

# NOBLE NEWS & VIEWS

## RESEARCH

# Wild Pigs Put Pecans at Risk, Research Learns More



by Stephen L. Webb, Ph.D., ag systems technology manager | [slwebb@noble.org](mailto:slwebb@noble.org)  
 Kelly Boyer, Oklahoma State University graduate student



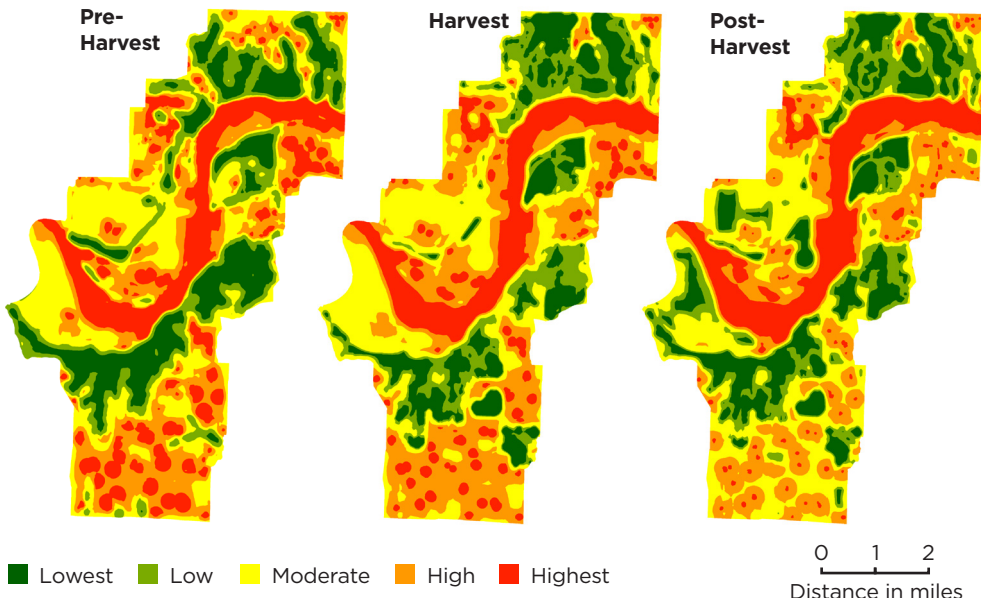
Not that producers need any more problems, but there is a major problem that can affect all types of operations. And, worst of all, it has four legs, bad habits and is very intelligent. This creature is none other than the wild pig. For those who attended the 2018 Texoma Cattlemen's Conference, I referred to wild pigs as "the cockroach of the mammalian world." Because of the widespread problems wild pigs cause, the Noble Research Institute is dedicated to providing solutions to control, manage and mitigate damage from wild pigs.

Here, we highlight some of the latest research on how wild pigs use agricultural landscapes and how damage can affect economic viability (for instance, how wild pig damage influences pecan harvest efficiency).

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# FINDINGS OF THE STUDY



The three maps show areas consistently used by sows across the pre-harvest (two weeks before pecan harvest), harvest (four weeks of pecan harvest) and post-harvest (two weeks after pecan harvest) periods. You can see areas of greatest use (in red and orange) to least use (green shades), and how the patterns change across periods.

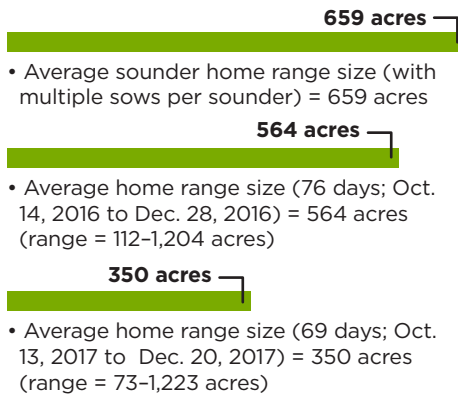


## WHAT ARE WILD PIGS?

Wild pigs are an invasive, nonnative species in the United States. They are known to cause extensive amounts of damage to agricultural operations. In 2016, the United States Department of Agriculture reported a conservative estimate of \$2.5 billion dollars annually in damage. Wild pigs are a challenging pest to manage due to factors such as high reproduction and survival, the ability to adapt to altered environments, and the absence of natural predators.

Because of wild pigs, agricultural producers face many challenges that can reduce their economic viability. Agricultural products such as grains, fruits and nut crops often offer an easily accessible food source for wild pigs, which reduces total production yield.

In addition to direct consumption, other wild pig activities, such as rooting, wallowing, digging and trampling, can compound losses to producers by reducing yields and affecting the ability to efficiently harvest agricultural products.



## WILD PIGS AND PECANS

Across the southern United States, where some of the highest densities of wild pigs occur, pecans are a specialty crop readily grown in conjunction with other farming and ranching operations. Pecans are one of the most popular specialty crops produced in Oklahoma. In 2017, Oklahoma was the fifth largest pecan producing state, producing 14 million pounds of pecans, valued at approximately \$24 million dollars.

Geographical overlap of wild pigs and pecans likely leads to pecan consumption by wild pigs because the nuts offer a high caloric, abundant food source at a time of year when food is limiting.

For these reasons, the Noble Research Institute and Oklahoma State University initiated a study to investigate wild pig habitat use, ecology and damage within agricultural landscapes where pecans are actively grown and harvested.

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- Sixteen sows were captured from a total of eight sounders in 2016.



- Thirteen sows were captured from a total of nine sounders in 2017.



- In 2016, 11 of the 16 collared pigs crossed the Red River 80 times (range = 2-11 crossings).

## OTHER FINDINGS

- Female wild pigs showed a strong liking for riparian vegetation communities and pecan orchards.

- Sows also used areas closer to water sources, including streams, rivers and ponds.

- Sows also used crop fields, rangeland and forested areas, but under a narrow range of conditions.

- At the conclusion of each study period, all collared wild pigs and their sounder mates were targeted for collection either using very high frequency (VHF) tracking or recapture with the BoarBuster™ trap.

## DID YOU KNOW?

Many people know that cellphones use GPS technology to give directions and track distance, but did you know that GPS is used in multiple ag-related products? According to GPS.gov, the technology also helps farmers and ranchers with:

**Precision soil sampling, data collection**

**Minimizing over-spray for fertilizer applications**

**Ability to work through low visibility field conditions**

**Accurately monitoring yield data**

# 2.5

**BILLION**

In 2016, the United States Department of Agriculture reported a conservative estimate of \$2.5 billion dollars annually in damage.

# 24

**MILLION**

In 2017, Oklahoma was the fifth largest pecan producing state, producing 14 million pounds of pecans, valued at approximately \$24 million dollars.



## THE STUDY

This study took place on the Noble Research Institute's Red River Farm in Love County, Oklahoma. The Red River Farm is a 3,252-acre demonstration and research farm situated along the northern edge of the Red River. This study area offers an opportunity to investigate the relationships between wild pigs and active pecan growing operations as well as other land uses such as cropland as well as native rangeland and pasture for grazing cattle.

We captured wild pigs using BoarBuster™ suspended traps. Our goal was to capture two adult female (sows) wild pigs per sounder (group of pigs) and fit them with GPS tracking collars. These collars allowed two-way communication between the collar and user so researchers could download the data every five to six hours. As defined in the Oklahoma Feral Swine Control Act, it is illegal to release any wild pig unless fitting the pig with a radio collar. Under the "Judas pig" provision, we fitted wild pigs with GPS collars so we could later track them down to assist with population control efforts.

## TAKEAWAYS AND NEXT STEPS

In general, wild pigs are very adaptable, using a wide range of habitat types. However, sows showed very strong selection for riparian areas, pecan orchards and proximity

to available water.

The relationships between wild pigs and their habitat were incorporated into a geographic information system to map the areas most used by sows and their sounders as a way to prioritize areas for population control. The predicted maps are similar to hot spot maps where we are able to identify where pigs spend most of their time.

We also can use the social nature of pigs to our advantage for control efforts. Sows within the same sounder tended to always stay within their sounder, meaning individual pigs did not move among sounders. Sows also have relatively small home ranges, and when this information is combined with hot spot mapping, we can fine-tune trap site locations to have a greater chance of attracting the whole sounder to a bait site.

## CONTROL CHALLENGES

Despite what we learned about wild pigs that we can use to our advantage, there still are many factors that make population control difficult. Survival is high, at least for sows. That is a problem since adult sows are the most reproductive age class, having an average litter size of more than five piglets and sometimes as many as nine. Sows also can have multiple litters per year.

Also making control efforts difficult, at least on our study site, is the fact that the

Red River occurred along the southern border of the property. The habitats associated with the river offer ideal habitat and security cover for wild pigs. The river itself also acts like a corridor where pigs move up and down the river, meaning that a lot of transient pigs also use the area.

## FUTURE RESEARCH AND TOOLS

There is always something new to learn about these creatures, so Noble is continuing its efforts into wild pig control and research.

Current projects are examining male (boar) ecology, movement, habitat use and survival, which may differ quite dramatically from that of sows.

On Noble's Oswalt Ranch, cattle, white-tailed deer and wild pigs are fitted with GPS collars to learn more about their interactions such as disease spread, differences in habitat use and potential negative effects of wild pigs on the behavior of other species, particularly native wildlife.

We are also developing online tools to help landowners track the success of their control programs. Landowners will be able to enter simple information to estimate age of wild pigs, which then will be used with other information to estimate survival rates and population size. Changes in population size can be used as an indicator of the success (or lack thereof) of population control programs. 🐷

## PECANS

# PECAN MANAGEMENT CALENDAR: NOVEMBER TO JANUARY

By Will Chaney, senior research associate | [jwchaney@noble.org](mailto:jwchaney@noble.org)



To properly manage a successful pecan orchard, a well-developed plan should be implemented. Planning will help growers and managers be prepared for tasks that will need to be addressed throughout the year. This calendar can be used as a

resource to help with planning.

## VIDEO TUTORIALS AVAILABLE ON YOUTUBE

January is the preferred time to collect graftwood. Go online to [youtube.com/nobleresearchinstitute](https://youtube.com/nobleresearchinstitute) to learn the different methods of pecan tree grafting and pecan tree management.

### FLOOR MAINTENANCE

Complete needed ground work like tilling and packing (to smooth any rough spots on the orchard floor), remove debris left over from harvest, etc.

### GRAFTWOOD

Collect graftwood while the trees are dormant. For more information on graftwood collection practices, visit [bit.ly/storing-pecan-wood](https://bit.ly/storing-pecan-wood).

### EQUIPMENT MAINTENANCE

Once harvest is complete, clean and perform any equipment maintenance needed before storing.

### ORCHARD MAINTENANCE

Remove trees marked the previous year for removal.

### PLANTING

Start planting trees.

### PRUNING

Decisions will depend on the age of the tree.

- Young trees (trees not in production): Train to a central leader. Remove competing leaders and weak crotches.
- Older trees (trees that are producing): Remove damaged branches and low hanging branches that interfere with tree management. 🐄

## NOVEMBER

### HARVEST

Continue to harvest your pecans.

### ORCHARD MAINTENANCE

Mark trees for removal that are damaged, and have small or undesirable pecans.

### PECAN NUT SHOW

Select the best examples of each nut cultivar and submit to the local or state show. Learn more about the Oklahoma State Pecan Show at [bit.ly/opga-show](https://bit.ly/opga-show)

## DECEMBER

### HARVEST

Continue to harvest your pecans.

### ORCHARD MAINTENANCE

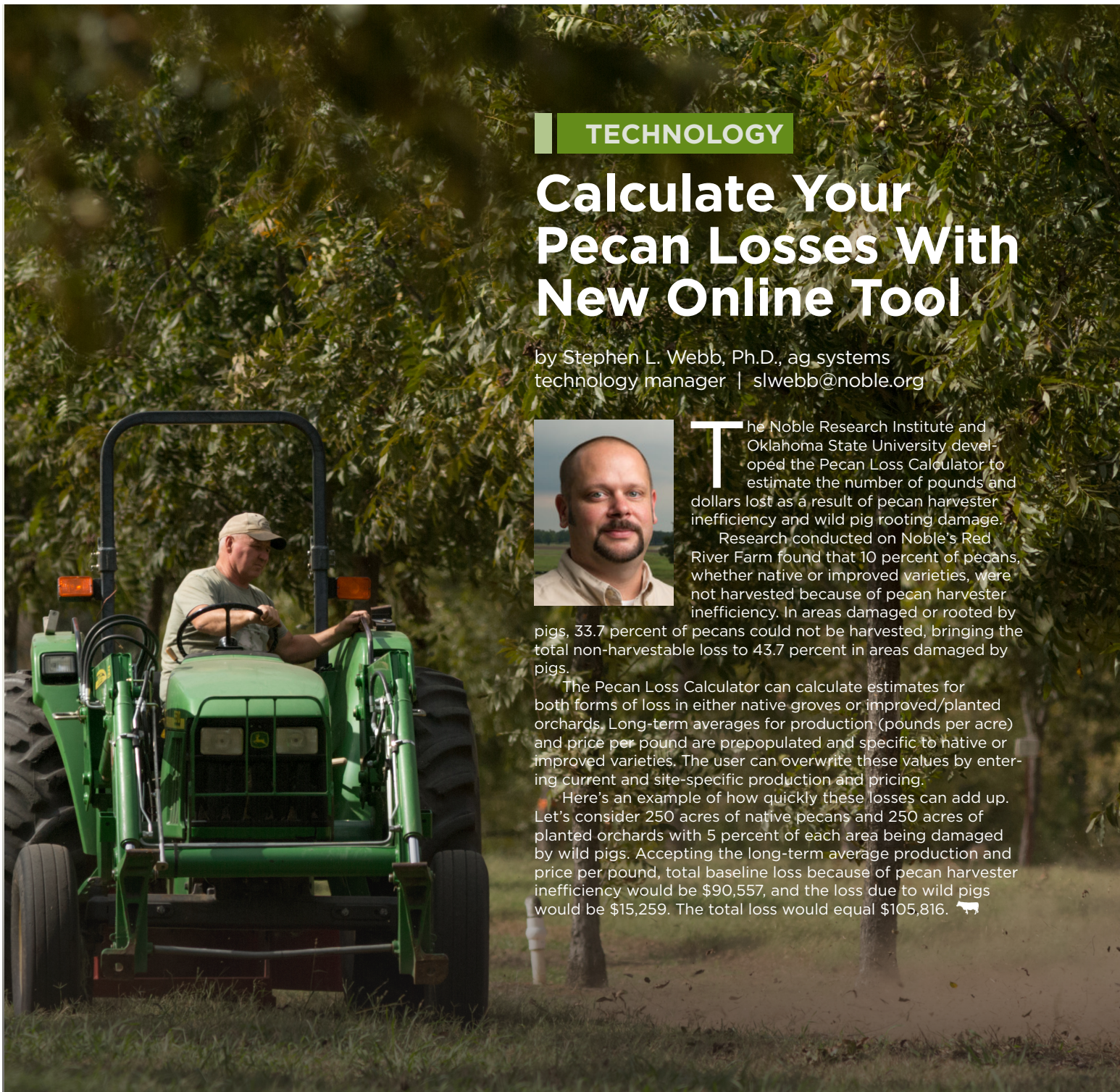
Mark for removal damaged trees and those with small or undesirable pecans.

## JANUARY

### HARVEST

Continue harvest if needed.





TECHNOLOGY

# Calculate Your Pecan Losses With New Online Tool

by Stephen L. Webb, Ph.D., ag systems technology manager | slwebb@noble.org



The Noble Research Institute and Oklahoma State University developed the Pecan Loss Calculator to estimate the number of pounds and dollars lost as a result of pecan harvester inefficiency and wild pig rooting damage.

Research conducted on Noble's Red River Farm found that 10 percent of pecans, whether native or improved varieties, were not harvested because of pecan harvester inefficiency. In areas damaged or rooted by pigs, 33.7 percent of pecans could not be harvested, bringing the total non-harvestable loss to 43.7 percent in areas damaged by pigs.

The Pecan Loss Calculator can calculate estimates for both forms of loss in either native groves or improved/planted orchards. Long-term averages for production (pounds per acre) and price per pound are prepopulated and specific to native or improved varieties. The user can overwrite these values by entering current and site-specific production and pricing.

Here's an example of how quickly these losses can add up. Let's consider 250 acres of native pecans and 250 acres of planted orchards with 5 percent of each area being damaged by wild pigs. Accepting the long-term average production and price per pound, total baseline loss because of pecan harvester inefficiency would be \$90,557, and the loss due to wild pigs would be \$15,259. The total loss would equal \$105,816. 🐷

## FIND THE NEW PECAN CALCULATOR AT NOBLE.ORG

Find the Pecan Loss Calculator at [www.noble.org/pecan-loss-calculator](http://www.noble.org/pecan-loss-calculator)

### Pecan Loss Calculator

Instructions Description  
 Estimates the number of pounds and dollars lost as a result of pecan harvester inefficiency and wild pig rooting damage.

#### Native Groves

Grove Size:   
In Acres

Hog Damage Area:   
In Acres

Production (in pounds per acre):   
Long-term average prepopulated

Price per Pound:   
Long-term average prepopulated

#### Improved Orchards

Orchard Size:   
In Acres

Hog Damage Area:   
In Acres

Production (in pounds per acre):   
Long-term average prepopulated

Price per Pound:   
Long-term average prepopulated

## DID YOU KNOW?

Wild pigs are established in 36 states. Present U.S. population estimates place wild pig numbers at 6.3 million nationwide. Significantly, in 1990, wild pigs numbered only 500,000 to 2 million.  
 —Farm Journal



SOILS

# You Can Control Many Indoor Pests Without an Exterminator

By Jim Johnson, soils and crops consultant | [jjjohnson@noble.org](mailto:jjjohnson@noble.org)



While there are times and places when a professional exterminator is needed, you can control many common indoor pests by yourself with some

prevention, treatment and monitoring.

Common pests that may be encountered in rural homes include insects like crickets, ants and beetles and other arthropods, such as spiders and scorpions. Rodents and snakes can also be problematic.

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**Local farm stores as well as big-box stores sell many products for lawn pest control. Directions for each pesticide are included on the label, so be sure to read and follow them carefully.**

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## THREE STEPS TO PREVENT PESTS IN YOUR HOME

You can take many actions to prevent pests from coming inside or at least reduce their population before they start coming in. Take these three steps to make it harder for pests to hide and multiply:

**1**  
**PREVENT LEAVES**  
and other debris from piling up around the house.

**2**  
**KEEP THE YARD MOWED**  
around the house.



**3**  
**STORE FIREWOOD**  
well away from the house.

### TO FURTHER PROTECT YOUR HOME FROM PESTS

- Keep trees and bushes trimmed so they are not touching the exterior of the house.
- Seal up any cracks and crevices around doors, windows and utilities, including plumbing and wiring.
- Apply an insecticide barrier treatment around the perimeter of the house each spring and fall.

Local farm stores as well as big-box stores sell many products for lawn pest control that can also be used as perimeter treatments. Directions for each pesticide are included on the label, so be sure to read and follow them carefully.



### POST-INVASION TIPS

Once pests get in the house, pesticide options become more limited. One nonchemical method that works for many pests is sticky traps. These come in various shapes, sizes and configurations. They catch bugs as well as reptiles and rodents. Carefully consider where to place them so you, your family and your pets don't accidentally step on them.

**Most chemical products work better on some pests than others. It is rare that any one pesticide will control all pests you may encounter.**

Most chemical products work better on some pests than others. It is rare that any one pesticide will control all pests you may encounter. However, one group of pesticides, known as synthetic pyrethroids, are fairly broad-spectrum and tend to do a good job on many bugs.

Be sure that whatever pesticide you choose is labeled to control your target pest. Again, specific instructions will be found on the label, so be sure to read and follow all directions.

After you have treated and gained control, continue to monitor for new invaders. Sticky traps are useful for this purpose as well. They catch many pests before you have a chance to see them. They may also indicate where populations are greatest, which can help you target future treatment.

By implementing some basic prevention, treatment and monitoring, you can successfully do much of your own indoor pest control. 🐞



## RESEARCH

# Noble Releases New Forage Crabgrass Cultivar Called Impact

*Impact crabgrass grows in Enid, Oklahoma, in 2016.*

by Mike Trammell, senior plant breeder | [matrammell@noble.org](mailto:matrammell@noble.org); Twain Butler, Ph.D., agronomy professor | [tjbutler@noble.org](mailto:tjbutler@noble.org)



Just mentioning the word “crabgrass” can make some agricultural producers and landowners cringe and mutter disapprovingly, while others smile and nod with approval.

Crabgrass is an annual, warm-season grass that is fast-growing, easy to establish, and capable of natural and prolific reseeding, all traits that allow it to excel as a “weed.” Despite its bad reputation, crabgrass was originally used in Europe as fodder before being introduced in the United States, probably in the mid-1800s, as a forage for grazing livestock.

The Noble Research Institute has been conducting research on crabgrass for many years.

In 1988, the Noble Research Institute (then called the Noble Foundation) was the first to publicly release a crabgrass cultivar, Red River. Over the years, Red River became the main commercial crabgrass cultivar and helped crabgrass gain acceptance as an important warm-season,

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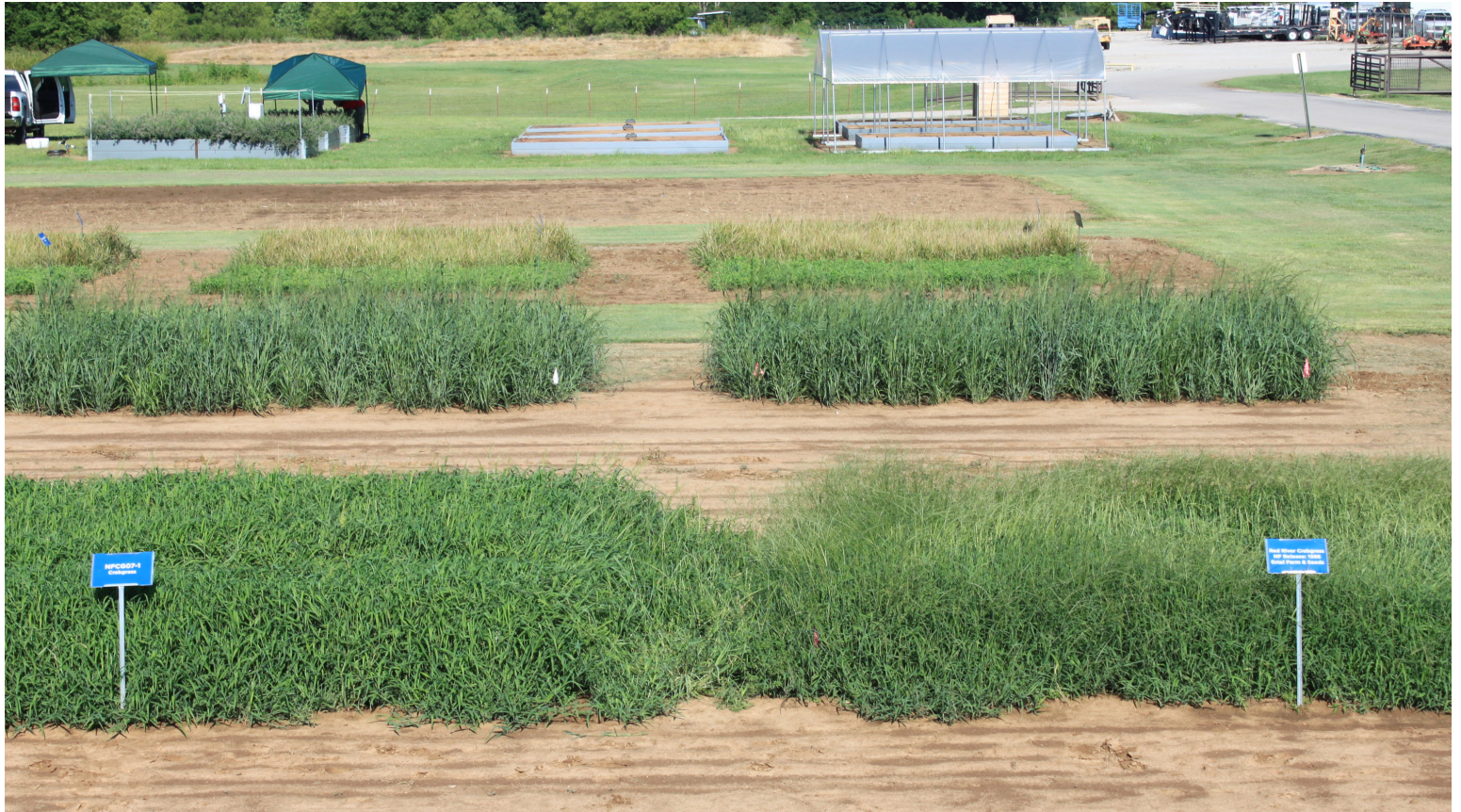



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**Impact crabgrass was released for forage livestock producers needing a later-maturing cultivar than Red River but one that is also broadly adapted, high-yielding, and with improved nutritive quality and good reseeding ability.**

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*Impact crabgrass (left), on average, heads out 10 days later than Red River (right), resulting in later maturity and improved forage quality.*

annual grass for forage and livestock operations initially in the Southern Great Plains and now throughout the southern United States. However, a limitation of Red River was its early seed-heading date, which increased maturity and reduced the quality and quantity of late-summer forage.

Recently, Noble plant breeders developed a new crabgrass cultivar called Impact. Impact crabgrass was released for forage livestock producers needing a later-maturing cultivar than Red River but one that is also broadly adapted, high-yielding, and with improved nutritive quality and good reseeding ability.

Steers grazing Impact crabgrass averaged

|  |   |
|--|---|
| <b>1.56</b>  | <b>192</b>  |
| pounds per day of weight gain per acre during a five-year period | pounds of live weight gain per acre during a five-year period |

In Noble's grazing systems research trials, steers grazing Impact crabgrass averaged 1.56 pounds per day of weight gain and 192 pounds of live weight gain per acre during a five-year period (2013-2018) following graze-out wheat.

Impact has an adaptation area that includes the south-central and south-eastern United States. It is particularly productive in dryland situations, but it also performs well under irrigation. Green chop, silage and hay production are also potential uses of Impact. It is adapted to both tilled and no-till forage livestock production systems. Impact crabgrass seed is available from Barenbrug USA. 🐄

## RESOURCES

# More News and Books Online

Keep up with the latest news and information from Noble Research Institute consultants at [www.noble.org](http://www.noble.org)

You can also purchase more books about wildlife, plants and more at [www.noble.org/store](http://www.noble.org/store)



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## PLANT IDENTIFICATION

# Know Your Plants to Prevent Overgrazing on Native Range

By Steven Smith, wildlife and fisheries consultant | [sgsmith@noble.org](mailto:sgsmith@noble.org)



**M**any land managers go into the fall and winter months thinking they have plenty of standing vegetation for livestock forage and wildlife habitat in their native rangeland areas. However, many managers become disappointed

in the true quantity and quality of the vegetation, resulting in a need to supplement livestock and/or seeing fewer wildlife in the area.

## NOT ALL NATIVE RANGELAND IS EQUAL

Different soil types and past management can cause variation in species composition and structure within a field, on a specific property, and more noticeably from neighbor to neighbor. It is critical for natural resource managers to know what common plants are present on their property and whether the plants are beneficial to their operation (livestock, wildlife, hay, etc.). As a manager looks out over an area, the area may appear to contain plenty of waist-high forage for cattle, but in reality the vegetation might be a lower-quality imitation of something much better.

## WATCH OUT FOR BLUESTEM

For example, the low quality forage broomsedge bluestem looks similar to the higher quality little bluestem.

However, cattle only eat mature broomsedge bluestem if they are forced to eat it due to its low palatability and course texture. By the time cattle graze it, they will have overutilized the preferred herbaceous (grasses and forbs) forages in the native rangeland plant community.

Little bluestem is considered one of the big four desirable grasses (little bluestem, Indiangrass, big bluestem and switchgrass) in the Great Plains for its livestock and wildlife value. In the spring, little bluestem can have crude protein levels higher than 20 percent. Once little bluestem matures, crude protein levels can drop as low as 4 percent, but cattle still graze it over broomsedge bluestem. Due to little bluestem's palatability, cattle select it over many other grasses, potentially causing its abundance to decline over time if a manager is not careful with grazing management.

## OVERGRAZING REDUCES BEST PLANTS

Overgrazing of the more palatable grasses and forbs can lead to an increase in less desirable species such as three-awn and bitter sneezeweed. Years of heavy continuous

grazing eventually weaken preferred plants to the point where root reserves are not able to maintain them and they ultimately die.

These changes can also occur if a native grass pasture is hayed then hauled off and fed in another pasture every year. In this situation, important soil nutrients are removed from the area over time, robbing the plant of what it needs to survive. All too often, these slow changes in the plant community go unnoticed while the preferred plants decline.

## IDENTIFY, THEN DEVELOP PLAN

These represent some of the many reasons why it is important for managers to learn the plants that are fundamental to their natural resource-associated operations. Knowing key plants enables a manager to develop management plans that address the specific needs of the plant community.

For example, many livestock managers with abundant little bluestem monitor its abundance and height to measure the impact of livestock grazing. If the plant community is in a desirable state, the manager should understand how to maintain it. If the plant community is less desirable, the manager should establish a plan to improve the plant community. 🐮



For help identifying plants in your area, go to the Noble Research Institute's Plant Image Gallery at [nobleapps.noble.org/plan-timagegallery](https://nobleapps.noble.org/plan-timagegallery).

*Side-by-side view of little bluestem on the left and broomsedge bluestem on the right.*



PLANT BREEDING

# Grazing Systems Research Update: Year-Round Forage Options



By Twain Butler, Ph.D., agronomy professor | [tjbutler@noble.org](mailto:tjbutler@noble.org)  
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The ultimate goal for every forage producer is to have high-quality forage in a sufficient quantity to feed livestock every day all year long. Current research at the Noble Research Institute aims to develop year-round grazing systems for the Southern Great Plains. Because no single forage can accomplish this (Figure 1), we are evaluating several forage species in mixtures or in combination.

We are using a put-and-take stocking method to measure grazing days, average daily

gain and total pounds of beef gain per acre for each system. Using the animal performance data and expected prices for cattle and agronomic inputs, we have developed detailed enterprise budgets that report calculated revenues, costs and net returns to land, labor, management and overhead for each of the alternative grazing systems we have evaluated during the past 16 years.

**ALTERNATIVE SYSTEMS**

Table 1 summarizes the animal performance and *Story continues on next page*

**Figure 1: Forage Distribution**

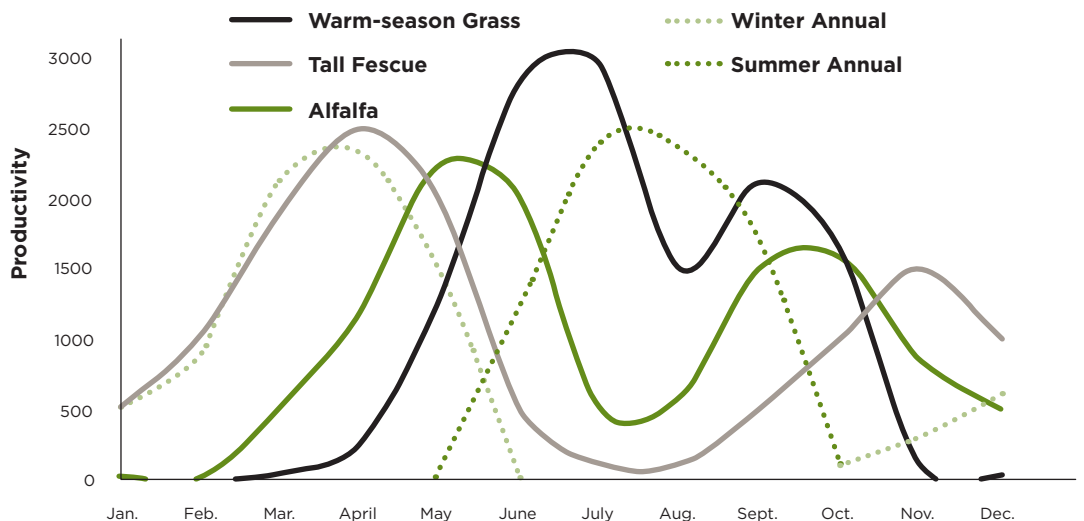


Table 1. Average Production and Expected Economics for Alternative Forage-Based Stocker Systems Evaluated at the Noble Research Institute

| Production System                                   | Study Years        | Normal Rainfall (%) | Grazing Initiation Date | Grazing Termination Date | Grazing Duration (days) | Steer Grazing Days (days/acre) | Average Daily Gain (lbs/hd/acre) | Total Gain (lbs/acre) | Value of Gain (\$/lb) | Gross Revenue (\$/acre) | Total Cost (\$/acre) | Net Return (\$/A) |
|---|--------------------|---------------------|-------------------------|--------------------------|-------------------------|--------------------------------|----------------------------------|-----------------------|-----------------------|-------------------------|----------------------|-------------------|
| NFI01 wheat/Impact crabgrass                        | 5 yr avg (2013-18) | 114                 | 12/16                   | 8/19                     | 164                     | 288                            | 1.9                              | 549                   | 0.80/0.60             | 400                     | 213                  | 187               |
| 800RR experimental alfalfa                          | 3 yr avg (2015-18) | 110                 | 3/13 and 10/23          | 7/30 and 11/25           | 148                     | 236                            | 2.2                              | 517                   | 0.80                  | 413                     | 241                  | 172               |
| Maton II rye/Marshall ryegrass                      | 7 yr avg (2005-12) | 82                  | 11/18                   | 4/28                     | 130                     | 183                            | 2.3                              | 421                   | 0.80                  | 337                     | 183                  | 154               |
| Flecha summer-dormant tall fescue                   | 5 yr avg (2013-18) | 114                 | 12/28                   | 5/22                     | 144                     | 188                            | 1.8                              | 340                   | 0.80                  | 272                     | 133                  | 139               |
| Chisholm summer-dormant tall fescue                 | 5 yr avg (2013-18) | 114                 | 12/28                   | 5/22                     | 145                     | 185                            | 1.8                              | 327                   | 0.80                  | 262                     | 127                  | 135               |
| Wheat-Alfalfa*-Crabgrass (2 paddock) system         | 5 yr avg (2013-18) | 114                 | 9/18                    | 8/19                     | 127                     | 210                            | 2.0                              | 424                   | 0.80                  | 339                     | 222                  | 117               |
| NFI01 wheat   | 5 yr avg (2013-18) | 114                 | 12/16                   | 4/20                     | 118                     | 165                            | 2.2                              | 356                   | 0.80                  | 285                     | 183                  | 102               |
| Impact crabgrass                                    | 5 yr avg (2013-18) | 142                 | 6/27                    | 8/19                     | 46                      | 123                            | 1.6                              | 192                   | 0.60                  | 115                     | 29                   | 86                |
| Bulldog 505 alfalfa#                                | 5 yr avg (2013-18) | 114                 | 4/24 and 9/18           | 6/18 and 11/12           | 90                      | 130                            | 2.0                              | 265                   | 0.80                  | 212                     | 166                  | 46                |
| Tall Fescue-Wheat-Tall Fescue system (20 bu wheat*) | 5 yr avg (2013-18) | 114                 | 12/16                   | 5/22                     | 187                     | 157                            | 2.0                              | 311                   | 0.80                  | 299                     | 182                  | 117               |
| Flecha-Bulldog 505 alfalfa# checkerboard mix        | 5 yr avg (2013-18) | 114                 | 11/19                   | 5/20                     | 103                     | 154                            | 2.2                              | 343                   | 0.80                  | 275                     | 162                  | 113               |
| Texoma MaxQII summer-active tall fescue             | 6 yr avg (2005-11) | 78                  | 1/24                    | 6/9                      | 116                     | 157                            | 2.0                              | 298                   | 0.80                  | 238                     | 133                  | 105               |
| Alfagraze alfalfa                                   | 3 yr avg (2002-04) | 89                  | 4/29                    | 9/16                     | 140                     | 204                            | 2.1                              | 420                   | 0.80                  | 336                     | 237                  | 99                |
| Bermudagrass  | 3 yr avg (2008-10) | 92                  | 5/23                    | 8/29                     | 98                      | 477                            | 0.35                             | 167                   | 0.80                  | 134                     | 87                   | 47                |

# Indicates the alfalfa was replanted in 2015 \* Indicates assumption of 20 bushels/acre

economics of 11 alternative systems. Because of differences in the cattle market across the various study periods, we normalized the revenue for each system by assigning a common value of gain for each pound of beef produced by each cool-season component. If graze-out wheat and bermudagrass systems are considered the standard, many of the systems are equal to them or greater in economic net return. The bermudagrass system was the least profitable because of extremely low animal performance and would not be recommended for stocker cattle production.

Perennial systems are generally considered desirable since they do not require annual establishment (less labor and fuel) and can potentially have greater soil health benefits (less erosion and greater carbon sequestration).

It's important to point out that the alfalfa systems planted in 2013 (alfalfa/tall fescue and alfalfa/wheat/crabgrass) had to be replanted in 2015 when Tropical Storm Bill dropped 12 inches of rain in 12 hours and the alfalfa did not survive. Therefore, we used an amortized stand life of 3.5 years in the analysis, and the trials are ongoing. These alfalfa systems are going into their fourth season, and final economic conclusions cannot be reported until the alfalfa stands decline below a critical threshold of 15 percent in mixtures and 50 percent in monoculture. However, pre-

A few systems with greater net returns are worth mentioning:

- Perennial, summer-dormant tall fescue (Flecha and Chisholm)
- 800RR experimental alfalfa, currently being developed by the Noble Research Institute
- The annual systems that include multiple species (i.e., wheat/crabgrass and rye/ryegrass)

liminary results from a sensitivity analysis suggest alfalfa needs to persist for approximately five seasons to be economically competitive in these systems.

### NEW TECHNOLOGIES

We are also developing and deploying new technology to improve efficiency in grazing research.

The photo you see above the title of this article depicts our walk-over-weighting (WOW) systems, which are designed to measure an animal's weight each time it accesses water. The systems are equipped with wireless connectivity that transmits the date, time, pasture identification, animal electronic identification (EID) and weight the instant an animal walks over

the scales. The data is transmitted to a specified computer that enables researchers and producers to access it in real time.

This system consists of Tru-Test brand components (WOW load bar/scale, platform, EID reader and associated electronics), a custom-designed solar power system, and a fabricated metal platform designed to be mobile. Each system is positioned in front of the sole water source, so each animal has to walk over the scales to access water.

Ultimately, we would like to develop decision support tools to help producers make management decisions — involving, for example, stocking rate adjustments, marketing opportunities and quick identification of sick animals — on the best-adapted and most profitable forage systems in the region. In order to accomplish this, we need to be able to estimate daily forage biomass and daily animal weight in conjunction with the integration of weather and proven crop models that will help us predict future biomass.

We plan to collaborate with a systems data modeler once these systems are fully functional to help us develop an infield real-time forage biomass growth prediction model.

The table will be updated in December with the final season data. 🐄

LIVESTOCK

# DNA

## Technology for the Commercial Cow-Calf Producer

By Robert Wells, Ph.D., livestock consultant | [rswells@noble.org](mailto:rswells@noble.org)



By now, most everyone is familiar with DNA technology to some degree. We've all seen television shows that have used DNA data to capture the criminal or to prove parentage of a person. The same technology is currently available in the cattle industry through several DNA testing companies. We now have the ability to not only determine "who's the daddy of that calf," but also to peel back the hide and genetically see how a calf is expected to perform for numerous traits. This industry has matured enough to provide suitable reliability at a reasonable cost for the commercial cattleman. So how should the commercial cattle producer embrace this relatively new technology?

First, ask yourself what goals you have for your beef cattle enterprise. Without sitting down and performing this critical step, it will be hard to decide which traits to

**A DNA TEST WILL QUANTIFY THE FOLLOWING TRAITS:**

### PERFORMANCE TRAITS

- Milk
- Residual feed intake
- Average daily gain (ADG)
- Weaning weight (WW)
- Yearling weight (YW)

### CARCASS TRAITS

- Tenderness
- Marbling
- Ribeye area
- Fat thickness
- Hot carcass weight

### MATERNAL TRAITS

- Birth weight (BW)
- Calving ease direct (CED)
- Calving ease maternal (CEM)
- Stayability
- Heifer pregnancy
- Docility

*Story continues on next page*



emphasize within the herd.

It will be difficult to find an animal that can excel in all traits. Therefore, you should pick the traits that will have the most economic impact on your operation and concentrate on them. Remember, it is not wise to perform single trait selection. A balanced selection approach will result in a cow that is more desirable for your ranch and subsequently a better calf for the industry.

The following are a few thoughts on how you can use the traits to identify a heifer that will become a profitable cow in your herd.

#### **DETERMINE WHICH TRAITS ARE IMPORTANT TO YOUR OPERATION**

These traits will be based on your marketing goals and endpoint. Are you marketing replacement heifers, and steers are a byproduct of your production system? Are you a 100 percent terminal operation that sells all calves at some endpoint before the packing plant? Or will you retain ownership and sell on a grid basis?

If you are breeding for replacement heifers, concentrate on the maternal characteristics (birth weight, calving ease maternal, calving ease direct, stayability, heifer pregnancy and docility), efficiency traits (residual feed intake and average daily gain) and carcass traits (marbling, fat thickness and ribeye area).

If you manage a terminal operation, you always buy replacement females and will sell

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### **It will be difficult to find an animal that can excel in all traits. Therefore, you should pick the traits that will have the most economic impact on your operation**

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before the calf goes to the packing plant, so concentrate mostly on maternal traits (calving ease direct and birth weight), performance traits (average daily gain, weaning weight and yearling weight). However, you should still have some selection pressure for carcass traits (marbling, ribeye area and fat thickness).

In my opinion, it is difficult to place equal selection pressure on the carcass traits and on the performance and maternal traits since you will be selling pounds of live product. It is difficult to get a buyer to truly pay enough for perceived carcass quality of the calf when not selling on the rail. Most times, the value of additional live weight will overcome any carcass quality premiums paid when selling a live calf before the feedlot phase of production. With

that said, I believe it is good business to stay at least average or better for DNA carcass traits. Most breeds do a fairly good job of meeting industry expectations. The cow-calf producer should ensure the calf has the genetic potential to be profitable for the entire industry. The old saying is true, "A rising tide floats all ships." Therefore, if one sector of the supply chain is not profitable, there is a trickle-down effect to those sectors that occur before it.

If you sell cattle on a grid basis, take a more balanced approach. You will need to pay attention to all the traits mentioned for terminal operations. However, you'll also want to more closely consider carcass traits since you will receive the actual full value of the carcass since you are selling directly to the packer.

#### **SET ACCEPTABLE LIMITS FOR EACH TRAIT AND STAY WITHIN THEM**

Maximizing any one trait can be a mistake if you don't consider the other traits that are economically important to the operation. If you have large-framed cows, overemphasizing calving ease direct and birth weight is not justifiable. Most Angus-type commercial cows already have enough milk built into them that going for the extremes is not justifiable and can actually work against you when looking at residual feed intake and the ability of the cow to be easy fleshing. Middle-of-the-road  
*Story continues on next page*



DNA values for milk are acceptable. Stayability has a low heritability estimate and can be impacted more so by heifer/cow management than DNA scores can currently predict. It's important to consider, but placing emphasis of this trait over others may not be as impactful as one might believe.

#### **UNDERSTAND THE GENETIC EFFECTS OF EACH DNA TRAIT AND HOW TO INTERPRET THEM**

Just because you select an animal with a very high DNA score (10) for a trait does not mean the calf will exhibit that trait 100 percent of the time.

Take calving ease direct (CED) for example. A DNA score of 10 has a 23.9 percent probability of being calving ease based on the factors used to develop this DNA score. A CED DNA score of 3 has a 5.3 percent probability of being calving ease. Therefore, if comparing two replacement heifers with DNA scores of 10 (23.9 percent) and 3 (5.3 percent), the numerical difference between the two probabilities (18.6 percent) is the relative difference between these two animals.

Likewise, a weaning weight (WW) DNA score of 10 (63.9 pounds) does not mean you wean off a calf that weighs 63.9 pounds heavier than current. If you compare a WW DNA score of 10 (63.9 pounds) to a score 3 (14.2 pounds), what you can assume is that the higher DNA score animal should have a calf that has a 49.7 pounds heavier calf at weaning.

### **DNA testing has become an economically viable tool that should be used when making selection decisions for commercial cattle producers.**

#### **SET REALISTIC EXPECTATIONS OF THE GENETIC PROGRESS THAT CAN BE MADE**

Management of the animal has a large impact on the ability of the animal to express its genetic potential. As demonstrated above, you should look at the relative differences between the DNA scores and how they translate in production values.

I do not recommend using DNA scores as the sole source of information for making selection decisions. Couple the use of DNA with all the other tools such as visual evaluation, history of the animal (how was she raised, vaccinations received, etc.), expected calving date, price, etc. Likewise, I cannot make the recommendation to use DNA to differentiate between two individuals that are fairly close in DNA score. However,

DNA can be used to identify the outliers. Identifying those individuals that would be in the lower 25 percent, 33 percent or 50 percent of the DNA trait will help to remove those animals from consideration.

#### **BOTTOM LINE: DNA CAN BE A USEFUL TOOL, BUT DON'T FORGET THE BASICS**

DNA testing has become an economically viable tool that should be used when making selection decisions for commercial cattle producers. Without DNA, most producers are selecting their females the same way great-grandpa did back in the early 1900s — with limited empirical data, mostly based on anecdotal information and visual evaluation.

Oftentimes, the purchase decision on retaining or buying a replacement female is based on how she was raised and what she was bred to for her first calf. I encourage you to look further beneath the hide to know what genetics she can contribute to your operation, through every calf she has while on your ranch.

Remember, DNA testing is one of many tools that should be considered when making replacement animal decisions.

Finally, the best genetics in the world cannot overcome poor management decisions and environment. How an animal is raised and managed and the environment it lives in will allow the animal to either reach its genetic potential or not. 🐮

## SPECIALTY AG

# Advice for Successful Raised Bed, Container Gardening



By Steve Upson, soils and crops consultant | [sdupson@noble.org](mailto:sdupson@noble.org)



**O**n Sept. 27, 2018, we conducted a backyard farming field day at our main campus in Ardmore, Oklahoma. This educational event was designed to acquaint participants with tools and techniques they can

use in a backyard setting to produce their own food.

One of the key components on display was the raised garden bed and container exhibit, which features beds and containers of all shapes, sizes, composition and pricing for both kit and home-built (DIY) structures. *Story continues on next page*



## FOR MORE IDEAS

You can learn more about some of our novel raised bed and container garden designs at the following links:

- Permanent Raised Bed Gardening ([www.noble.org/permanent-raised-bed](http://www.noble.org/permanent-raised-bed))
- Build Your Own Tower Garden ([www.noble.org/diy-tower-garden](http://www.noble.org/diy-tower-garden))
- Easy Access Raised Garden Bed ([www.noble.org/easy-access-raised-bed](http://www.noble.org/easy-access-raised-bed))
- Raised Bed Downsized for Construction Ease ([www.noble.org/raised-bed-downsized](http://www.noble.org/raised-bed-downsized))





Some structures are commonplace, having been used for generations. Others are novel designs. Participants were able to examine these growing structures and learn about construction and maintenance requirements.

We have constructed roughly 30 beds or containers and have plans to construct many more as resources permit. It is my opinion that all of the beds and containers we are currently evaluating have the potential to produce bountiful vegetable crops, if properly managed. However, some are more difficult to manage because of design. This is also true when it comes to durability. Some growing structures are more prone to structural failure based on composition and design.

Based on many years of raised bed and container garden construction and growing experience, I offer the following comments and recommendations.

### RAISED BEDS VS. CONTAINERS

One of the topics that often confuses new gardeners is the difference between a container and a raised bed. Many of the display structures look like beds but are technically containers because they have bottoms. A bed may contain a different soil type than the soil it rests on, but because it is bottomless there is no barrier to prevent the movement of water out of the bed. This is an oversimplification of the process as soil depth, soil type, pore space and capillary action all contribute to drainage. Garden soil may be used successfully in a raised bed but should never be used in a container due to drainage issues. A soilless mix (potting soil) is recommended for container gardening because of superior drainage characteristics.

For more information on growing mixes for container production, refer to my *Noble*

*News and Views* article, “Container Gardening: Here’s What You Need to Know” at [www.noble.org/container-gardening](http://www.noble.org/container-gardening).

### KIT STRUCTURES

As a rule, kit structures lack durability. The kit structures we demonstrate range in price from \$200 to \$500 depending on size and composition. Most of the structures are wood-framed with a few made of vinyl or recycled plastic panels. Many components are undersized to keep construction and shipping costs to a minimum. Also, much of the hardware used to connect the structure is undersized or there is not enough to ensure a good connection. Consequently, side panels bow out, come lose or break apart, and screws pull out. This is especially true with the wood-framed structures that come equipped with boards often less than one-inch thick.

Kit structures might look great while viewing online but fall short of delivering in the garden. This is not to say there are not good kit structures on the market, but be ready to pay far more than \$500 for a durable one with decent size.

### RAISED BED LINERS

Plan on spending a little extra money to coat raised garden bed liners prior to using. Wood bed liners are susceptible to rot and metal liners to corrosion. Using pressure-treated wood or a rot-resistant wood such as cedar is a good first step, but additional protection is recommended to extend the life of your structure.

Preventing water absorption is the key to extending the service life of wood. To seal out moisture, consider applying several coats of a rubber-based sealant to the interior surface of all wood liners. Commercial oil-based wood

sealants and preservatives may be used on exterior surfaces but should not be used on interior surfaces due to potential health risks.

Galvanized, corrugated sheet metal roof panels are commonly used as a liner. If exposed only to rain water, these panels can resist corrosion for decades. However, the service life is greatly reduced when in contact with soil. Without additional protection, these sheet metal liners can rust out in as little as five years. Moist soil is much more corrosive than water because fertilizer salts (electrolytes) in the soil speed up the rate of corrosion. A coating is recommended to prevent contact with the soil solution. Consider applying several coats of a rubber-based sealant to the interior surface of all metal liners.

### RAISED BED CONSTRUCTION

Concrete blocks and landscape wall blocks are excellent building materials for use in raised garden bed construction. Both may be loosely stacked using an overlapping pattern for maximum stability.

To minimize shifting, the first run of blocks should be set on a packed gravel base. It is tempting to use mortar on block walls to prevent block slippage, but this should not be done unless a concrete footing is used. Without a concrete foundation, the soil is prone to shift, causing the wall to crack. When using hollow core blocks, it is best to dry stack the blocks and use sections of rebar or steel pipe “pins” inserted through the core openings and into the soil to limit block movement. Once pinned, the cores can be filled with sand or gravel.

When selecting a style of growing structure and composition, you should consider the initial construction cost and the maintenance cost.

One material we have found that offers both a low initial cost and a low maintenance cost is a discarded tire. As part of our raised garden bed and container exhibit, we display multiple growing structures made from used tires. 🐾

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## MARCH 5

### Nutrient Management for Pastures and Hayfields

1-4 p.m.  
Noble Research Institute  
Kruse Auditorium, Entry 5  
No Registration Fee

Join the Noble Research Institute's soil and crop consultants as they discuss concepts in pasture and hayfield fertilization. Efficient and economical fertilization to increase yields while minimizing environmental risks is imperative to any operation using fertilization. This seminar will cover the essential information you need to implement an effective nutrient management program.

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## UPCOMING EVENTS

For more information or to register, visit [www.noble.org/events](http://www.noble.org/events) or call 580-223-5810. Preregistration is requested. For other agricultural questions, please call our Ag Helpline at 580-224-6500.



Congress passed a new tax law in December 2017 that will impact all business entities and people who will file a tax return for the 2018 tax year.

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



JANUARY | 15

### How to Use Prescribed Fire for Wildlife and Livestock

8:30 a.m.-3 p.m.  
Coffey Ranch  
Registration Fee: \$25,  
Includes Lunch



JANUARY | 29

### So You Want to Grow Fruit in Your Backyard?

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



JANUARY | 31

### So You Want to Grow Vegetables in Your Backyard?

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



FEBRUARY | 22

### Heifer Selection and Development

9 a.m.-3 p.m.  
Oswalt Ranch  
\$25, Includes Lunch