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INNOVATIONS

Tools in development leverage data for decision-making

by Rob Cook / rwcook@noble.org and Mike Komp / mrkomp@noble.org

What could your ranch be? How will data and information drive your decisions in the future? How will big data, algorithms, smart devices, sensors, unmanned aerial vehicles (UAVs) and any of the other techy buzzwords actually benefit your operations? All of this technology can be overwhelming at times, which makes it tempting to avoid. However, understanding the difference between useful and useless technology will become increasingly important for producers to differentiate themselves and maximize economic productivity into the future.

Grazing land management has always and will continue to be an art on some level. The most effective grazing land managers are in tune with the plant communities, weather and climate, as well as what this means for management solutions. This information is usually acquired over time with experience, but what about the new producers with little experience in an area or producers in new areas? What about the producer who is searching for a way to compile data quickly and efficiently? These producers are at odds with success unless they can rapidly assess and act effectively.

Noble Foundation consultants and researchers are identifying opportunities for sensors and drones to help meet producer goals.

Right now, the Noble Foundation is working to develop and incorporate new data-rich tools to help determine stocking rates and carrying capacities, and to support the development of grazing programs for producers in our consultation program. These tools will not take decision-making out of producers' hands; rather, it will provide them with consistent data and information to make effective decisions quicker. Timely decision-making is a trait of the most successful producers. We should look to embrace technologies that encourage this.

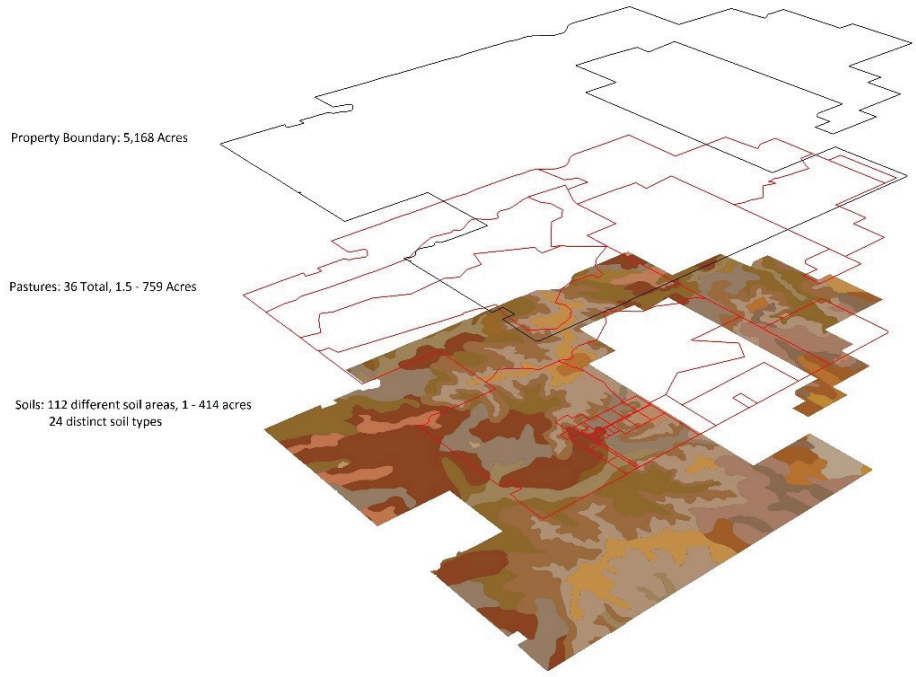
These tools leverage large databases focused on soils, ecological sites and climate to provide baselines for understanding the production potential of a property or pasture. The soil and ecological data was developed for use on a landscape view. However, the information acquired from these databases is extremely important to give producers and consultants a frame of reference for the production potentials and ecological processes that are at play on the ▸

producer's property.

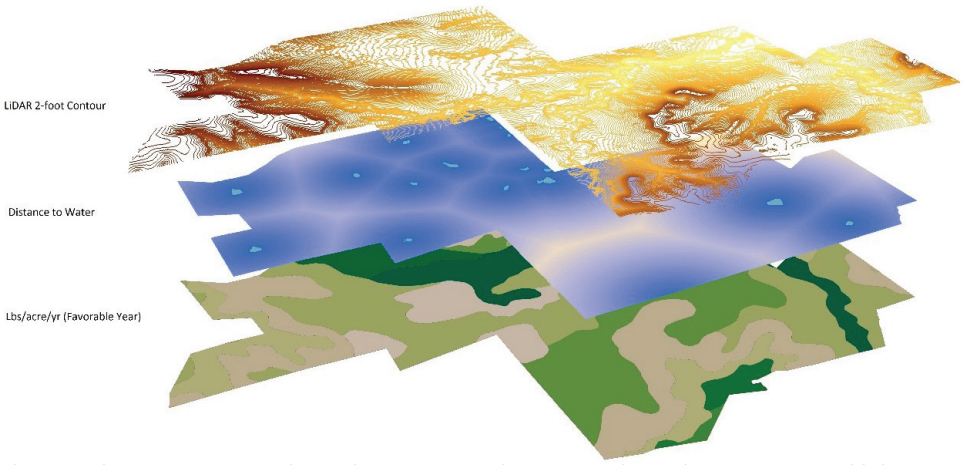
Producers will know their grazing land better than anyone or any database, and technology needs to utilize that input to provide maximum benefit. For example, something as simple as digging a hole can be a tool that can confirms the soil type for a pasture to adjust calculations for forage potential. Furthermore, producers understand current status of range. This information is vital for determining stocking rates, carrying capacities and strategies for grazing rotations. Knowing where they are will allow them to make management decisions to maximize the ecological and economical potential of their properties. Ultimately, this will help producers understand what their properties are relative to what they could be.

When thinking about a property's potential from a data perspective, it starts by understanding where boundaries and pastures exist. This information needs to be created and stored in a digital form in order to be useful; this information is collected through GPS or drawing on a digital map. The information provides the ability to cut information from databases specific to each pasture or property, and. This information gives consistent baseline information for thinking about a property and what it could be.

Looking at information even further on a pasture level, we can determine the utility of pastures for grazing. Elevation and contour data tell us information about grazeability of each pasture. Combining this information with plant community data, road area, energy production sites and/or any other areas that are not grazeable or will not be grazed, will give producers the total grazeable acres in each pasture. Forage production estimates and grazeable acres will help producers and consultants frame an idea of carrying capacity.



Together, information about boundaries, pastures and soils provides producers with a sense of production potential.



Elevation, distance to water, and pounds/acre/year production provide insight into true grazeable locations in pastures, depending on weather and time of year.

Distance to surface water helps us understand pasture utilization and improve grazing distribution. Utilizing this information will allow a producer to make management decisions to ensure the health of the grazing land is maintained or improved.

Historically, extracting data by location has been difficult as it requires expert knowledge, extensive software and specific training. However, new technologies make these tasks easier to repeat. User interfaces provide opportunities for this data to be created, visualized, and interpreted like never before by novice and expert users alike. When you include data from sensor grids like the Oklahoma Mesonet, imagery collected at higher frequency and clarity, and LiDAR, the possibilities for agricultural benefit become extremely exciting. ■

Pregnancy checking provides management options

by Bryan Nichols / bmnichols@noble.org

Checking cows for pregnancy is nothing new, yet its adoption rates are still incredibly low. According to the 2008 United States Department of Agriculture (USDA) survey on cow/calf management practices in the U.S., only 18 percent of all operations and 58 percent of operations with 200 head or more check cows for pregnancy status. The USDA is currently conducting an update to this survey. My hope is that we see adoption rates for this practice increase because there are many benefits to pregnancy checking and multiple options available to do so.

Knowing the pregnancy status of the cow creates additional management options. It essentially gives us a glimpse into the future so that management options can be analyzed and implemented now rather than several months from now. Maintaining an open cow for a year is rarely a sound decision. An open cow can be sold, retained as a stocker cow, or transitioned to a different calving season such as spring to fall. This knowledge allows the producer to make the best management decision given current market conditions. Without this knowledge, the producer is forfeiting a large amount of management control and potential profit.

Other potential benefits based on the method chosen are the ability to sort early calvers from late calvers, determine sex of the calf, identify reproductive abnormalities and provide time with your veterinarian to discuss overall herd health. The latter benefit may become more important for some individuals as the need for a veterinary feed directive goes into effect for some products in 2017.

There are three very good options for determining pregnancy in females: 1) rectal palpation, 2) ultrasound and 3) blood testing.

Rectal palpation is likely the most recognized method by producers. It gives immediate results so that animals can be sorted out of the chute. Accuracy of this method is generally very high at 45 to 60 days post-breeding. A downside is that the skill level of the technician must be accounted for.

Ultrasound is another method and displays higher accuracy slightly earlier at 28 to 35 days post-breeding. It also gives immediate results so that animals can be sorted out of the chute. In addition, this method gives the ability to determine sex of the calf.

Both rectal palpation and ultrasound allow the technician to physically evaluate the reproductive tract and estimate age of the fetus.

Another method is the BioPRYN blood test. This method essentially removes the variable of operator skill level. The test's ability to detect open females is 99 percent accurate, and its ability to detect bred females is 95 percent accurate. The blood must be drawn at least 28 days post-breeding and 75 days post-calving. The biggest advantage is the ease in which producers can learn to pull blood themselves and perform the test as their schedule allows. Downsides of the test are that all females must be individually identifiable. Since the blood must be tested, sorting out of the chute is not an option. Results are generally available within a couple days. Knowledge gained from this test is more limited than rectal palpation and ultrasound. It simply reports a female as bred or open.

The three methods are generally competitive in price. The most important thing is that producers determine what information they want to ascertain through pregnancy checking, then choose the method that provides this information while being logistically feasible. ■

Jar test helps determine compatible chemical mixes

by Eddie Funderburg, Ed.D. / efunderburg@noble.org

I'm often asked if certain pesticides can be tank-mixed, or if they will mix with liquid fertilizer. Many are compatible, but some are not. There are two types of incompatibilities. One is chemical incompatibility. When this happens, the resultant mixture will cause chemical degradation of one or all materials in the mixture, which will result in poor efficacy of the products. For example, if you mix two herbicides that are chemically incompatible, you are likely to encounter poor weed control. The pesticide label should inform the user on what products are chemically compatible.

A more common compatibility problem is physical. When two or more products are physically incompatible, an emulsion may form. This results in a mayonnaise-like substance in your tank that is very difficult to get out. Obviously, you want to avoid physical incompatibility. Usually, the label says to conduct a "jar test" to determine if products will mix. Following is a description of how to do a jar test from Utah State University Extension.

First, get a quart-sized jar with a sealable lid. Add 1 pint of the carrier you plan to use (water or liquid fertilizer). If water is your carrier, be sure to use the same water source that will go into the spray tank. Add the materials and rates you plan to use to the carrier in the following order: water soluble pouches (1 tablespoon), wettable powder (1 tablespoon), dry flowables (1 tablespoon), capsule suspensions (1 teaspoon), emulsifiable concentrates (1 teaspoon), soluble liquids (1 teaspoon), soluble powders (1 teaspoon) and surfactants (1 teaspoon). Seal the jar with the lid and shake vigorously after each addition. You will almost never use all these types of products at one time, so choose the ones you will use and add them to the jar in the order and amounts listed.

For example, let's say you want to spray a combination of liquid fertilizer, 2,4-D amine and Cimarron Plus. Since liquid fertilizer is the carrier, add 1 pint to the jar. Cimarron Plus is a dry flowable (formulation can be found under the "Product Information" section on the label), and 2,4-D amine is a soluble liquid. Following the order in the preceding paragraph, add 1 tablespoon of Cimarron Plus into the jar, seal and shake vigorously; then add 1 teaspoon of 2,4-D amine, seal and shake vigorously; then add 1 teaspoon of surfactant, seal and shake vigorously. Let the solution stand 15 minutes after the last shaking. Shake again and observe the results.

If the materials are physically compatible, the jar will be cool to the touch and there will be no separation of materials or forming of clumps or emulsions. If the mixture is incompatible, the jar may be warm or hot to the touch; layers may form in the mixture; or sludge, clumps or grains may form in the mixture. If the mixture is incompatible, either do not use that group of products together or re-do the test with a compatibility agent to see if that aids in making the mixture compatible.

After the test is complete, pour the contents of the jar into the spray tank (if it is compatible), triple rinse the jar, add the rinsate to the spray tank and throw the jar away.

Always conduct this test when mixing pesticides together. I have heard many stories from people who mixed Brand X and Brand Y together many times with no problems then had a foul-up with the same products and had to clean out their tank. ■

Producers react to changes in crop insurance choices

by Jason Bradley / jwbradley@noble.org

The 2014 Farm Bill is the latest version of a national program that has been in place to support the agricultural production sector since the 1930s. While the new policy brought many changes, this article specifically focuses on how farmers' crop insurance choices changed when the 2014 Farm Bill took effect.

We looked at factors tied directly to crop insurance policy including the 2014 Farm Bill as a whole; the amount of the insurance premium subsidized by the federal government; available commodity program payments such as Agricultural Risk Coverage (ARC), Price Loss Coverage (PLC), Average Crop Revenue Election (ACRE), Supplemental Revenue Assistance (SURE) and Direct and Counter-Cyclical Program (DCP); the amount of a selected county enrolled in a particular commodity program; the percentage of the selected county covered by enterprise units; and the availability of the Supplemental Coverage Option (SCO). We also examined factors not directly tied to policy such as farm location, commodity produced, commodity futures price and previous yields.

Here, we will only discuss a single factor of the 2014 Farm Bill: coverage level. By looking at the coverage levels from 2008, the first year of the previous Farm Bill, through the most recent USDA reports, we were able to see if there was a shift in coverage levels based only on the introduction of the 2014 Farm Bill. Because crop insurance coverage can be obtained in two major categories (i.e., revenue protection and yield protection), the analysis was conducted for each type in order to compare the influence of the direct and indirect factors on each type.

We found that the average coverage level increased by 0.13 percent for producers who chose an insurance plan based on revenue protection. Producers who selected yield protection were influenced slightly stronger by the 2014 Farm Bill, having an increase in crop average insurance coverage levels by about 0.23 percent. While these percentages may not seem like major shifts or jumps in coverage levels, the overall implications are important. To determine this, we have to ask two questions: Why is there an overall increased shift due to the 2014 Farm Bill? Why is there a major difference between the two types of coverage?

Without hundreds of surveys, it's difficult to say what caused the increase in coverage levels. But, we can look at what changed when the 2014 Farm Bill came out. With all the commodity programs that were removed, the Direct Counter-Cyclical Payment (DCP) program found itself among them. A purpose of this program was to provide a direct payment to producers based on their allocated base acres and yields. It's been shown that when someone's level of income is reduced, like the removal of a guaranteed government payment, they tend to not take as many chances and reduce their level of risk. In this case, it could be the risk of an income loss is reduced through crop insurance.

So why is there a difference in the influence on revenue and yield protection policies? Yield protection looks at only the historical production and the current crop. If production falls below the coverage level, a payment ensues based on the projected crop price. On the other hand, revenue protection is based on the yield and expected price. If a drop in either causes the preset level of revenue, a payment is made. Because this protection is tied directly to a producer's proportional income, the loss of any guaranteed income creates a higher drive for risk aversion or higher levels of coverage. ■

Brush encroachment provides clues about soil health

by Mike Proctor / mdproctor@noble.org

After a long, hot day out on the range, one may begin to reflect on the things on the landscape that change – and those that don't. Seeing a clump of brush that seems to move across the pasture on its own may have more to do with the air temperature, and one's current level of dehydration, than with pacing persimmons, strolling sumac or pedestrial plums. Still, there are changes occurring.

After spending many hours sampling at the same spot multiple times per year, one develops an awareness of changes in the vegetation and some theories as to what is causing them.

Fire, climate, herbivory and sometimes just bad luck explain most of the phenomena one might observe. Something that is harder to get a handle on is those things that don't change but should.

Brush encroachment is a common problem across the landscape these days, and several sites that I visit regularly are undergoing significant encroachment. However, there are areas immediately adjacent to locations that brush doesn't seem to impact. The brush gets taller and denser but doesn't spread into new territory. Why would brush grow well in one area and not so well in another?

I hadn't come up with an explanation until I started trying to push a soil probe into the ground to collect samples for a project. In areas with lots of brush, the probe goes right in; the soil has lots of organic matter, moisture and good structure. Several important forage grasses are associated with the brush. In areas not impacted by the brush, the soils often have a hardpan near the surface with little or no top soil, little moisture and organic matter, and poor structure. Vegetation on these areas is often dominated by Oldfield threeawn. So, the grasses most productive for livestock are found in the mostly inaccessible areas covered in brush, while the open, grazeable areas are covered in a species that livestock won't eat.

This is where the disagreement arises between livestock and managers as to how many grazeable acres are available. If the livestock graze less area than calculated by the land manager, animal performance and forage utilization may be unpredictable. If overgrazing takes place, brush encroachment may be encouraged.

So how should land managers treat this situation? If the topsoil is still present, indicated by the presence of the brush, then the productive grasses are probably still there. Deal with the brush, preferably with fire. If that's not an option, try herbicides or small ruminants, and lastly, mechanical methods. A combination of any or all of those methods could be useful as well.

The Oldfield threeawn presents a more difficult problem, particularly when solid stands are present. Oldfield threeawn is often indicative of poor soil fertility. When associated with a hardpan, it's not just a soil fertility issue; water infiltration is severely restricted and most roots can't penetrate deep enough to get to moisture.

These are not trivial issues to overcome. One thing a manager might consider is using the sites when feeding or storing hay since these areas have little production potential. This prevents damage to higher production areas and could add some organic matter to the site. Just about any practice that builds soil and increases organic matter will be helpful for these sites. Otherwise, there just won't be much there to ruminate on.

More information on how to control brush is available at www.noble.org/ag/soils/early-brush-control, www.noble.org/fire/impacts/brush-control and www.noble.org/ag/pasture/wiregrass. ■

Proper livestock stocking rate supports operation, wildlife

by Steven Smith / sgsmith@noble.org

Proper stocking rate is the most important management decision a manager can make, regardless of goals. Stocking rate is defined as the number of animals on a specific area for a specific period of time. Livestock stocking rate impacts not only a livestock operation and operation economics, but impacts wildlife habitat as well.

Overstocked pastures lead to overgrazing, which is consistently the number one problem we see in many operations. Overgrazing is a significant cause of poor forage and livestock production, wildlife habitat loss, soil erosion, weed problems, and lower profitability on millions of acres across the country. A correctly stocked property can provide flexibility in operational management, which could be used to provide or improve wildlife habitat, implement prescribed fire, adapt to drought or other adverse weather conditions, or temporarily increase livestock numbers in years of better than average growing conditions.

Proper stocking rate varies throughout time due to changes in precipitation patterns, plant communities and other issues. However, a manager needs to determine a stocking rate then evaluate and adjust it through time.

Step 1: Determine how many grazeable acres are in a pasture. Grazeable acres can be determined by staff members of county, state, federal and nongovernmental organizations, or by using smartphone apps or websites such as www.daftlogic.com/projects-google-maps-area-calculator-tool.htm. For example, if a pasture is 100 acres and 20 acres are wooded and water, the grazeable area is 80 acres.

Step 2: Estimate how much forage a pasture typically produces on the grazeable acres. The easiest way to start the process is reviewing forage production estimates on the soils. The Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm) provides estimates (in pounds per acre) for native rangeland and introduced pastures for average rainfall and drought years. Estimates can be checked by using exclosures and collecting samples in the field by clipping or using a grazing stick or by using records from past haying or grazing experiences.

Step 3: Do a few simple math equations. Let's assume the pasture has 80 grazeable acres and produces about 3,000 pounds of native grass forage per acre during an average rainfall year; 25 percent of standing forage will be used (accounts for at least 25 percent trampling and fouling and at least 50 percent left to provide adequate leaf and root mass to produce more forage, maintain plant health, protect the soil and provide wildlife habitat); and grazing livestock will be 1,000-pound cows with a calf (1 animal unit).

- How much forage is produced per year in this pasture?
  80 acres × 3,000 pounds per acres = 240,000 pounds per year
- How much forage can be used?
  240,000 pounds per year × 25 percent = 60,000 pounds per year
- How many pounds of forage does an animal unit need per year?
  780 pounds of forage consumed per animal unit per month × 12 months = 9,360 pounds of forage needed per year (larger cows require more forage)

Using a grazing stick can help determine stocking rate.

- How many 1,000-pound cows can graze on this 80 acres for one year?
  60,000 pounds of forage produced per year ÷ 9,360 pounds of forage needed per year = 6.4 animal units per year (AUY)
- How many acres are needed to provide enough forage for one AUY?
  80 acres ÷ 6.4 AUY = 12.5 acres per cow for one year

This example is specific to this pasture, but the same principles can be applied to any property. Realistically, a manager probably should stock a somewhat lower number of livestock than this calculation to provide some additional flexibility against drought years. ■

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UPCOMING EVENTS

For more information and to register, please visit www.noble.org/events or call Maggie Scott at 580-224-6375. Preregistration is requested.

Summer Burn Workshop

8:30 a.m.-1 p.m., July 19, 2016
Noble Foundation
D. Joyce Coffey Ranch
Registration Fee: $20, includes lunch

Beekeeping: Honey Harvest Workshop

9 a.m.-noon, July 23, 2016
Noble Foundation
Kruse Auditorium
No Registration Fee

Winter Pasture Stocker Seminar

1-5 p.m., Aug. 2, 2016
Southern Oklahoma Technology Center
No Registration Fee

White-tailed Deer Management Workshop

9 a.m.-4:15 p.m., Aug. 25, 2016
Arcadia Conservation Education Area
Registration Fee: $20, includes lunch

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