Center for Grassland Studies

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Capturing the Greenness of Buffalograss through Aerial Robotics

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When I began my research program as the turfgrass breeder here at the University of Nebraska–Lincoln, I was amazed by the amount of diversity and the large numbers of unique individuals in our buffalograss collection. With the large numbers of varieties, it takes several days to evaluate all of the plant material for a single trait. In turfgrass science, we are interested in collecting data for many traits such as quality, uniformity, density, color, texture, stress tolerance, and damage recovery. Collecting all of this phenotypic data, or the visual traits we can measure, for our entire collection would take weeks. These ratings would need to be conducted several times throughout the growing season. Since time is the limiting factor, it is not practical to collect data on our entire collection, and we are forced to prioritize which field experiments we want to collect data from in order to most efficiently advance our breeding efforts.

Figure 1. Multi-rotor radio controlled aircraft used for data collection.

Several of the traits we are interested in are visual in nature, and previous research has shown that digital images can be used and computationally analyzed to capture these data. If the computer algorithms are appropriately "trained," the ratings are generally more consistent and less subjective than ratings given by a trained researcher. While several traits cannot be scored through digital images, a single image can be analyzed for several different visual traits. Assessing phenotypes through computational analysis of digital images dramatically reduces the time required to evaluate our research plots. This time saving allows us to collect more phenotypic data on a larger set of germplasm, further advancing the breeding program.

Vishal Singh, a senior instructional multimedia designer at UNL and an aerial robotics hobbyist, developed a small radio controlled multi-rotor aircraft that can be equipped with a digital camera (http://pixobot.com). Scott Dworak, a Ph.D. student in the UNL Department of Agronomy and Horticulture, has experience using aerial images to analyze data collected from his turf research. The three of us worked together to optimize the use of aerial robotics in turf research and improve the efficiency of field data collection and analysis.

Buffalograss is a warm-season species adapted to the Great Plains region of the United States. It is a sod-forming, fine-textured turfgrass species with exceptional heat and drought tolerance. Buffalograss is found naturally occurring as far north as Canada, which is rare for a warm-season turf species. Buffalograss is able to avoid the low temperature stress through a strong winter dormancy response. Dormant buffalograss is straw colored and is objectionable to many homeowners and turf managers that grow buffalograss next to cool-season species that green-up early in the spring and retain their green color late into the fall. By identifying buffalograss varieties with an extended growing season or good color retention when dormant, the varieties will be more desirable to a broader group of turf growers.

In a pilot study, we collected spring green-up data on 104 buffalograss varieties established in research plots at the John Seaton Anderson Turfgrass Research Facility, near Mead, NE. The study includes six cultivars and 98 experimental lines. Using a

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The Center for Grassland Studies is a unit within the University of Nebraska–Lincoln Institute of Agriculture and Natural Resources. It receives guidance from a Policy Advisory Committee and a Citizens Advisory Council.

Note: Opinions expressed in this newsletter are those of the authors and do not necessarily represent the policy of the Center for Grassland Studies, the Institute of Agriculture and Natural Resources or the University of Nebraska.

Martin A. Massengale .....CGS Director
Pam Murray..... Newsletter Editor
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From the Director

When prices of harvested feed, energy, fertilizer and other production inputs continue to increase as they have in recent times, we see cowcalf and stocker operators begin to recognize more and more that grazing and less feeding can help to reduce production costs and improve profits. Feed is a major component in the cost of producing livestock, and grazing pastures is the least expensive way of feeding forages.

There are several things a producer can do to increase forage production on the same or less acreage of land. For example, a producer could decide to apply irrigation water, increase the use of fertilizer, use different plants or use different grazing systems including continuous or rotational.

Continuous grazing is a system where the animals are placed in the pasture and left there for the grazing season. It is the least labor intensive of all grazing systems, but when using this method of grazing, one must be careful not to overgraze certain areas within the pasture. Techniques such as the placement of water, salt, minerals or supplemental feed can be used to entice the animals to disperse out from these areas and to reduce their being overgrazed.

With rotational grazing systems, the animals are left in the pasture to graze for a specified period of time and then moved to another area before they are allowed back on the original pasture. The success of a rotational grazing system is that it provides the plants time for recovery and rest. A rest period during the growing season allows the plants to stay healthy, live longer, have better regrowth and be more productive. Plants that are in a healthy condition are also better able to withstand stresses such as drought and high or low temperatures.

In recent years we have been introduced to the term "mob grazing." Mob grazing is a form of rotational grazing where many animals are placed on a small acreage for a short period of time. The forage is grazed very rapidly, and the plants are allowed a longer period of time for rest.

There is no universally best grazing system for all conditions, but each system has its own advantages and disadvantages. Grazing systems will vary depending on goals of the producer, climate and environmental conditions and the type of pastures available. Regardless of the grazing system used, it is highly important that enough green leaf area remain on the plants after grazing that they can manufacture sufficient food for the plant's growth, maintenance and storage, especially if it is a perennial plant.

M. A. Massengale

Opportunities and Challenges: Grassland Resources in Namibia

Walter Schacht, Department of Agronomy and Horticulture, UNL

Many of us have dreamed about traveling through the grasslands and savannas of Africa while viewing the many antelopes, elephants and cats, and feeling the excitement of such a "wild" place. When picturing African wildlife, we commonly think of East Africa, and countries like Kenya and Tanzania come to mind. Africa, however, is a huge continent, and there are many wide-open spaces that offer opportunities to see and study Africa's relatively undisturbed ecosystems. Namibia, a semi-arid country in southwestern Africa, is one such place. It is one of the largest countries in southern Africa with a population of 2.1 million people. I was fortunate enough to receive a Fulbright Fellowship to teach and conduct research in Namibia from January to December 2011. My research and education program focused on woody plant invasion of grasslands and savannahs. Namibia was an incredible place to work, and I continue to interact with Namibian scientists and educators concerning the management of their grassland resources.

Cattle grazing bush-encroached grassland in Namibia.

Namibians recognize the attractiveness of their landscapes, wildlife and cultures. Since becoming independent in 1990, a focus of the Namibian government has been the development of its tourism industry, especially ecotourism. A network of commercial and communal conservancies has been developed where the natural landscapes and native wildlife are sustainably managed for an ecotourism industry. Namibia has become a destination for trophy hunters and a variety of ecotourists. A huge challenge for land managers and the ecotourism industry, however, has been the encroachment and thickening of woody plants on the grasslands and savannas. Especially from a hunting and ecotourism perspective, this conversion not only affects habitat for the valuable wildlife species, but also changes the "typical" grassland/savanna appearance expected by tourists in Africa.

Wildebeest and zebra on grassland in Namibia.

Most of Namibia is classified as arid to semi-arid grassland/savannah (receiving less than 14 inches of precipitation annually), which is used primarily for livestock and wildlife grazing. Similar to much of southern Africa, the grasslands and savannahs have shifted to dense bushlands over the last century. About 50% of the commercial ranching areas of Namibia are affected by bush thickening, mainly by *Acacia mellifera*. As a result, Namibia ranchers forego an estimated $100 million in lost meat production annually. Reported causes of bush encroachment include suppression of fire, climate change, removal of mega-browsers (e.g., elephants and giraffe), reduction of herbivory by small mammals, and erosion and top soil loss. Recent research, including mine, has focused on soil-water balance and fire. However, as conceptual models are developed, bush thickening continues to be a growing concern in Namibia.

CGS Associates

Aaron Berger received the 2011 IANR Dinsdale Family Faculty Award, which recognizes pre-tenure faculty who have demonstrated a commitment to academic excellence.

For his work in muscle profiling, **Chris Calkins** received the University of Nebraska's Innovation, Development and Engagement Award, which recognizes faculty members who have extended their academic expertise beyond the boundaries of the university in ways that have enriched the broader community.

The Wachiska Audubon Society honored one CGS Associate and one Citizens Advisory Committee member this spring. The President's Award was given to **Chuck Francis** and his wife, Barb, who have been active in the chapter for 18 years. For his 20 years of dedicated service, **Duane Hovorka**, executive director of the Nebraska Wildlife Federation, received the Wachiska Audubon Society's Earthkeeper Award.

Tiffany HengMoss received the University of Nebraska's Outstanding Teaching and Instructional Creativity Award, which recognizes individual faculty members who have demonstrated meritorious and sustained records of excellence and creativity in teaching.

In June **Nadine Bishop** became the new NRCS State Range Management Specialist.

As the recipient of the Nebraska 2012 Leopold Conservation Award, the families of Larry and **Homer Buell** were honored at a luncheon reception at the Capitol on April 20. See related story in this newsletter.

Capturing the Greenness of Buffalograss through Aerial Robotics *(continued from page 1)*

multi-rotor remote controlled aircraft (Figure 1), pictures were taken of this study on April 9 and April 30, 2012. The pictures were processed using software tools designed to analyze images of turf plots (Karcher, D.E., and M.D. Richardson. 2003. Quantifying turfgrass color using digital image analysis. Crop Science 42:943-951).

The dark green color index (DGCI) is a function of the hue, saturation, and brightness of an entire image. In this study, a higher DGCI value indicates a darker green buffalograss. The percent green plot coverage is a measure of how much of the image is covered by green, in this case non-dormant buffalograss. The percent green plot coverage is an indication of how much of the plot is green, while DGCI is an indicator of how green a turf plot is. These measures can be used to identify varieties that are greener during the dormancy period, suggesting the variety has good color retention, as well as those that green-up quickly or break dormancy early.

Of the 104 varieties, 18 had a DGCI value greater than 0.23 on April 9 (Figure 2A). Sixteen varieties had a DGCI value greater than 0.27 on April 30. At the early rating date, 24 varieties had greater than 10% green plot coverage (90% of the plot remained straw-colored), and these may be varieties that are breaking winter dormancy early in the season (Figure 2B). At the second rating date, 24 varieties had at least 80% green plot coverage. Only four varieties were found to have a relatively high DGCI index and high percent green plot coverage at both rating dates. These four varieties have good color retention compared to other buffalograss varieties and they break dormancy early in the spring.

The process of estimating how green a turf plot is and determining percent green plot coverage is difficult for even a trained evaluator. Without the use of the multi-rotor aircraft and digital image analysis, the entire process would have likely taken a full week to complete. By using aerial robotics, we were able to image our research plots, analyze the pictures, and interpret the results in a single afternoon, increasing the speed of buffalograss spring green-up data collection tenfold.

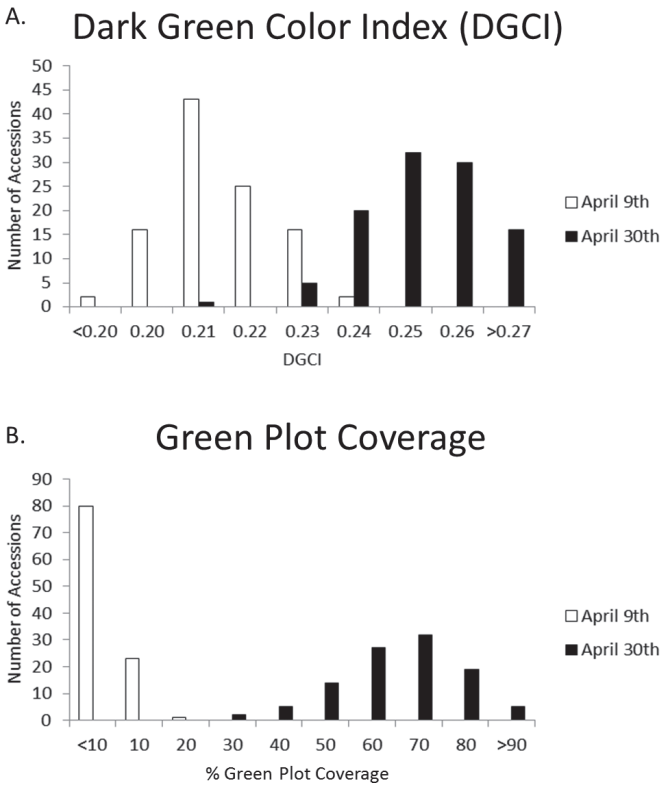

Figure 2. Average dark green color index (A) and % green plot coverage (B) ratings from digital images taken of 104 buffalograss varieties during the spring of 2012.

August 1 Is Pre-registration Deadline for Nebraska Grazing Conference

The deadline is fast approaching to pre-register for the 12th annual Nebraska Grazing Conference to be held in Kearney August 14-15. To receive the pre-registration rate of $80 for the two days (including lunches and banquet), the form and check (**payable to 2012 Nebraska Grazing Conference**) must be postmarked by August 1. Otherwise, the walk-in fee of $95 applies. One-day registrations and student rates are available. See nebraskagrazingconference.unl.edu for program details and to download the brochure. Questions on the conference may be directed to the Center for Grassland Studies.

Resources

America's Grasslands Conference: Status, Threats, and Opportunities. Proceedings of the First Biennial Conference on the Conservation of America's Grasslands, August 15-17, 2011, Sioux Falls, SD. Edited by Aviva Glaser, National Wildlife Federation. Published June 2012 by National Wildlife Federation and South Dakota State University. The document is online at www.sdstate.edu/nrm/grasslandconference/upload/AmericasGrasslandsConferenceProceedings.pdf.

All About Soils – A website featuring all things soil can be found at www.soils.org/story. Short videos on the site feature soils connection to human health, water quality and food security. The site is part of the Soil Science Society of America's website.

Range Monitoring Video – The North Dakota State University Extension Service and Hettinger Research Extension Center have teamed up to produce a video titled "The Importance of Range Monitoring." The video highlights the benefits of healthy rangelands including forage for livestock, wildlife habitat, water storage and filtration and soil erosion protection, as well as recreational possibilities. View the video at www.ag.ndsu.edu/HettingerREC/rangewildlife.

Ethanol Co-Products and Forages: An Opportunity for Alternative Cow-Calf Production Systems in Nebraska

Jason Warner and Terry Klopfenstein, Department of Animal Science, UNL

The beef cattle industry is currently entering unprecedented times. Feeder cattle prices are at historically high levels due largely to a shrinking annual calf supply. The 2011 national calf crop was the smallest since 1951. Despite record calf values, the cow-calf sector has contracted in 14 of the previous 16 years. There are many reasons why the U.S. beef cowherd has been liquidated, but paramount among them is the lack of available land for grazing or hay production. The demand-driven price increase for grain has spurred annual corn production. Consequently, acres have been increasingly converted from forage to row crops, and this competition for land use has contributed to the inflation in land values. Grain prices directly affect forages because of the opportunity cost associated with producing hay or grazing cattle. This is especially true in areas containing pasture that can be easily converted to crop production. Thus, high corn prices have contributed to the increase in pasture rental rates. Given current economic constraints, alternative production systems designed to increase stocking rates and minimize the land base needed for cow-calf production may be feasible.

Cow-calf pairs grazing smooth bromegrass pasture in eastern Nebraska in late May.

Increased corn and ethanol production provides the Nebraska beef cattle industry with excellent feed resources including distillers grains and crop residues. While distillers grains are usually the most economical source of energy and protein, cornstalk residues are becoming an increasingly available forage resource as grain yields increase. These feed resources are abundant and may offer producers within the state an opportunity to implement alternative production systems. Distillers grains can be mixed with low-quality forages such as cornstalks or wheat straw to provide high quality diets for beef cattle. Because such co-products are excellent sources of energy, protein and phosphorus, low-quality fibrous roughages can be incorporated instead of higher-quality forages such as alfalfa. In addition, fiber and bulk from the crop residues may provide a rumen fill effect that can reduce grazed forage intake. Wet or modified distillers grains work especially well because the moisture conditions the diet and encourages the consumption of low-quality crop residues. Therefore, mixtures of co-products and low-quality forages could be utilized to replace a portion of the grazed forage intake, allowing for an increase in stocking rate. This is one strategy that could be implemented as an alternative to leasing or purchasing additional pasture. In recent years, our group has been conducting considerable research on this concept in different production environments.

Research was initially conducted in 2007 at the Gudmundsen Sandhills Laboratory near Whitman, NE (2010 Nebraska Beef Cattle Report, p. 19). Cows with spring-born calves were assigned to one of three treatments: 1) stocked at the recommended stocking rate (0.6 AUM/acre) with no supplementation; 2) double stocked (1.2 AUM/acre) and supplemented with 14.6 lbs/hd/d (50% of estimated DMI) of a distillers grains/forage mixture; and 3) double stocked (1.2 AUM/acre) with no supplementation. The supplement was a mixture of 55% grass hay and 45% wet distillers grains (DM basis). All pairs grazed upland Sandhills range during the summer growing season. Pairs double stocked and supplemented received the mixture at 50% of their daily intake and were fed daily in metal bunks. Cow-calf pairs that were double stocked and received supplementation had greater cow and calf gains than pairs either stocked at the recommended level or double stocked without supplementation. The increase in calf gain for supplemented pairs may have been due to either improved cow milk production, or consumption of the mixture by the calves, or a combination of both. Calves were observed at the bunk and appeared to be eating the mixture alongside the cows each day. Interestingly, grazed forage intake was not different across treatments, and each lb of the distillers and hay mixture only replaced 0.22 lbs of grazed forage.

This experiment was replicated the next year to evaluate different mixtures of wet distillers grains and wheat straw. Wheat straw was utilized as roughage during the second year to provide additional fiber, and therefore fill, as compared to the grass hay the previous year. Wheat straw was mixed with wet distillers grains at three different levels – 50:50, 40:60, and 30:70 wet distillers:wheat straw (DM basis). Pairs were assigned to one of four treatments: 1) stocked at the recommended stocking rate (0.6 AUM/acre) with no supplementation; 2) supplemented with a 50:50 wet distillers:straw mixture; 3) supplemented with a 40:60 wet distillers:straw mixture; and 4) supplemented with a 30:70 wet distillers:straw mixture. All supplemented pairs were double stocked (1.2 AUM/acre) and supplemented with 12.6 lbs/hd/d (50% of estimated DMI) during the summer. Cow ADG was greatest for pairs supplemented with the 50:50 wet distillers:straw mixture, and all supplemented groups had greater cow ADG compared to those at the recommended stocking rate. Interestingly, calf performance was not different among treatments. However, grazed forage intake was reduced for all supplemented groups compared to nonsupplemented pairs. Cattle fed the 30:70 wet distillers:wheat straw mixture had the lowest grazed forage intake, suggesting the additional fiber limited consumption. Supplementation of this mixture nearly replaced grazed forage intake on a 1:1 basis, indicating the addition of low-quality forages is necessary for achieving successful forage replacement rates.

Results from these initial trials indicate that mixtures of low-quality forages and co-products can be supplemented to pairs to replace grazed forage intake. Replacement of approximately half of the daily forage intake would allow for stocking rate to be doubled. Therefore, twice the number of pairs could be maintained on the same amount of pasture, or the same number of cattle could utilize half the necessary acres with this system. However, it is critical that pastures are managed to avoid overgrazing to ensure that range condition is not negatively impacted. Most importantly, the

(continued on next page)

costs associated with the supplement and delivery to the cowherd must be less than the grass it is replacing. Therefore, the economic feasibility for an operation to adopt this system may be dictated by location. Trucking of distillers grains and low-quality forages to operations in extensive range settings may or may not be feasible. Ethanol co-products and crop residues are usually more abundant in southern and eastern Nebraska. These areas of the state have also seen the greatest competition for crop production acres. Consequently, this management system may be more practical for operations located in these areas.

To evaluate the efficacy of supplementing to replace forage intake on smooth bromegrass pastures, an experiment was conducted in 2010 at the Agricultural Research and Development Center near Mead, NE (2012 Nebraska Beef Cattle Report, p. 53). Nonpregnant, nonlactating cows were assigned to one of two treatments: 1) stocked at the recommended stocking rate (1.8 ac/cow) with no supplementation; or 2) double stocked (0.9 ac/cow) with supplementation (50% of estimated DMI) to replace grazed forage intake. In this trial, supplementation consisted of a 35% synergy (40% wet corn gluten feed and 60% modified distillers grains) and 65% wheat straw mixture (DM basis). The supplement was delivered daily in feed bunks and an ensiled mixture was fed from late April through mid-August, while a fresh mixture was fed during the last month of the grazing season. Cows were supplemented with an increasing level throughout the grazing season to account for differences in grazed forage intake due to quality. It was hypothesized that grazed forage intake would be greatest early in the growing season and would decline as the cool-season grass matured. Thus, supplementation levels were lower at initiation and increased as forage quality declined. Supplementation of the synergy:wheat straw mixture reduced smooth brome intake by approximately 48%. Therefore, a mixture of 30% distillers grains and 70% roughage nearly replaced grazed forage intake on a 1:1 basis, similar to the results observed in year 2 with pairs on Sandhills range. The ensiled mixture was stored in a bag and appeared to deteriorate in quality because it was not getting fed quickly enough as the season advanced. Supplement was then mixed and fed fresh daily, and palatability appeared acceptable for the remainder of the season. Greater levels of co-products may need to be included in the mixture early on in the season to encourage consumption, with the supplemented adjusted as the grazing period advances.

The following year, a similar trial was conducted using cows with spring-born calves at side grazing smooth bromegrass pastures. Pairs were assigned to either a traditional stocking rate without supplementation or double stocked with supplementation. Again, supplementation levels were increased as the season advanced to replace approximately 50% of grazed forage intake (DM basis). In this experiment, a mixture of 50:50 modified distillers grains:cornstalks (DM basis) was used at the start of the season to encourage consumption while forage quality was high. Distillers grains were gradually removed from the supplement until a ratio of 30:70 co-product:forage was reached. Cow and calf gains were greater for supplemented pairs. However, grazed forage replacement rates were slightly less than the previous year. The modified distillers grains and cornstalk mixture reduced grazed forage intake by 33%. Thus, every lb of supplement replaced about 0.9 lbs of grazed intake. This experiment is being replicated this season to further evaluate replacement rates on cool-season pastures. Our data indicate using mixtures of low-quality forage and co-products to reduce grazed intake is more successful on smooth bromegrass pastures in eastern Nebraska than on Sandhills upland range. Smooth bromegrass pastures may be more resilient to overgrazing and long-term consequences on pasture quality less severe if incomplete forage replacement occurs.

Feed bunk with a mixture of 30:70 modified distillers grains to ground cornstalks (DM basis); supplemented to pairs on grass to reduce grazed forage intake.

Supplementing to increase stocking rate is one management strategy to reduce the need for additional acres for grazing. An alternative system to reduce the land base needed for cow-calf production would be semi-confinement. This type of production system may involve drylotting cow-calf pairs during the summer and grazing cornstalks and other forage residues during the fall/winter. Traditionally, drylotting has been a management strategy utilized only when forage resources are limited due to drought or other circumstances. However, such a system may be competitive given current pasture rental rates as well as impending drought conditions that appear to be developing this year. Evaluation of such production systems is necessary if the cowherd and subsequent beef industry are going to expand in the future. When one considers the excess feedlot capacity that is available throughout the Great Plains, a semi-confinement production system that benefits both the feeding and cow-calf sectors seems logical. Drylotting pairs and/or cows during the summer may be feasible for some producers while simultaneously allowing a feedlot to maintain inventories.

Drylotting beef cows often requires the use of limit-fed diets to control feed costs because cows are inefficient at converting feed to gain. High-energy, limit-fed diets can be used to meet requirements and can be formulated using ethanol co-products and low-quality forages. Data from our research group suggest that wet distillers grains and cornstalks or wheat straw can be used in limit-fed diets for both nongestating (2009 Nebraska Beef Cattle Report, p. 11) and pregnant (2012 Nebraska Beef Cattle Report, p. 13) cows. Again, the combination of feed resources and feedlot capacity provides producers in Nebraska with the opportunity to incorporate this system. A cow-calf production system within a commercial feedlot environment has not been evaluated. To that end, our group is currently in the beginning phase of researching the production and economic efficiencies of confinement cow-calf production systems. This production system will be evaluated against a traditional year-round grazing environment and will be based on the use of ethanol co-products and crop residues. It is a model that, if economically competitive with traditional systems, could be utilized by Nebraska producers and commercial feedlots and may have beneficial impacts on the entire beef industry.

Editors Notes: Warner is a graduate student and Klopfenstein a professor. Referenced Beef Reports are online at beef.unl.edu/reports.

Buell Family Receives Leopold Conservation Award

In honor of Earth Day, Governor Dave Heineman announced the Buell family as the recipient of the 2012 Leopold Conservation Award April 20, during a ceremony at the Capitol.

The Leopold Conservation Award, named in honor of world-renowned conservationist Aldo Leopold, is comprised of $10,000 and a Leopold crystal. Sand County Foundation, Nebraska Cattlemen and Cargill present the award annually to agricultural families in Nebraska who practice responsible land stewardship and management.

The Homer (center) and brother Larry (right of Homer) families at the press conference at which Governor Dave Heineman (second from right) announced that they were the Nebraska 2012 Leopold Conservation Award. Also pictured are Sand County Foundation Vice Chairman Dave Hanson (left) and Nebraska Cattlemen President Jim Ramm (right).

"As we prepare to celebrate Earth Day, we acknowledge the conservation efforts of Nebraska landowners, including this year's award recipients, the Buell family," said Governor Dave Heineman. "More than ninety percent of Nebraska's land is used for farming and ranching. It is being well cared for by those who take on the responsibility of leaving things better for future generations. Conservation on private land is something Nebraskans do very well. We all benefit from the work of private landowners who are preserving the natural beauty of our state."

The Buell family is part of the fabric of the Nebraska Sandhills. For nearly 130 years, they have ranched in the region, while caring for the land, water and wildlife that each Buell generation passed on to the next.

The Buell family's legacy in the Sandhills began when Benjamin Franklin Buell settled in the Sandhills in 1882 and began a ranch tradition that included the preservation and enhancement of the unique landscape of the Nebraska Sandhills. Today, the Buells' Shovel Dot Ranch is owned and managed by brothers Larry and Homer Buell and their wives, Nickie and Darla, respectively, who carry on the commitment to conservation they inherited from their predecessors.

The Buells continue to maintain and expand upon an environment in which water quality and the region's native plant life and animal habitat can flourish alongside livestock and crop production.

With the help of the Natural Resources Conservation Service (NRCS) the family installed high tensile electric cross fencing and over fifty miles of pipeline, watering close to one hundred pastures. This allows for more effective cattle distribution, giving pastures more rest between grazing periods, which leads to improved recovery, better ground cover, and increased production.

Many of the Buells' management decisions are made to benefit wildlife habitat. Approximately fifty acres are fenced off around two lakes on their land to provide space for deer, turkey, swan, ducks, and geese. Abundant vegetation along two creeks on the ranch attracts several native wildlife species, and trees are planted to provide windbreaks for cattle and habitat for turkey and deer.

"The determined, dedicated and innovative Buell family clearly cares about the health of natural resources in the Sandhills region and Nebraska, in general," said Dr. Brent Haglund, Sand County Foundation President. "A commitment to open space, clean air and water and robust plant life and animal habitat is synonymous with the name 'Buell' and has been for many generations."

The Leopold Conservation Award in Nebraska is sponsored by: Burlington Northern Sante Fe, Cargill, Farm Credit Services of America, The Lynde and Harry Bradley Foundation, Natural Resources Conservation Service (NRCS), Nebraska Cattlemen Research & Education Foundation, Nebraska Environmental Trust, Nebraska Farm Bureau, Nebraska Game and Parks Commission, Nebraska Land Trust, Nebraska Nature Conservancy, Rainwater Basin Joint Venture, Sandhills Task Force, The Nature Conservancy and Union Pacific.

Past recipients of the Leopold Conservation Award in Nebraska include:

2011 – Mathewson family (Cheyenne County)
2010 – Kalkowski family (Boyd County)
2009 – Todd & Kristen Eggerling and Lyle & Alice Sittler, Bluestem Valley Farms (Lancaster County)
2008 – A.B. Cox (Hooker County)
2007 – Rod & Amy Christen (Pawnee County)
2006 – Wilson family (Sheridan County)

In 2012, Sand County Foundation will present Leopold Conservation Awards in California, Colorado, Nebraska, South Dakota, Texas, Utah, Wisconsin and Wyoming. The awards are presented to accomplish four objectives: First, they recognize extraordinary achievement in voluntary conservation on the land of exemplary private landowners. Second, they inspire countless other landowners in their own communities through these examples. Third, they provide a visible forum where leaders from the agricultural community are recognized as conservation leaders to groups outside of agriculture. Finally, the award program brings representatives from agriculture, environmental organizations, government, industry and academia to advance private land stewardship.

For more information, please visit: www.leopoldconservationaward.org or www.nebraskacattlemen.org.

Editor's Note: The above article was reprinted with permission from www.sandcounty.net/newsroom/?Id=240. Photo courtesy of Nebraska Cattlemen; photographer Paige Bek.

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Info Tufts

Some of our readers may enjoy the following tidbits from the program distributed at the April 27, 2012 "Nebraska Golf Day" event.

- There are more than 26 million golfers in the U.S.
- The golf industry is responsible for two million jobs in the U.S.
- The golf economy in the U.S. was $76 billion in 2005.
- The total economic impact of golf in America in 2005, including direct, indirect, and induced impacts, was $195 billion.
- The golf industry is larger than performing arts and spectator sports, and larger than the motion picture and video business.

And of particular interest to Nebraskans:

- Since its inception in 1996, the Cox Classic, Nationwide Tournament has raised more than $1.9 million for Nebraska charities. The event has a $9 million economic impact on the Omaha Metro. In 2010, more than 109,000 people attended – highest attendance of any Nationwide Tour event that year.
- The 2013 U.S. Senior Open, which will be held at the Omaha Country Club July 8-14, will be broadcast to more than 100 countries. It is expected to draw more than 150,000 spectators and involve 3,000 volunteers. Projected economic impact to the Nebraska economy: $30-50 million.