to increase accessibility and usage by cattle.

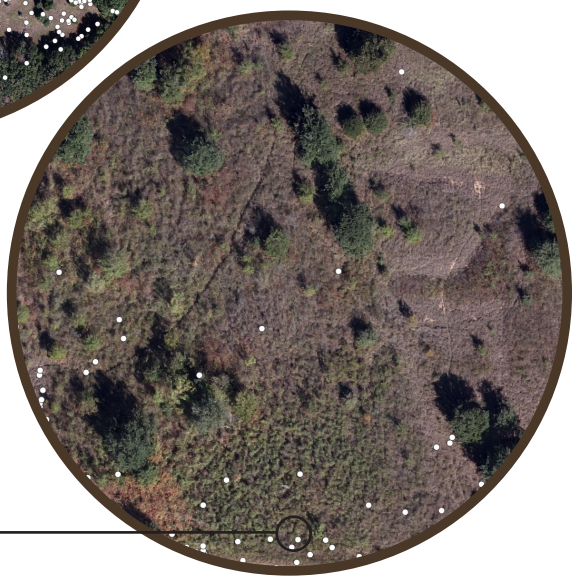

IMAGE THREE

Location fixes from stocker GPS collars on Oswalt Ranch in the spring (2011-2016). The lower density of points in the identified area may be the result of brush encroachment and accessibility affecting grazing distribution. Greenbrier is surrounding and encroaching on this opening, making it inaccessible to grazing cattle.

IMPOUNDMENTS CAN HELP DISTRIBUTE GRAZING PRESSURE.

4

Impoundments are also a nice rangeland feature, because with appropriate spacing they can help distribute grazing pressure and add to the landscape aesthetically and often recreationally. It is important to consider that areas located more than 1 mile from available water will receive less grazing pressure. Additionally, when using mapping tools to determine grazeable acres, managers may only cut out wooded areas, disregarding many water features. Ponds, of course, should not be considered grazeable.

The same can be said for roads. One mile of gravel road (8 feet wide) is 1 acre. In our study, roads showed cattle using the roads because of ease of walking, not because they were graze-worthy.

CONCLUSION

Using aerial imagery to identify acres suitable for grazing is a practical tool for most managers, but it is important to realize its limitations. Just like determining forage availability, the accuracy in assessing grazeable acreage will depend on the manager's familiarity with the ranch.

REFERENCE

Hohlt, J. C., Lyons, R. K., Hanselka, C. W., McKown, D. (2009). Estimating Grazeable Acreage for Cattle. B-6222. AgriLife Extension Service, College Station, Texas.

LIVESTOCK

Why Ecosystems and Their Management Are the Essence of Land Stewardship

by Stephen L. Webb, Ph.D., staff scientist, range and wildlife ecology | slwebb@noble.org and
Jeff Goodwin, conservation stewardship leader and pasture and range consultant | djgoodwin@noble.org

Understanding ecosystems can lead to a greater appreciation and application of systems thinking — a holistic approach that focuses on the way that a system's components are related or interconnected, and how the parts function as a whole. The more we use systems thinking in land stewardship and research, the more we can reduce the unintended consequences of management decisions on soil health and ecosystem services — the benefits we as humans gain from healthy ecosystems.

UNDERSTANDING ECOSYSTEMS: ORGANISMS AND THEIR ENVIRONMENT

The degradation of soil health and ecosystem services resulting from poor management practices, often in the pursuit of ever-greater production, is pervasive. That statement is the essence of why Noble Research Institute (originally called The Samuel Roberts Noble Foundation) was founded in 1945, and why we still identify ecosystem health as one of the three great challenges for which Noble seeks solutions. (The other two great challenges are economic uncertainty and education/training.)

To understand why ecosystem health is so important to land stewardship, we must take a deeper look into the topic of ecosystems as it relates to ecosystem services and the provisioning of resources, such as food, fiber and fuel.

Story continues on next page

THE MORE WE USE SYSTEMS THINKING IN LAND STEWARDSHIP AND RESEARCH, THE MORE WE CAN REDUCE THE UNINTENDED CONSEQUENCES.

Understanding ecosystems can lead to a greater appreciation and application of systems thinking, which can help reduce the chances of unintended consequences of management decisions.

For centuries, people have been domesticating plants and animals to have greater control related to selection, which ultimately would result in a more stable food supply. Further improvement to cultivation practices developed over the past century, which has resulted in more land conversion to agriculture. The advent of technology such as plows further increased efficiency at planting and harvest time. But when hundreds of millions of acres of native grassland are plowed without keeping the ground covered, especially in the absence of rain, you have a recipe for an ecological disaster. This is exactly what happened during the Dust Bowl. Ecosystems were forever changed.

ECOSYSTEMS

Ecosystems are communities of living organisms along with their physical environment, interacting as a system. Ecosystems are controlled by physical factors such as climate and topography, and internal factors such as disturbance, succession and species. Nutrient cycles and energy flow are what link the physical components of the system with the living part.

Now that we know the definition of an ecosystem, we turn our attention to ecology: the study of relationships between living organisms and their environment. Here are two examples — one of a natural system and the other of an agroecosystem.

- Early hunters and gatherers were essentially ecologists in a natural system. Hunters had to know their prey and the prey's use of the environment (habitats), and gatherers had to know their environment to know where to look for food.
- In our present-day agroecosystems, farmers and ranchers still need to understand the relationships between the environment and their crops and/or livestock (the living organisms).

DISTURBANCE

Although ecosystems are always in a state of change, they are not chaotic assemblages of species. Ecosystems do have structure. This means that communities of plant and animal species usually are found in association with each other. Disturbance is a form of change and is part of all ecosystems. Historically, disturbance maintained many types of ecosystems. For example, fire and grazing by bison maintained prairie grasslands.

Disturbance also influences succession, the change of plant communities and their associated animal species. Disturbance and succession both influence biodiversity. Biodiversity in turn also affects ecosystem functioning because ecosystem processes are dependent on the number and role of species present. Recently, biodiversity, or indicator or umbrella species (usually birds, frogs, bats, pollinators, etc.), have become the basis for monitoring successional stage or ecosystem health and functioning. For instance, to trained ecologists such as those on Noble's producer relations team, identifying indicator species or monitoring biodiversity will help assess the health and functioning of an ecosystem and which direction a management program is heading.

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BENEFITS OF HEALTHY ECOSYSTEMS CAN IMPROVE:

- Sustainable fisheries, wildlife, timber and forest products
- Recreation/ tourism (or aesthetics) of natural resources
- Biodiversity and habitat for wildlife
- Water quality/ quantity

- Air quality
- Food, fiber and fuel
- Temperature control

LIST OF ECOSYSTEM SERVICES

- Carbon sequestration
- Climate regulation
- Erosion control
- Pollination
- Nutrient cycling
- Natural regulation or control of pests/ pathogens
- Water regulation and purification
- Waste decomposition
- Primary production
- Soil formation

ECOSYSTEM MANAGEMENT

Assessing the status and health of an entire landscape is the essence of ecosystem management. Ecosystem management is natural resource management targeted at whole ecosystems versus management targeted at a single species or components. Therefore, ecosystem management implies stewardship and systems. To understand this concept, let's first look at the father of wildlife management, Aldo Leopold. In his 1949 work, *A Sand County Almanac*, Leopold writes, "I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer." In short, this means that a single focus on predator control (i.e., control of wolves) to increase deer populations did not consider the interactions between the animals and their environment. That led to unintended consequences that allowed the deer population to grow too much. Too many deer caused severe damage to the range, which in turn influenced other parts of the system.

The same thing happened in the Greater Yellowstone Ecosystem. What happened when wolves were extirpated (made extinct) in the Greater Yellowstone Ecosystem? Herbivore (elk) numbers increased dramatically and recruitment of aspen trees was nearly non-existent because of the heavy grazing pressure on young aspens. In 1995, after an absence of 70 years, wolves were reintroduced to the Greater Yellowstone Ecosystem. With reintroduction of top-tier predators (wolves, grizzly bears), the system became more balanced; herbivore numbers are kept in check and there is recruitment of vegetation (particularly aspen).

Saying it better than we can, Mark Everard wrote, "The diverse roles that ecosystems play in supporting human well-being are too frequently overlooked, often leading to their incremental degradation." Restoration of ecological processes tends to generate a wealth of ecosystem service. In summary, ecosystems and their management are the essence of land stewardship, which considers the whole and interacting parts of the system.

SYSTEMS THINKING: A HOLISTIC APPROACH

We are now familiar with ecosystems and how living organisms interact with their environment as an interrelated system, so we turn our attention to the role of systems thinking for management and research. A system, in simplest terms, is the interaction among components. Expanding on this, a system is an assemblage of interacting components forming a whole. Systems thinking is a holistic approach that focuses on the way that a system's components are related or interconnected, and how the parts function as a whole.

In research, systems approaches require that researchers from a variety of fields collaborate in designing and carrying out the research, typically requiring long-term commitments. Even at a basic level of science, or when the research is narrower in scope, scientists can benefit from bringing a systems perspective to their work. Systems thinking enhances the researcher's ability to understand how each part functions, and how the components function as a whole.

The goal of systems research is to develop knowledge about how a complex system functions as a whole. Despite criticisms that component research isn't necessary, we would argue that it is needed (when it is part of a larger system that is under study) to understand each component fully, and the interactions among components, until a more complete understanding of a functioning system is developed. To summarize, systems research is: 1) holistic in nature and 2) comprehensive in scope.

Many readers may be familiar with "holistic management," which is similar to the definition of a system in the context of systems management. Allan Savory, who initially developed holistic management to restore grassland soils and halt the damaging effects of climate change and desertification, stresses the importance of remembering that a system cannot be managed without looking inward at the lesser wholes that combine to form it, or without looking outward to the greater wholes of which it is a part.

When agricultural production or resource management is holistic in nature, it offers greater management flexibility, provides for more environmentally and economically sound practices, and creates safer and healthier conditions. Without systems thinking, there will be unplanned and unexpected consequences, such as the examples above about the extirpation (local extinction in a given area) of predators portray, which had many unintended consequences to the system of which they were part. Systems research or management strives to avoid the "what I don't know won't hurt me" mentality, which tends to be a narrower way of thinking that so often results in those unintended, but damaging, consequences.

PECANS

How to Recognize Grafted and Native Pecan Trees for Best Management of Your Orchard

by Will Chaney, pecan management systems senior associate | jwchaney@noble.org; Photos by William Reid | NorthernPecans.Blogspot.com

The pecan is America's native nut. Pecans have been harvested for hundreds of years, with crops originally harvested in native groves. Over time, agricultural producers developed techniques for producing genetically identical nuts on each tree by grafting a piece of scion wood onto a rootstock tree.

Management needs differ among pecan cultivars. Management between natives and improved pecans can differ dramatically as well. Being able to identify which cultivars you have in your orchard, as well as which trees are native and which are grafted, can influence the management styles you select for optimum production.

Pecans are a long-lived crop. In agriculture, you have crops that are annuals, such as corn, wheat and rice. You also have plants that are perennials, such as alfalfa and red clover. Pecans are a particular type of the latter known as a woody perennial. Pecans can grow and produce a crop over hundreds of years. While production can vary from tree to tree and under different management regimes, with the right care, adult trees have the potential for a long production life.

FROM GROVES TO ORCHARDS

Improved grafted pecans began to increase in numbers in pecan's native range of the lower Mississippi River Valley. Eventually, the cultivation of pecans expanded into states that were not part of the native range, planted in orchards with rows and rows of improved trees in straight lines. The design of these new orchards improved management and production.

Orchards also were developed in the native range of pecans in Oklahoma, Texas, Louisiana and other states in the lower Mississippi valley. However, in these states, a producer might have a pecan grove along his creek bank and then have a planted orchard next to the grove. In these areas, you also would see more natives that had been grafted within the grove.

Story continues on next page

ROOTSTOCK OVERGROWING THE SCION

ROOTSTOCK AND SCION HAVE THE SAME GROWTH

SCION GROWING FASTER THAN ROOTSTOCK

SCION GROWING FASTER THAN ROOTSTOCK

HOW GRAFTS WORK AND APPEAR

In the grafting process, a point on the tree will be selected. Everything above that point will be removed and a piece of scion wood grafted onto that point. A successful graft will grow once the cuts have healed and the scion wood becomes the growing point for that tree. Everything below the union is rootstock. That scion wood is a selected cultivar chosen by the producer for desired traits.

When looking at pecan trees, you can look for signs to see if a tree has been grafted. Generally, you will find an area on the main trunk that looks like a vague line that circles the tree. The bark above and below the line appear completely different. One side might be smooth, the other rough; color might be darker or lighter. Scion and rootstock will usually vary in these two traits.

Any tree that has been grafted has been top-worked. However, if a single-graft joint can be seen, it is common to say the tree is grafted. If multiple limbs have been grafted in the tree, it is often said that tree has been top-worked. A top-worked tree could have any number of graft points in its branches, but the entire production area of the tree has been changed to a selected cultivar.

Sometimes you might see signs of grafting which are more unusual than the ring dividing different textured or colored bark. Pecan is a species of hickory that includes about 13 other close relatives. You can graft between these relatives, but their growth patterns are not all the same. Because of this, you might have a huge rootstock that quickly shrinks to a small top or even a narrow rootstock that bulges out to a large scion.

When working to restore pecan production acreage that might have fallen out of use, it's not only important to identify cultivars that have been used, but it also it can be important to look at your native grove for any signs of grafting. Knowing what you have can go a long way to aid planning and management.

PECAN TERMS

Groves – Groups of naturally occurring trees

Grafting – Inserting a shoot or graft into a selected rootstock

Orchards – An intentional planting of trees that are maintained for food production

Annuals – Plants that complete their life cycle, from germination to the production of seeds, within one growing season

Perennials – Plants that live more than two years

Cultivars – Plant varieties that have been produced in cultivation by selection

Natives – Species whose presence in a region is the result of only natural processes

Improved – Contains certain traits that are improved better than other varieties, such as pest and disease resistance

Scion wood – A piece of last year's growth (containing approximately two buds) that is inserted into the rootstock during grafting

Rootstock – Stem with a well-developed root system onto which a graft can be made

Bark – A nontechnical term for the outermost layer of stems and roots, usually referring to all of the tissue outside the vascular cambium

Top-worked – Act of changing out the variety of a tree through grafting on the limb and branches

Hickory – A type of deciduous tree with pinnately compound leaves, comprising the genus Carya, which includes approximately 18 species

FALL 2019

PRESCRIBED FIRE WORKSHOPS

OK-FIRE is pleased to announce its fall schedule of training workshops. They will be led by J. D. Carlson, Ph.D., OSU fire meteorologist and OK-FIRE program manager, and will consist of a combination of presentations and lab exercises in which attendees will get hands-on experience with the OK-FIRE website at mesonet.org/index.php/okfire.

WHAT YOU WILL LEARN

Attendees will learn about fire weather, fire danger, and smoke dispersion products available on OK-FIRE as well as how to use them, They will also learn how to access past, current, and forecast values via maps, charts, and tables. Wildfire, prescribed fire and smoke applications will be covered.

HOW TO REGISTER

Registration is required. Please register at http://bit.ly/ok-fire-2019 or by contacting Andrea Melvin (andrea@mesonet.org or 405-325-2652) at the Oklahoma Climatological Survey.

LOCATION AND DATES

Durant, 9:30 a.m.-4:30 p.m., Nov. 14 | Stillwater, 9:30 a.m.-4:30 p.m., Dec. 12

ECONOMICS

Overcoming Barriers to Entry for the Next Generation of Ranchers

by Dan Childs, senior agricultural economist | mdchilds@noble.org

The U.S. Department of Agriculture has been saying for years that the average age of the American farmer is going up. The latest estimate of the average age is 59.3 years, as the baby-boom generation gets older. As a result, it has been estimated that 70% of the land in agriculture will change hands by 2031. This is a startling forecast and one worth contemplating in terms of how the transition will occur.

The number of farmers and ranchers in the United States has been decreasing, with the latest estimate just a bit more than 2 million in total. Fewer children are being raised on farms or ranches, too, and many of those who have are choosing other occupations, with no plans to return to the farm or ranch. Young people who have developed an interest in agriculture but do not have farm roots face a variety of barriers to entry as beginning farmers.

According to the balance sheet of agriculture, the total value of all U.S. farm assets is just over

$3 trillion. When divided equally among the estimated number of farmers in the U.S., the average investment per farmer is $1.5 million, with the majority of that being in land. So how does an interested young person get started, when the day one could buy land and expect to pay for it by working it is long gone?

Story continues on next page

70

PERCENT

OF THE LAND IN AGRICULTURE WILL CHANGE HANDS BY 2031. THIS IS A STARTLING FORECAST AND ONE WORTH CONTEMPLATING IN TERMS OF HOW THE TRANSITION WILL OCCUR.

-USDA estimate

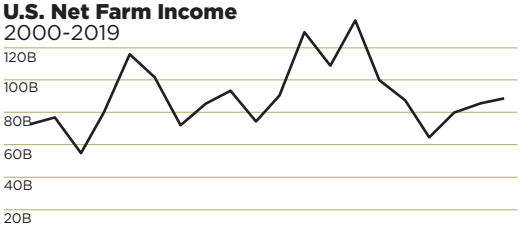
LAND: OWN OR LEASE?

It is generally agreed that the biggest barrier of entry to agriculture is the price of land. When the price of land prohibits entry into agriculture, what is the best alternative? Typically the answer is to lease it from a landowner. Lease payments are usually much lower than land payments, even in today's low-interest-rate environment. However, leasing does come with challenges. Often landowners will only negotiate one- to three-year terms. It is usually not feasible to develop infrastructure through permanent structures or invest in long-term soil health improvements with lease terms no longer than three years. Aging farmers need to be more amenable to longer term-lease agreements or willing to recognize improvements lasting longer than the lease term by cost-sharing or including a refund clause if the lease is terminated.

OPERATING CAPITAL AND DEBT CONCERNS

A second barrier common among many people wanting to have their own farm is operating capital. Granted, there is a greater awareness by some lenders such as the Farm Service Agency and the Farm Credit System, which have created special credit standards for young, beginning and small farmers and ranchers to be able acquire financing. However, then debt becomes a concern. As noted in the below figure, U.S. farm income has been somewhat of a roller coaster. Managing debt in such an uncertain landscape can be very difficult.

U.S. Net Farm Income
2000-2019



Source: USDA, Economic Research Service, Farm Income and Wealth Statistics

PROFITABILITY AND RISK MANAGEMENT

This brings us to a third barrier: the lack of consistent profitability. The perils present in production agriculture are many. At the end of each day, every agricultural producer must be an astute risk manager. First and foremost, weather risks could be at the top of the list, with markets or commodity prices not far below, followed by government policy, including regulations, trade, tax and labor laws. Many other risks exist that challenge consistent profitability. Considering all these factors, it becomes apparent that agricultural producers truly have a genuine passion for the work they do and the contribution they make to feed the world, despite the risks.

JAN. | 9

Estate Planning for Agricultural Producers

10 a.m.-3 p.m.
Ardmore Convention Center
2401 Rockford Road
Ardmore, OK 73401
Registration Fee: $25

Farm families work hard to build successful operations and to create estates. This workshop provides information on the need to plan for estate transfer as well as laws governing estate transfer and the tools available to use in estate planning.

ENSURING THE FUTURE

The U.S. has not had to depend on another country for food, and that is a great blessing. We have achieved national food security because of the work ethic and productivity of American farmers and ranchers. Yes, there are obvious reasons for the U.S. to trade with other countries and benefit from our comparative advantage. Fair trade between countries helps both consumers and producers.

Much work lies ahead for the U.S. as we navigate the transition of farmland to the next generation. It is paramount that the transition is made to people who have the same passion and dedication to production agriculture as past generations, who have made U.S. agriculture the envy of the world.

NOBLE
NEWS&VIEWS

IN THIS ISSUE

FEB. 25

Managing Crops in Hoop Houses

6:30 p.m.-8:30 p.m.
Kruse Auditorium, Entry 5
No Registration Fee

Specialty crop growers worldwide continue to adopt high tunnel hoop houses because they provide an element of environmental control not possible with field production. During this course, you will learn how to manage the growing environment unique to hoop houses to produce high yielding, high quality crops.

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UPCOMING EVENTS

Preregistration is requested. Registration fees for paid events will increase by $10 one week before the event. *For more information or to register, visit www.noble.org/events. For other agricultural questions, please call our Ag Helpline at 580-224-6500.*

Come learn about the many kit and homemade garden bed/container options available and the pros and cons associated with each. You will have the opportunity to learn by participating in the construction of a novel raised garden bed and container garden ideal for use in a backyard setting.

9 a.m.-3 p.m.
Small-Scale Ag Demo Area, Entry 2
Registration Fee: $25

Managing Taxes for Agricultural Producers

1-5 p.m.
Kruse Auditorium, Entry 5
No Registration Fee

How to Get Your Wild Game from Field to Table

1:30-6 p.m.
Pavilion
Registration Fee: $25

Selecting and Developing Bulls

9 a.m.-3:30 p.m.
Oswalt Ranch
Registration Fee: $25

Beef Quality Assurance Certification

1:30-5 p.m.
Kruse Auditorium, Entry 5
No Registration Fee