

# NOBLE NEWS & VIEWS

## WILDLIFE

### 7 Things Research Tells Us About Northern Bobwhite and What They Need



Figure 1: Breeding Bird Survey data for bobwhite populations in Oklahoma. Since 1967, the bobwhite population has declined by nearly 68%.



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The northern bobwhite quail is an iconic species for many reasons. Depending on who you talk to, you may hear bobwhite referred to as a game bird, an indicator or an umbrella species, or a species of conservation concern.

Bobwhite are found in the eastern half of the United States. Having such a large distribution is driven by their generalist behavior, meaning they can live in a variety of habitats as long as basic habitat requirements are met for foraging, nesting and raising a brood (newborn chicks). As an indicator species, bobwhite are used to gauge the health or status of ecosystems and other grassland species. Bobwhite may also serve as an umbrella species because many other plants and animals rely on the same type of habitat and healthy landscapes.

During its spring courting ritual, you

will hear the male’s unique whistle — “bob” “white” — which gives the bobwhite its name. Hearing the “bobwhite” whistle reminds us of days gone by when one could drive backcountry roads and hear whistles at each stop. But today, it is much rarer to hear the iconic “bobwhite” whistle.

#### DISAPPEARANCE OF THE BOBWHITE

Data from the Breeding Bird Survey shows that bobwhite populations across much of their range have been declining since 1967. From 1967 to 2015 in Oklahoma, the bobwhite population has declined by nearly 68%, which equates to about a 2% decline per year (Figure 1). Some areas of Texas have experienced declines of 75% in the past four decades.

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There are a number of factors that have led to the decline: overgrazing, woody plant encroachment (primarily trees), introduction of exotic grasses, variable weather, herbicide/pesticide use, disease, predation and the list goes on. However, loss of habitat is the driving factor behind the decline. In addition to habitat loss, habitat fragmentation and degradation also play roles.

Although a general decline in bobwhite populations is evident, bobwhite also exhibit good and bad years. The cycle of these years is known as the “boom and bust” cycle. Population productivity is tied to weather patterns, especially rainfall in the western portion of the bobwhite’s range. Rainfall produces greater forage and insect abundance as well as the necessary vegetation requirements to increase survival and reproduction.

### WHAT BOBWHITE NEED TO SURVIVE

Just like any species, bobwhite need food, cover, water and space to meet seasonal habitat requirements. Oklahoma and Texas consist primarily of native rangeland containing grasslands, brushland or remnants. Grasslands are particularly important as feeding, nesting and brood-rearing habitat. Woody cover, mainly as shrubs or brush, is also required and used for whistling posts, loafing cover, thermal cover and escape cover. Bobwhite have predators that attack from the air and the ground, so a certain level of woody vegetation is needed to provide overhead cover and screening cover. A number of estimates exist on the amount of woody cover required. Estimates of as little as 5% have been reported, but estimates of 30% also are reported, with the average falling between 15 to 25%.

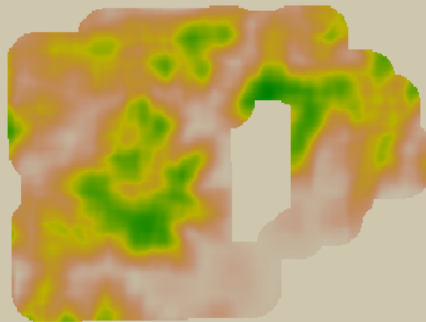
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## Studying Habitat in Relation to Bobwhite Population

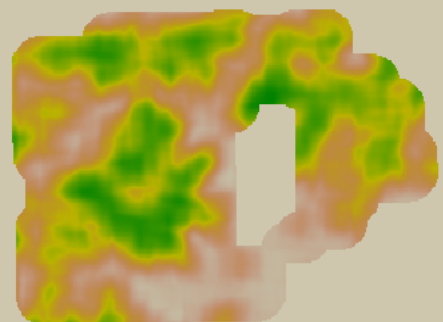
From 2008 to 2018, Noble Research Institute conducted spring whistle counts for bobwhite at 13 survey sites on the Oswalt Ranch in Love County, Oklahoma. Using these data, we are able to look at trends in populations as they relate to environmental conditions or factors, such as encroachment of woody species. We used data from the Rangeland Analysis Platform (see “Track Annual Changes in Range Vegetation With Online Tool”) to assess how changes in shrub and tree cover affect bobwhite populations.

Mapping shrub and tree cover shows that these classes of woody cover have increased approximately 1.7% per year across the ranch during the course of the study. Considering the woody cover needs of bobwhite, mainly dense, low growing (less than 6 feet) shrubs, we expect bobwhite populations to respond favorably to shrub cover when within the recommended range. However, trees offer little habitat for quail, so greater tree cover will negatively affect bobwhite populations.

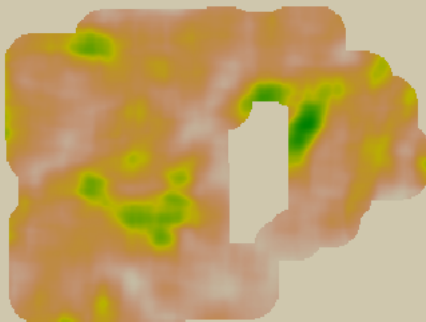
TREE COVERAGE 2008



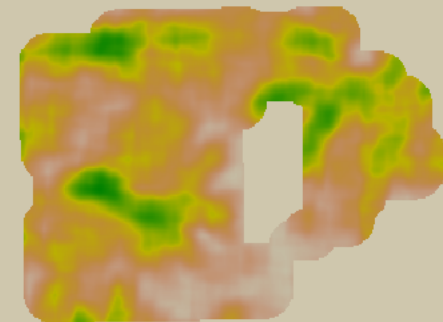
TREE COVERAGE 2018



SHRUB COVERAGE 2008



SHRUB COVERAGE 2018



## Help Oklahoma Gather Important Information About Game Birds

Wildlife biologists at Oklahoma State University developed a mobile app (available for iPhone and Android users) to collect data on common game birds in Oklahoma. The species of interest include: scaled (blue) quail, prairie chicken, bobwhite quail, ring-necked pheasant and wild turkey. The goal of the app is to collect data that can be used by the Oklahoma Department of Wildlife Conservation to estimate annual reproduction, an important aspect of healthy game bird populations. Users enter the number of adult birds observed along with the number of chicks or poults, the county of observation, date, and any notes or comments about the observation. Data can be entered at any time during the year but is most critical during the reproductive season, which falls between April and October.



For more information about the app, go to: [bit.ly/ok-state-bird-app](https://bit.ly/ok-state-bird-app)



## Trends Observed In Northern Bobwhite Research

### 1 Grazing cattle is compatible with quail management and when done properly, benefits rangeland health and creates habitat for quail.

For example, cattle disturb the soil, which can increase bare ground and promote forb production. Bobwhite spend much of their time on the ground, so they require some bare ground to ease their movement. This is especially important for chicks. Greater forb production then provides seeds and attracts insects as sources of food. However, proper stocking rate is key.

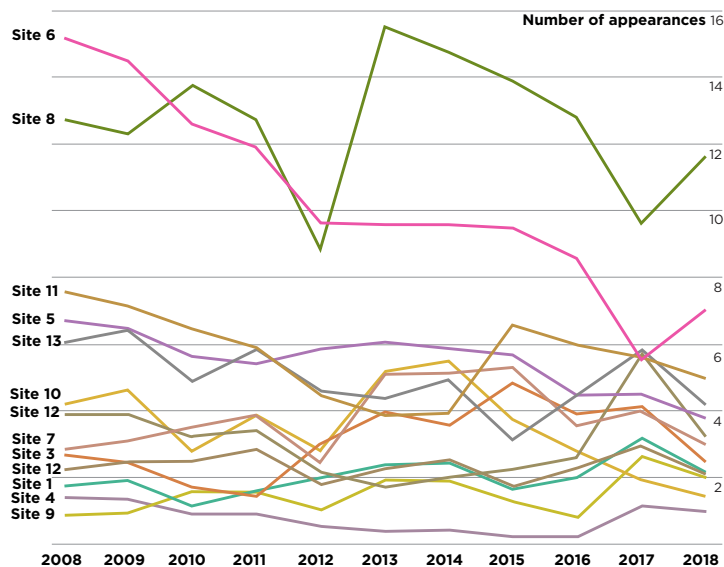
### 2 The abundance of bobwhite was lower at sites with greater tree cover.

Average tree cover at sites was 29% in 2008, ranging from 9.7-43.8%. Also as expected, bobwhite abundance was greater at sites where shrub cover was greater, which averaged 5.5% in 2008. The average shrub cover at our survey sites is within the recommended range for shrub cover (5-30%), even after shrub cover increased through 2018.

### 3 Warm weather makes a difference.

We also found that calling activity of male bobwhites was greater on warmer days, so whistle counts may be more informative about the presence of bobwhite when surveyed at warmer times during the morning from sunrise through mid-morning. And, like most bobwhite populations, there is a lot of variability in abundance from year to year and from site to site (Figure 4).

**Figure 4.** Annual abundance estimates of calling male bobwhites across 13 survey sites and 11 years. Survey data was not available for 2009 and 2014, so models predicted abundance for these years.



### 4 Precipitation preceding the whistle count from October to March influenced whether bobwhite used particular sites or not.

As precipitation increased during the cool season, quail were less likely to be found at most of the survey sites. Bobwhite may not be found on particular sites after greater cool-season precipitation because most forage production is dominated by three types: native Texas wintergrass as well as non-native bromes and goatgrass. These species can comprise up to 85% of the biomass prior to the start of surveys on some sites. As these species increase, often as a result of improper grazing management, bobwhite have a more difficult time moving through these areas, which may cause a reduction in the use of these sites.



### 5 With tree cover increasing in many areas, an affordable and effective management tool to manage woody cover is the use of prescribed fire.

For many reasons other than management of woody species, fire is one of the most effective tools for managing quail habitat. Fire removes excess litter (aiding in movement), stimulates new forage production, and can increase insects and preferred forbs. Most burns are cool-season burns that stimulate perennial forbs. However, growing-season burns (conducted in July through September) may be required when the goal is to reduce woody species. Patch burning is probably more beneficial than other burn types because it creates patches of burned and unburned sites for quail. This creates greater plant diversity and edge habitat.

### 6 Improper use of fire and grazing can be detrimental to quail.

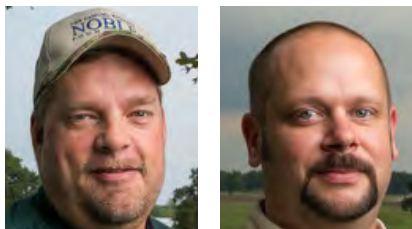
Too little vegetation and too much bare ground doesn't offer food or security cover. Also, having too little vegetation may interfere with successful prescribed fire management because there is too little fuel to carry a fire. Just like overgrazing can impact quail habitat, so can too much grass. If there is too much grass and litter and not enough bare ground, then quail have a difficult time moving about.

### 7 Too much of any one thing is not a good thing, especially for quail.

Too much litter, too much woody cover, too much grazing or too much bare ground limit habitats that quail need to survive and reproduce. 🐔

## WILDLIFE

# Track Annual Changes in Range Vegetation With Online Tool



by Mike Proctor, senior research associate | [mdproctor@noble.org](mailto:mdproctor@noble.org) and Stephen L. Webb, Ph.D., staff scientist | [slwebb@noble.org](mailto:slwebb@noble.org)

Vegetation monitoring is of great importance to land managers. But it's difficult to accomplish. It's tedious and time-consuming, requiring personnel trained in ecology and range plant identification. Once the data is collected, it has to be entered into a database, processed further to obtain estimates of biomass or quality, then analyzed. Most often, vegetation data is collected for limited seasons or years, so you only gain an understanding into the current conditions, and nothing about what direction things are headed. Knowing something about the past can provide a great deal of insight into what may happen into the future, but that can only be done if the data exists.

This is where the Rangeland Analysis Platform (RAP) comes into play as a useful tool for everything from monitoring how drought has affected perennial forage on a ranch to evaluating how well prescribed burns are working over time to reduce tree cover.

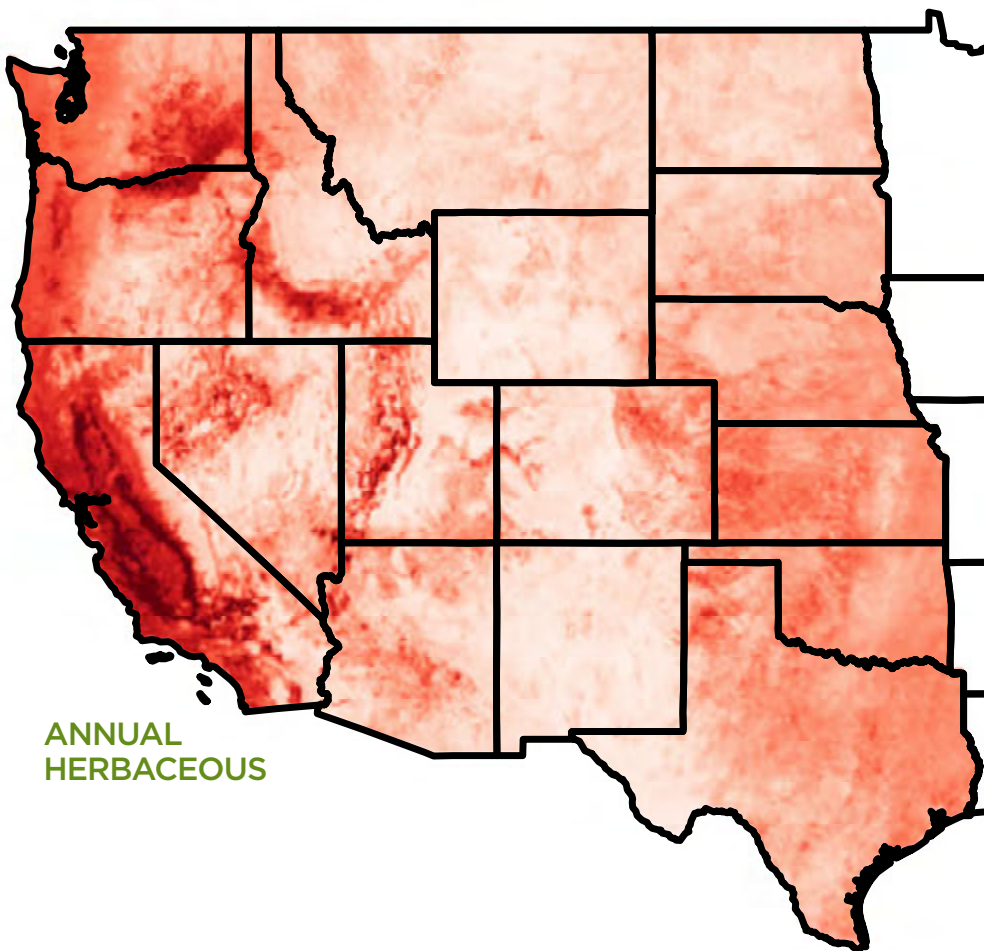
## MORE THAN THREE DECADES OF VEGETATION DATA

The RAP dataset consists of images where vegetation cover is estimated over an area of about one-fourth of an acre. RAP data extends back to 1984; the most current year is 2019, with plans to add a new set each year. The dataset uses Landsat satellite imagery, various vegetation indices, weather, topography and soils to estimate vegetation cover. To provide greater accuracy of cover estimates, 30,000 sampling locations are monitored for on-the-ground data. The program uses advanced analytical tools known as machine learning to develop predictions for estimating cover of grasses, forbs (grasses and forbs are combined into what is called a "herbaceous" cover type), shrubs, trees and bare ground. Currently, the data only covers the western half of the U.S.

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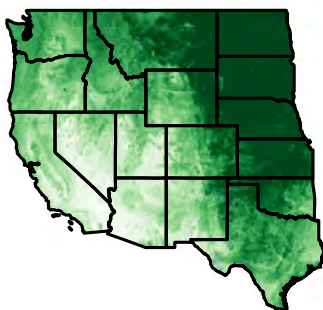
## ABOUT THE TOOL

RAP is a free, interactive online mapping tool (<https://rangelands.app>) that allows managers to track annual changes in vegetation cover. RAP lets managers, landowners or conservationists visualize and estimate the percentage cover of annual grasses and forbs, perennial grasses and forbs, shrubs, trees, and bare ground.

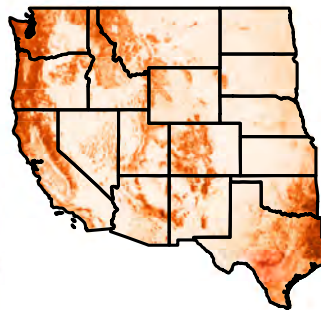


ANNUAL HERBACEOUS

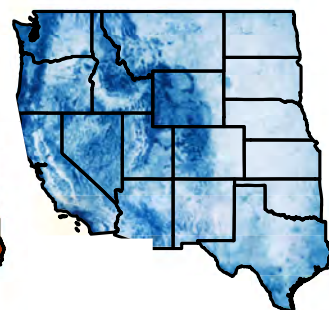
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TREES

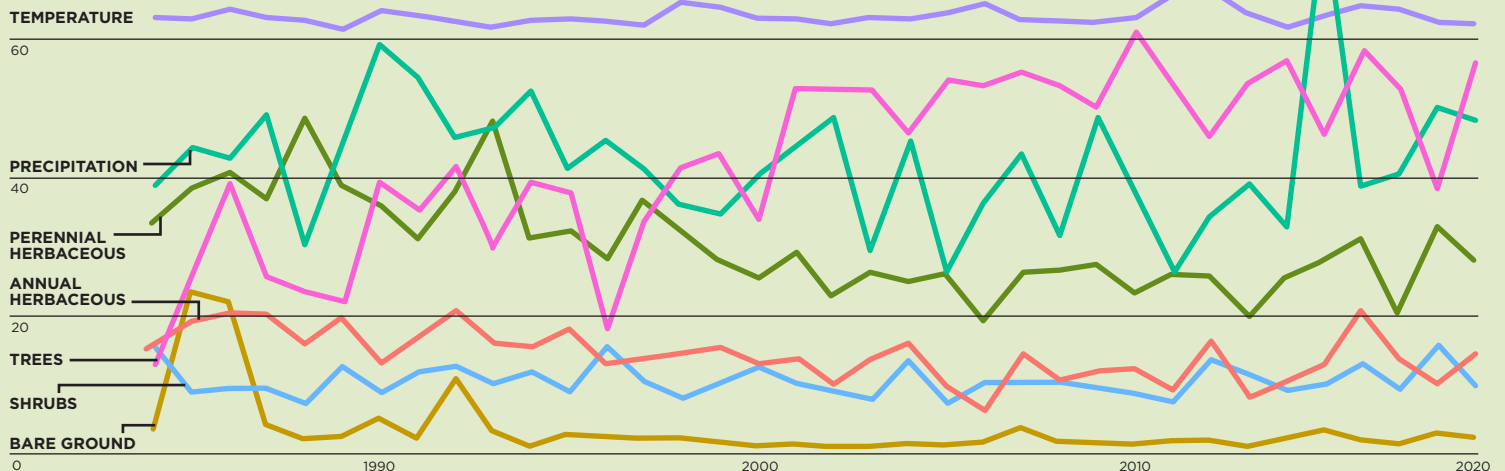


SHRUBS





## PREDICTED COVER FOR RAP CLASSES



### REAL-LIFE RAP EXAMPLE: MARSHALL COUNTY, OKLA.

We downloaded RAP data for an area in southern Marshall County, Oklahoma, comprising about 130 acres. We knew the land-use history of this location, so we were interested in how RAP predicted vegetation cover changes over time. Most of the area had been disked just a few years prior to the start of the platform. Since that initial disking, no further land management or modification has occurred. As ecologists, we predicted that we would

see a strong increase in woody plants (shrubs and trees).

The graph produced by RAP is pretty busy, with seven lines for the vegetation types along with temperature and precipitation. Again, notice the annual variability of each cover class (the peaks and valleys in the lines). This is partially driven by weather patterns. There are trends in the data even if they are difficult to see.

Temperature is averaged over an entire year. The change in average annual temperature over the whole time

period isn't dramatic (less than 1 degree Fahrenheit increase), but considering these are average annual temperatures, there is a lot of variability over years. This is something we are all too familiar with, living in Oklahoma and Texas. The same holds for precipitation: the trend line shows average precipitation of approximately 40 to 42 inches per year. Just like temperature, there are variable patterns of precipitation, with some years showing above-average precipitation along with years of well-below-average rainfall.

## USING RAP

On the RAP homepage, you'll see a fact sheet, video demonstration and user guide to help you get started, or, since RAP is interactive, we recommend that you just navigate around the application and learn what each feature can do. Click the "LAUNCH APP" button to take you to the application. From there, you can zoom into an area of interest (AOI). Adjusting the "Opacity" in the box to the left will make navigation to an AOI easier. Land cover type and year can be changed from the menu in the top left. Where RAP really shines is by creating "times series" data sets to view.

Using RAP to view a specific area is fairly straightforward if you are already familiar with shapefiles (polygon boundaries of an AOI). If not, don't be intimidated. Simply click the "Draw features" button to draw a box or polygon around the AOI. You can draw a simple box or try to map the exact boundaries of a property. To map the property, you will need to click on the area more often to smooth the AOI boundaries to conform to the property boundary. If you have a shapefile of your AOI, simply click on the "Upload shapefile" button and browse to the file.

There are also several land cover types from which to choose. For example, choosing a cover like tree cover and clicking on the right triangle will let you see changes in tree cover from 1984 to present. Now that you are familiar with this visualization, known as a time series, click on the "Calculate time series" button. After the program does an analysis, a small graph will appear in the lower left

of your screen. The graph is too small for interpretation, so click on "Generate report," which will create a PDF containing the graph and AOI. For more advanced users, or to create your own figures, click on the "csv" or "Excel" buttons on the left of the thumbnail figure to export the raw data.

There can be a lot of variability in cover of each vegetation type from year to year (see "Predicted Cover for RAP Classes" figure). Some of the real value comes from the data spanning the past 35 years, so that is a powerful way to look at trends in cover changes over time. Advanced users can export the raw data to Excel as we mentioned previously and then create a figure within Excel. After that, add a trendline to see whether a land cover type is increasing or decreasing over time. See the Marshall County, Oklahoma, case study for an example of what type of information can be extracted from the raw data.

### USEFUL TOOL FOR LAND MANAGERS

The Rangeland Analysis Platform can be a useful tool, not only in the Western U.S., but also in the Great Plains. It can help managers involved in land stewardship and range ecology better mitigate climate and land use change by managing and building resilient rangelands.

## CHANGE IN VEGETATION COVER CLASSES

Now, let's look at the vegetation cover classes. Annual herbaceous vegetation declines slightly, from 19% cover to 15%, over the 35-year period. The amount of bare ground also decreases, which is good news because the soil is staying covered with vegetation, one of the soil health principles. Perennial herbaceous vegetation shows a drastic decline, from 40% down to 20% over time.

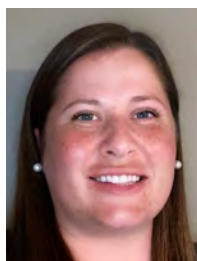
Next, let's look at tree cover. Tree cover increases from 27% all the way up to 60%, as we predicted would happen based on principles of succession (changes in vegetation communities). If there's such a noticeable increase in trees, then why aren't there any changes in shrub cover? The increase in the tree cover has come at the expense of the first three classes, but shrubs seem unaffected. The loss of herbaceous cover changes the wildlife forage and habitat potential and the amount of grazeable acres for cattle, but not for the better.

Now back to our question about why shrub cover hasn't changed. The shrubs overtake bare ground and herbaceous cover during succession, but then this woody community matures into what is then classified as tree cover. The amount of area covered by shrubs remains relatively constant over time, but the area covered in trees increases steadily. Once a vegetation community reaches its final seral state, the tree class, there is nowhere else to go, unless a woody plant control management practice is implemented, like prescribed fire or chemical or mechanical brush control. 🐾



## LIVESTOCK

# The Search for Forage-Efficient Cows



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**F**or many years, selection for improved beef production centered on heavier weaning weights and rapid post-weaning gain. Recently, measurement of post-weaning feed intake has facilitated direct improvement in feed efficiency, resulting in animals with a lower feed-to-gain ratio.

The biological mechanisms that control feed intake (the amount consumed by an animal in one day) are highly complex and remain poorly defined. Nevertheless, most scientists agree that intake of low-quality forage is driven primarily by rumen capacity, whereas intake of high-quality, grain-based diets is driven by chemostatic (hormonal) mechanisms. These fundamental differences suggest that the genes

controlling intake in forage diets might be different than the genes controlling intake in concentrate-based diets. The question remains whether a growing animal that efficiently converts calories from a high-quality, grain-based ration to weight gain is also an efficient forage utilizer as a mature animal.

### WHAT WE DID

Researchers at Noble Research Institute and Oklahoma State University set out to determine if intake and performance of cows are similar when fed a high-quality diet (grain + hay) versus a low-quality diet (grass hay) during two different feeding periods.

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This is an important question, because approximately 70% of the feed energy used in beef production is consumed by the cow herd (Gregory, 1972). Furthermore, beef cows spend approximately 60 to 75% of the year consuming moderate to low-quality forage.

During the fall of 2019, 48 non-lactating pregnant Angus-cross cows were divided into four pens of 12 cows each based on age and body weight. The GrowSafe® feed intake system (technology used to measure individual animal voluntary intake) was used in each of the four pens with four feed intake units per pen to evaluate dry matter intake and ranking of animals on two different diets. Two pens were initially assigned to a hay diet with 100% grass hay (10% protein, 55% total digestible nutrients (TDN)) and the other two pens were initially assigned to a grain + hay diet with 43% grass hay, 57% concentrate (11.7% protein, 67% TDN). The concentrate was made up of 23% cracked corn, 24% soybean hull pellet and 10% liquid molasses.

At the beginning of the study, cows were adapted to their assigned diet for 14 days. Following adaptation, feed intake was measured for 45 days. On day 60, diets were switched so that each pen received the opposite diet from the previous period. Cows were then adapted to their new diet for 14 days followed by 45 days of feed intake measurement.

## PRELIMINARY RESULTS

In our study, we found that on a dry matter basis, cows consumed approximately 1.8% of their body weight daily on the hay diet and approximately 2.3% of their body weight on the grain + hay diet. However, there was tremendous variation in feed intake. For example, minimum and maximum hay diet intake was 1.1 and 2.6% of body weight, respectively. Similarly, minimum and maximum grain + hay diet intake was 1.5 and 3.3% of body weight, respectively.

Under these conditions, average daily consumption of the grain + hay diet was highly correlated to average daily consumption of the hay diet. This suggests that, on average, cows with a big appetite consume a lot of feed regardless of diet quality or source of calories (grain versus forage). However, there was a modest negative correlation between body weight gains among the two diets. This data suggest that cattle consuming a moderate-quality forage diet do not perform at the same rate (positively or negatively) as cattle consuming a higher-quality diet.

In Table 1, cows A and B are both 6 years old and are similar in body weight, with cow B consuming more from both diets than cow A. However, feed-to-gain conversion told us a different story. Feed-to-gain-conversion is how many pounds of feed/hay it takes to make 1 pound of body weight gain. Cow A gained weight easier on hay, requiring approximately 15 pounds of hay for every 1 pound of weight gain; whereas, she needed 44 pounds of the grain + hay diet to achieve 1 pound of gain. In comparison, Cow B gained weight relatively easily on the grain + hay diet, needing less than 11 pounds for each pound of gain, but she needed almost 45 pounds of hay per 1 pound of gain.



**Table 1.** Dry matter intake (DMI) and feed:gain ratio (F:G) from two cows consuming a moderate-quality hay-only diet and a higher-quality grain+hay diet during two 60-day feeding periods.

(Cow), Tag #	Age, years	Average Study Body Weight, lbs	Hay Diet DMI (lbs/day)	Hay Diet F:G (lb:lb)	Grain + Hay Diet DMI (lbs/day)	Grain + Hay Diet F:G (lb:lb)
(A) A324	6	1,500	28.1	14.8	36.0	44.1
(B) A337	6	1,425	38.6	44.5	44.5	10.8

**Table 2.** Dry matter intake (DMI) and average daily gain (ADG) from two cows consuming a moderate-quality hay-only diet and a higher-quality grain+hay diet during two 60-day feeding periods.

(Cow), Tag #	Age, years	Average Study Body Weight, lbs	Hay Diet DMI (lbs/day)	Hay Diet ADG (lb:lb)	Grain + Hay Diet DMI (lbs/day)	Grain + Hay Diet ADG (lb:lb)
(C) Z238	7	1,750	28.9	1.0	31.1	1.8
(D) Z241	7	1,740	40.5	0.3	52.0	4.2

In Table 2, cows C and D exemplify the difference in average daily gain (ADG) in this study. Both cows are the same age with similar body weight; however, cow D had a greater intake on both diets and gained poorly on the hay diet while gaining 4.2 pounds per day on grain + hay diet. Cow C was more efficient on the hay diet than cow D, gaining more body weight while consuming 12 pounds per day less, but was less efficient on the grain + hay diet.

## WHAT'S NEXT

Genetic markers for feed intake and feed efficiency to date have been developed using growing animals consuming a high-quality diet. Therefore, a second objective in this study is to determine if genes known to control high-quality feed intake show differential expression depending on the type of diet the cows were consuming. To answer this question, muscle tissue samples were collected at the beginning, midpoint and end of the study. Ribonucleic acid (RNA) will be extracted from these tissue samples to determine if gene expression is similar or substantially different depending on the diet.

## SUMMARY

Thus far, results from this study and a handful of other studies indicate that ranking for feed intake may be similar regardless of diet quality or type. Data from this study also shows us that there are big differences in intake, performance and efficiency between animals of the same weight class that we cannot detect through phenotype alone. This suggests that current selection tools, such as genomic testing and expected progeny differences (EPDS), for feed intake should be useful in selecting low-intake replacement females for forage-based production systems. However, using these tools to select for low intake and above average daily gains may have negative implications when selecting replacement heifers to be efficient cows on forage. 🐮

## Reference

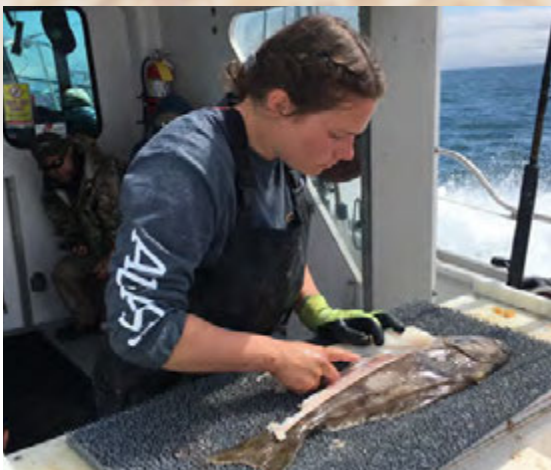
Gregory, K. E. 1972. Beef cattle type for maximum efficiency "Pulling it all together." J. Anim. Sci. 34: 881





FISHERIES

# Grilled: Another Way to Cook Fish



by Mike Porter,  
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**M**ost people in the South, where I grew up, seem to prefer fried fish. I like fried fish, but I like some fish even better when grilled, baked, broiled or sautéed.

Grilling fish with the approach described in this article seems to work best when either fillets or fish flesh attached to the spine are 0.5 to 1.5 inches thick. For grilling, fillets of many fish species can have the skin and scales attached (sometimes described as “on the half shell”) or have the skin removed. Fresh fish is better than frozen fish, but both are good when cooked properly.

Grilling works well with many fish species. I have successfully grilled

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freshwater species, such as largemouth bass, and channel and blue catfish. Channel and blue catfish smaller than 1.5 pounds grill best when attached to the spine without the skin. Larger channel and blue catfish grill best as fillets without the skin, but the fillets tend to draw up and curl. Fillets of crappies, bluegill, redear sunfish and green sunfish do not grill well because they are relatively delicate and crumble during grilling; if grilled, their flesh should be attached to the spine.

I have successfully grilled at least 18 saltwater fish species. Examples include red snapper, red drum, black drum, spotted seatrout and blacktip shark. Red drum should be smaller than 33 inches, and black drum should be smaller than 28 inches, because fillets from larger fish can be course and chewy. Skin of spotted seatrout is too thin for the half-shell approach.

I generally serve grilled fish with baked sweet or white potato; a broiled green vegetable such as asparagus or green beans; and often with stuffed crab, stuffed shrimp or stuffed jalapeno.

## INGREDIENTS

- 6 to 8 ounces of fish fillet per person
- Lemon or lime concentrate juice
- Butter or margarine
- Worcestershire sauce (Mike prefers French's)
- Chef Paul Prudhomme's Blackened Redfish Magic seasoning
- Crushed rosemary (optional)

## COOKING SUPPLIES

- Heavy-duty aluminum foil (use one time and then discard)
- Serving fork
- No-stick grill spray (e.g., Pam, Crisco, etc.)
- 1-quart stainless steel saucepan
- Basting brush
- 2 spatulas
- Grill
- Serving platter

## DIRECTIONS FOR GRILLING FISH WITHOUT SKIN

### STEP 1

Fold edges of a piece of heavy-duty aluminum foil to fit all the fish and fit the available grill space (edges should be folded to the bottom). The doubled edges strengthen the foil. Punch holes 1 to 2 inches apart throughout foil using the serving fork. Spray top side of foil with no-stick grill spray.

### STEP 2

Prepare basting sauce for two servings of fish by melting approximately 4 tablespoons of butter or margarine in the saucepan and mixing in about 3 tablespoons of lemon or lime concentrate juice and no more than 2 tablespoons of Worcestershire sauce. I often vary the relative amounts of each ingredient to give the sauce a different flavor.

### STEP 3

Heat the grill.

### STEP 4

Place the aluminum foil on the grill and then place the fillets without skin onto the foil with the side filleted off the spine down first. This side absorbs the sauce better when the

fillet is partially cooked and turned over. Place either side of a fish onto the foil when it has the spine in it.

### STEP 5

Use the basting brush and sauce to baste the top side of the fillets immediately before turning them when the fish is approximately half-cooked (fish fillets start to turn white near the edges). Only turn the fish once while cooking. I use two spatulas to turn and move cooked fillets, because larger fish fillets tend to fall apart when using only one spatula. Baste the second side (the one facing up) after turning. Sprinkle blackened redfish seasoning and optional crushed rosemary on top of the second side after last basting before fish is completely cooked.

### STEP 6

Fish is ready to eat when it flakes and turns white in the middle of the thickest portion. Place cooked fish on the platter, and serve and eat immediately. Do not overcook. Fish cooks quickly, requiring only a few minutes. **BON APPETIT!**

## FOR BONELESS FISH WITH SKIN AND SCALES ("ON THE HALF SHELL")

Use the same steps for grilling fish without the skin with these alternative instructions for steps 4 and 5: when cooking fish on the half shell, place skin side down on the foil. Cook without turning, and baste only the top side. Cooking fish on the

half shell requires more time than cooking skinless fillets of the same thickness. Basting, seasoning and determining readiness are the same as for fillets or fish with spine in it. Use a spatula to separate the cooked fillet from the skin when serving. 🍴

## RANGE

# Understand These 8 Grazing Metrics to Make Better Decisions on the Ranch



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**A**s we move into the peak of the growing season, it's time to evaluate our forage resources, rolling rainfall data and pasture utilization plans. Making those timely adjustments to our grazing management can save considerable economic and ecologic capital over the short and long term. However, in order to make those appropriate decisions, we need to

fully understand grazing management metrics and how they relate to one another.

Understanding the following foundational and management metrics are key to intentionally managing

any grazing enterprise. They can and will assist you in making better and more informed management decisions. Ultimately, knowing these metrics will help you better understand your operation. We cannot effectively manage what we do not measure.

## FOUNDATIONAL METRICS

### Stocking Rate

Foundational to any grazing enterprise is stocking rate — the number of specified animal units utilizing a unit of land. The unit of land is typically considered the ranch as a whole, and the rate is expressed as animal units per acre or section. Stocking rate is a function of demand and is a producer decision.

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By comparison, a metric often confused with stocking rate is carrying capacity.

### Carrying Capacity

This is the maximum number of animals that a unit of land/ranch can support while maintaining the management objectives of the unit. Carrying capacity is a function of supply. Each pasture will only produce so much forage. Although carrying capacity can be influenced by producer actions, it is not dependent upon a producer decision.

The other side of the forage/animal balance is animal demand.

### Animal Demand and Animal Unit

Animal demand is the amount of forage required to support an animal unit based solely on animal-related factors, such as body size, percentage intake and the number of days grazing. In an effort to provide consistency, animal demand is typically calculated on the animal unit (AU) basis.

An animal unit is a 1,000-pound cow with a calf up to 6 months in age. Animal demand is generally expressed as a daily, monthly or annual forage requirement.

For instance, an annual forage requirement for one animal unit would be 1,000 pounds  $\times$  3% intake  $\times$  365 days = 10,950 pounds on an air-dry basis.

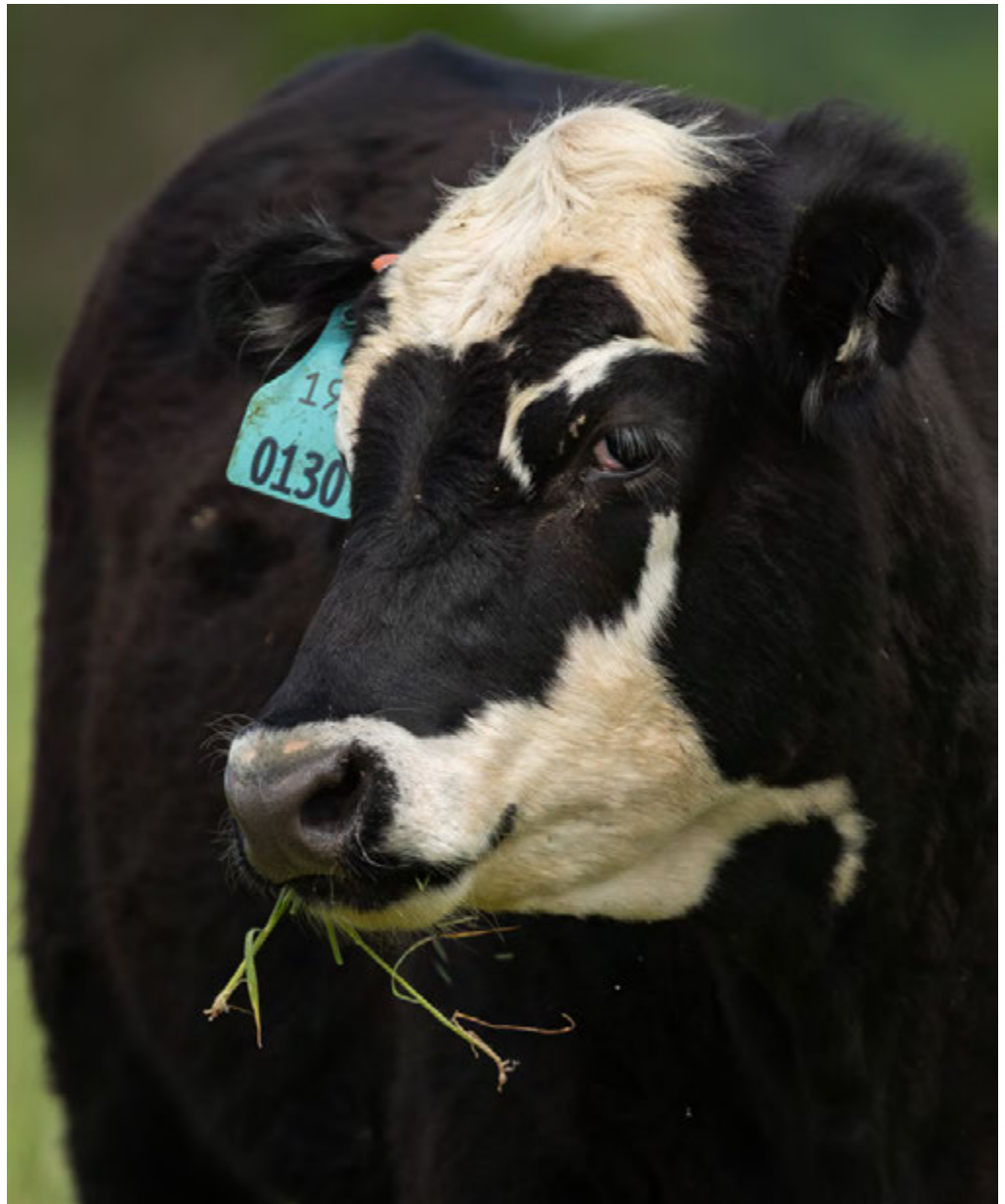
Animal demand is strongly influenced by the weight of cattle. Adjust the animal unit weight by adding in your cattle's average weight to get a more precise animal demand for your operation (i.e., a 1,300-pound cow equals 1.3 AUs or 14,235 pounds annual forage demand).

### Allowable Forage and Harvest Efficiency

When calculating the stocking rate, keen interest must also be paid to how much of the forage produced we allow to be grazed. We refer to this amount as allowable forage, and it is based on a harvest efficiency.

Most producers have heard of the "take half, leave half" rule of thumb. This rule of thumb states that if no more than 50%, or half, of the production is utilized, then the plant will remain healthy and no root growth stoppage will occur. The over-simplification of this rule of thumb has, at times, caused many operations to be overstocked. The problem arises when the decision is made to stock based on 50% of the forage produced. On rangelands, cattle are not the only forage consumers. Approximately 25% of the total annual production is utilized by other grazing (such as by grasshoppers and rabbits) or is lost to other factors such as trampling. The remaining 25% of the total annual forage is what should be used to calculate the stocking rate on rangelands. This is called a harvest efficiency and is always expressed as a percentage.

Harvest efficiencies can be different rates for different forage types. For instance, we typically utilize 25% for rangelands but higher harvest efficiencies are often utilized on introduced monoculture forages like bermudagrass. Knowing the harvest efficiency, we can then calculate the allowable forage (for example, 4,000 pounds total production



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per acre  $\times$  25% harvest efficiency = 1,000 pounds per acre allowable forage for consumption by livestock). Multiply the allowable forage per acre by the total number of acres to get the total allowable forage for the operation. Dividing the total allowable forage by the total animal demand will give you a good estimate of carrying capacity and help you determine a proper stocking rate.

### Grazable Acres

Once the carrying capacity is estimated, one more metric should be considered. A metric commonly overlooked is grazable acres. Not all of the acres on any given ranch are grazeable. Some acres have limited accessibility and lower production because of increased brush encroachment or excessive slope.

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Other acreages that should be excluded due to limited or minimal production include the acres of surface water and ranch roads.

One mile of 20-foot-wide ranch road equals 2.4 acres. Adding up all the acres on the ranch that are inaccessible or are severely limited will aid in estimating a proper stocking rate. A proper stocking rate is one that has addressed grazable acres (i.e., 20 acres per AU initial carrying capacity ÷ 70% grazable acres = 28.5 acres per AU proper stocking rate).

## MANAGEMENT TOOLS & METRICS

Once the overall proper stocking rate for a property has been established, several management tools and metrics can be utilized and measured to improve efficiencies, meet ecological outcomes and track progress.

### Stock Density

Stock density is often confused with stocking rate. Stock density is the number of animals on a specific area for a specific length of time and is generally expressed as live weight per acre. Stock density is the concentration of animals, and that concentration can vary depending on the desired outcome.

For instance, if we have a proper stocking rate estimated at 10 acres per AU and we have a 1,000-acre property, that rate allows us 100 AUs. If those 100 cows continuously graze the 1,000 acres, we would have achieved a stock density of 100 pounds of live weight per acre (100 Cows × 1,000 pounds per cow ÷ 1,000 acres). If we were to subdivide that same 1,000 acres and we placed those same 100 cows on a 5-acre paddock, we would have

increased the stock density to 20,000 pounds live weight per acre with no change to the overall stocking rate. Remember, if your cows are heavier than 1,000 pounds, adjust to their animal unit equivalent (AUE) (i.e., 100 animal units adjusted to 1,100 pound cows = 100 ÷ 1.1 AUE = 91 of the 1,100 pound cows).

Stock density can be utilized to meet ecological objectives, increase grazing utilization and increase recovery/rest periods.

### Grazeable Days Per Pasture

One metric that is useful in developing a pasture utilization plan is grazeable days per pasture. This is an estimate of the number of days a particular herd can graze based on the amount of allowable forage in a given pasture.

**Grazeable Days Per Pasture = (Allowable Forage Per Acre × Pasture Acres) / Daily Animal Demand # Herd AUs**

Grazeable Days Per Pasture = (1,000 Pounds Per Acre × 200 Acres) / 30 Pounds Daily Demand

### 100 Cows

Grazeable Days Per Pasture = (200,000 / 30) / 100 = 66 Days

Ultimately when calculating the grazeable days per pasture, we will be estimating the total days each pasture can be grazed within the given year. When developing a pasture utilization plan, we will go through the process of allocating specific days to specific pastures. Given the number of times you would like to rotate through your pastures, allocate days that

match the growing and dormant seasons, accordingly. Knowing the grazeable days allowable in each pasture is a key metric to understand.

## STOCK DAYS PER ACRE

This is another metric useful to the intentional grazing manager. Stock days per acre can be used as a planning metric as well as a monitoring metric. Planning metrics are used to assess a resource and develop a strategic approach to utilize it. Monitoring metrics are used after a process has occurred to assess the outcome.

Although stock days per acre can be utilized to estimate production prior to a graze, I like to use stock days per acre as a tool to gauge the productivity of my individual pastures after they have been grazed. Essentially, they are an assessment of the actual productivity of each pasture given a desired utilization.

**Stock Days Per Acre = Actual # Days Grazed × # Animals Grazed # Acres in Pasture**

Stock Days Per Acre = (3 Days Grazed × 100 Cows) / 25 Pasture Acres

Stock Days Per Acre = 300 / 25 = 12 stock days per acre

After each grazing year, add up the total number of stock days per acre for each individual pasture to provide an estimate of its overall value and importance to your operation. Some smaller pastures may have more stock days per acre than larger pastures; it's simply based on the level of productivity and the ability of that pasture to recover and be utilized. 🐄

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## SEPT. 3

### So You Want To Grow Pecans

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

There is growing demand for pecans as more people are discovering the many health benefits of this native nut. Pecan culture presents unique management challenges, not to mention the need for specialized equipment. Join Noble Research Institute horticulturists as they review the various production and management practices required for successful pecan production.

## SEPT. 10

### So You Want To Grow Fruit

6:30-8:30 p.m.  
University Center of Southern Oklahoma  
2901 Mt. Washington Road  
Ardmore, OK 73401

There is a growing demand for locally grown fruit, both small fruit and tree fruit. Join Steve Upson, Noble Research Institute senior soils and crops consultant, as he reviews the various practices that fruit growers need to master to be successful.

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Noble Research Institute continues to monitor the COVID-19 situation and to cancel or reschedule events accordingly. Please check [www.noble.org/events](http://www.noble.org/events) for the most current information.

## 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](http://www.noble.org/events). For other agricultural questions, please call our Ag Helpline at 580-224-6500.

## Understanding the Impacts of Fire on Your Property

JULY | 21

Fire can improve wildlife habitat, reduce woody plants, remove thatch, and improve forage quality and quantity for livestock. The most important way to safely burn is to gain experience conducting burns. If weather parameters are within prescription during the field day, we will attempt multiple burns to give you real experience conducting prescribed fire management.

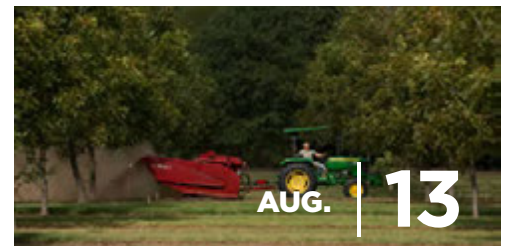
9 a.m.-4 p.m.  
Coffey Ranch  
Registration  
Fee: \$25



AUG. | 4

### Improving Your Pecan Pesticide Utilization

8:30 a.m.-Noon  
Kruse Auditorium  
No Registration Fee



AUG. | 13

### Improving Pecan Profitability With Marketing Strategies

8:30-11:30 a.m.  
Kruse Auditorium  
No Registration Fee



AUG. | 18

### Preconditioning Calves for Success

9:30 a.m.-2:30 p.m.  
Pavilion  
Registration Fee: \$25



SEPT. | 1

### Introduction to Integrity Beef

4-7:30 p.m.  
Pavilion  
No Registration Fee