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RAINFALL AND CONSUMPTION OF SUPPLEMENTAL FEED

by Kim N. Echols, Dawson W. Lilly, and Emily H. Belser

Supplemental feed is often provided to deer in South Texas because low fertility soils, drought, or past land use often result in poor quality diets. Deficient diets reduce deer growth, reproduction, and survival. Supplemental feed can provide nutrients lacking in native forage and help deer perform to their potential.

Although managers may want to have deer consume supplemental feed consistently, consumption often varies seasonally and annually. Environmental conditions, especially rainfall, also appear to influence supplemental feed use. One explanation for changes in supplement consumption is that deer prefer forbs to pelleted feed and when forbs are available, the deer reduce consumption of the supplement.

Because forbs are most abundant after rainfall, it makes sense that feed consumption may decline during wet conditions. To understand the impact of rainfall on use of supplemental feed, we related per capita feed consumption and corresponding rainfall amounts over 2 years (2010–2011). Rainfall totals in 2010 were above average, whereas 2011 was a year of severe drought.

Our research was conducted on both the Comanche and Faith ranches, which are located in Dimmit County, each with 3 200-acre high fenced enclosures with different densities of deer (high: 1 deer per 5 acres, medium: 1 deer per 8 acres, and low: 1 deer per 20 acres; these are actual deer densities, whereas density estimates from helicopter surveys of these populations might be 1 deer per 15, 24, or 60 acres). Deer within each enclosure were provided year-round access to unlimited pelleted feed and water. We recorded rainfall totals using rain

Editor's Note: Mrs. Kim Echols is the Director of Comanche-Faith Deer Study Project and Dawson Lilly and Emily Belser are graduate students at the Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville.

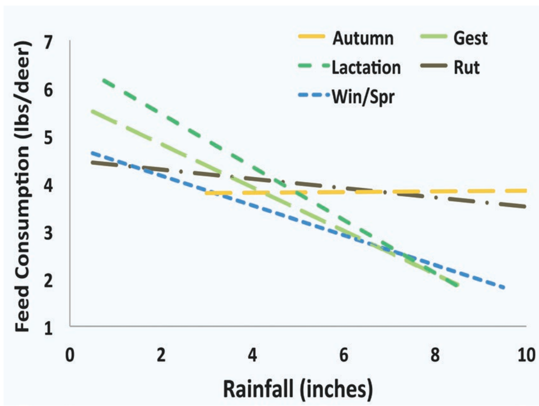
This Issue

By The Numbers

5.25 to 6.9 — wingspan length in feet of the sandhill crane (Handbook of Birds of the World, Vol. 3, del Hoyo et al., Lynx Edicions)

277 — length in miles of the Laguna Madre from Corpus Christi, Texas to Rio Soto la Marina, Tamaulipas (*Laguna Madre A New Day...Un Nuevo Dia*, U.S. Fish and Wildlife Service)

gauges located within the enclosures. Feed records were used to compute the amount of supplemental feed that disappeared between the filling of feeders, and estimated deer densities from camera surveys were used to calculate feed usage on a per deer basis. In this analysis, feed consumption and feed disappearance are considered to be the same, but may include deer consumption and losses due to non-target species and other losses.



Relationships found between 90-day rainfall totals and deer daily supplemental feed consumption during 5 separate biologically relevant seasons.

We used cumulative rainfall from 14, 30, and 90 days prior to the feed consumption period of interest to evaluate the period most closely related to changes in feed consumption rates. Since nutritional needs vary by season, we analyzed consumption and rainfall data separately in 5 biologically relevant seasons to look for seasonal relationships.

The best relationship we found was a negative relationship between the last 90 days of accumulated rainfall and the amount of per capita feed consumption. For each accumulated inch of precipitation over the previous 90 days, we saw a reduction in daily feed consumption of 0.4 to 0.6 pounds of feed per deer.

Does have high nutrient and energy requirements during lactation (July 16–August 31), at a time of year when forbs have generally disappeared, thus the strong reliance on feed and the strong relationship during lactation was expected (see Figure). The period of gestation (May 1–July 15) had the second strongest relationship, followed by winter-spring (January 16–April 30), supporting the idea that native forage is still a deer's preferred food.

Forb production is often highest during winter-spring, when conditions are more conducive to forb growth—a favorable situation for deer recovering from the rut's physical toll on body condition. During the rut (November 1–January 15), bucks are less interested in eating and the resulting weak relationship between feed and rain was not surprising. Wide variation in feed use and rainfall in autumn (September 1–October 31) obscured any clear trend.

A deer's relationship to its environment is complex with many dynamic factors at work. Temperature and other climatic factors likely play a role in forage availability and, thus feed consumption rates. We hope to explore this and other climatic and feed relationships more fully as our research continues.

This research is part of the long-term Comanche-Faith Deer Study Project that is supported by Dan T. Friedkin and the Comanche Ranch, and Stuart Stedman and the Stedman West Foundation. ~

CKWRI NEWS

NBCI Visit to South Texas

The CKWRI hosted representatives from the *National Bobwhite Conservation Initiative* (NBCI) and the National Bobwhite Technical Committee during April 23–24 to thank the NBCI for its designation of South Texas as a National Legacy Landscape for Northern Bobwhite Conservation (see full article "*A Legacy Landscape for Bobwhite Conservation*" by Lenny Brennan in South Texas Wildlife, Fall 2014 issue, which is available at www.ckwri.tamuk.edu/uploads/media/Fall_2014.pdf).

The welcoming event started with a luncheon at the Coronado Club in Houston, followed by field tours on the Elizita Ranch and the San Tomas hunting lease located on Encino division of the King Ranch showing off some of South Texas' prime bobwhite habitat. The field tours at the Elizita Ranch and San Tomas were particularly enjoyable for our NBCI friends as we flushed literally hundreds of bobwhite pairs from along the roadsides we traveled during our morning and afternoon ranch tours.

Pictured L to R: Mr. Chuck Kowaleski (Chair of the National Bobwhite Technical Committee), Dr. Lenny Brennan, Mr. John Wilson Kelsey (Honorary Chair of Quail Associates at CKWRI), Dr. Fred Bryant, Mr. Don MacKenzie (Director of National Bobwhite Conservation Initiative), and Dr. Tom Dailey (Assistant Director and Science Program Leader of National Bobwhite Conservation Initiative).

Bird Conservation Curriculum Teacher-Training Program

Ten educators from local school districts and environmental education programs participated in the Bird Conservation Curriculum teacher-training workshop in July 2015. Janel Ortiz, Ph.D. student, and Dr. April Conkey, Assistant Professor and Research Scientist, conducted the 2-day program featuring 5 lesson plans aligned with 6th grade science standards. The hands-on lessons focus on bird identification, capture and handling techniques, diseases and parasites, habitat, and conservation and include real-world examples from CKWRI research projects. Activities included a citizen science component where the students collect, record, and analyze data from our South Texas Wintering Birds website. In addition, we provided a loaner kit with all the supplies and specimens for the lessons; the lessons are available for free on the Education and Outreach Program page of the CKWRI website.

In one session, teachers learned how to age bobwhites using the bird's wings so they can teach their students how to do it.

Sarita ISD and Riviera ISD 6th grade teachers are currently using the curriculum in their classrooms. We are looking for additional 6th grade classes to participate. If interested, please contact Janel Ortiz, Program Coordinator (tamukbirdsgk12@gmail.com) or April Conkey (april.conkey@tamuk.edu) for more information or to sign up for the upcoming winter teacher-training event. ~

Visit our web page at
http://www.ckwri.tamuk.edu

THE GREAT WHITE QUAIL: PART 2

by Randy DeYoung

Birds have a tremendous array of feather, skin, and bill coloration derived from 2 sources: pigments, including melanin and carotenoids, and the 3-D structure of the feather. Melanin produces brown, gray, black, and reddish-brown colors. Carotenoids, a common source of yellows and reds, are derived from dietary sources. At the microscopic level, 3-D arrangement of feather proteins can produce violet, blue, and iridescent coloration without any pigment whatsoever.

Dozens of genes may influence coloration, especially patterns of color. However, a few genes have major effects on coloration. Unlike most mammals, male birds often have more colorful plumage than females. This difference in coloration between sexes is because of the agouti signaling protein (ASIP) genes. One of the functions of ASIP is to produce countershading, or a pattern of lighter coloration on the underside, with darker coloration on the back. In birds, ASIP is also sensitive to estrogen. The presence of estrogen in females results in drab plumage, while the absence of estrogen in males results in colorful plumage; both patterns are derived from the same genetic blueprint.

The melanocortin receptor gene, MC1R, codes for a protein that affects the production of melanin. In organisms, proteins are complex, multi-dimensional structures. The 3-D shape is as critical for normal function to a protein as the shape of a key is to opening a lock. Mutations in MC1R occur frequently, but most have no effect on coloration. Occasionally, a mutation causes a change to one or more amino acids, the building blocks that affect the shape and function of a protein.

In MC1R, mutations that change an amino acid often affect the production of melanin. In humans, certain mutations in MC1R correlate with red hair and fair skin. A mutation to MC1R may even delete a part of the genetic code. In this case, individuals may be darker or lighter than normal. The total absence of pigment will result in albinism. Individuals have white feathers (or hair), red eyes, and pink skin—the latter because blood vessels show through the skin and eyes. More

Courtesy Joe Averill, Jr.

A white colored bobwhite and a "normal" colored bobwhite harvested on a ranch in South Texas.

Editor's Note: Dr. Randy DeYoung is a Research Scientist at the Caesar Kleberg Wildlife Research Institute and Associate Professor within the Department of Animal, Rangeland, and Wildlife Sciences at Texas A&M University-Kingsville.

Did You Know?

The long-tailed weasel is considered to be terrestrial, but is known to climb trees and swim. (The Mammals of Texas, W.B. Davis and D.J. Schmidly, TPWD)

Gator holes made by alligators in the marsh are important during droughts because they serve as refuges for fish, aquatic animals, and wetland birds. (American Alligator, Biologue Series, U.S. Fish and Wildlife Service) commonly, individuals have normal eye and skin color, but light or even white feathers, sometimes with hints of other feather markings showing through—like our great white quail. These individuals are termed 'leucistic' to differentiate them from true albinos.

Will we ever witness a population of white bobwhites? Ground-living birds such as bobwhites need to hide from predators; white coloration is not conducive to survival in the South Texas brushlands. Color mutations might become common if changes in coloration are adaptive. The snowshoe hare, arctic fox, and ptarmigan are 3 examples of animals with the ability to change colors with the seasons—they put on a white "jacket" to blend in with the snow during winter and shed it when the snow disappears in spring.

We cannot say for sure if the sporadic appearance of white quail within South Texas is the result of recessive gene forms that exist at a low frequency and only become apparent if a bird inherits the rare form from both parents. In contrast, the occasional white quail may derive from spontaneous mutations instead of inheritance.

The gene(s) responsible for the *Great White Quail* and its predecessors also remain unknown. The MC1R gene is a good candidate, but is merely the best-studied, not the only possibility. The genome is a big place, and there are numerous examples of plumage variation within species of birds that were not associated with mutations at MC1R.

We are reading the DNA sequence of a few candidate genes and will report back when we find something. In the meantime, the continuing advances in genetic technology promise to make the answers to these questions a bit easier in the future coming years. ~

Courtesy Gerry Solcher

A white colored bobwhite harvested on a ranch in South Texas.

What Do They Eat?

Barn swallows are insectivores, devouring flying insects such as flies, ants, and beetles. (Handbook of Birds of the World, Vol. 9, del Hoyo et al., Lynx Edicions)

Attwater's pocket gophers are herbivores, foraging on a wide range of perennials and annuals. (The Mammals of Texas - Online Edition, W.B. Davis and D.J. Schmidly, Texas Tech University)

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