



INSIDE DEER RESEARCH

*A newsletter for supporters of the deer research program at the
Caesar Kleberg Wildlife Research Institute
Texas A&M University-Kingsville*

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Effects of Deer Density and Supplemental Feed on Deer Herd Performance

by Charles A. DeYoung, David G. Hewitt, and Timothy E. Fulbright

The Beginning

In 2004, we began the most ambitious field experiment on deer dynamics that has ever been conducted. Wow! What a statement! Nevertheless, we believe it is true.

The series of studies began with discussions with T. Dan Friedkin and Donnie Draeger of the Comanche Ranch in Dimmit and Maverick counties. At one meeting in Houston during the late spring of 2003, Dan invited Stuart W. Stedman to join the discussions, and by the end of the meeting, he was a partner in the project! Stuart operates the Faith Ranch in Dimmit, Maverick, and Webb counties.

The Objectives

The objective of the studies is to provide managers with information on how to obtain the best combination of supplemental feed, native deer forage plants, and deer density.

There are varieties of opinions, but little hard data, on trade-offs among these factors. Some advocate intensive feeding and letting deer populations increase to force deer to eat more of the supplement. Others believe that regardless of whether a ranch feeds or not, deer density should be kept low to obtain the best performance. Some say heavy feeding, along with high deer density, has little effect on native deer forages. Others claim that feeding leads to overuse of the most palatable plants. No one knows if overuse by deer actually kills forage plants on a wide scale. Do we even need the native plants in intensive deer management if deer can eat all the high-quality feed they want? With financial support from T. Dan Friedkin and Stuart W. Stedman, and their ranches, we are going to answer many of these questions in the coming years. This issue of *Inside Deer Research* is a progress report on the research.

The Design

The experimental design of our studies is elaborate (Figure 1). It is repeated on the Comanche and Faith ranches. Each ranch has a 1,200-acre experimental area that is high fenced. Each 1,200-acre area is divided into 6 high fenced enclosures of 200 acres each. Each ranch has 2 enclosures of

low deer density, 2 of moderate density, and 2 of high density. Then on each ranch one enclosure at each density is provided with free-choice, pelleted supplemental deer feed. All enclosures are provided with a water trough in the center.

We did a lot of thinking and consulting with others about the target stocking of deer for our low, medium, and high density treatments. Ultimately, we settled on a target of 10

Feed 10 Deer	No Feed 25 Deer	No Feed 10 Deer
No Feed 40 Deer	Feed 25 Deer	Feed 40 Deer

Figure 1. Experimental design of ongoing deer study.

Project Participants

Principle Investigators

Susan M. Cooper, Charles A. DeYoung, Randy W. DeYoung, Don A. Draeger, T. Dan Friedkin, Timothy E. Fulbright, David G. Hewitt, Stuart W. Stedman

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TPWD Personnel

Ty Bartoskewitz, Alan Cain, Daniel Kunz, Evan McCoy, Jimmy Rutledge

deer for low density, 25 deer for medium density, and 40 deer for high density. The high-fenced enclosures were constructed in the summer and fall of 2003. All enclosures had some resident deer inside when fencing was completed. We estimated how many were enclosed in each and then captured deer on each ranch and placed them in the enclosures to bring them up to target density during March 2004. Each fall and winter, we estimate the number of deer in each enclosure using intensive trail camera surveys. These surveys are aided by numbered ear tags on many of the enclosure deer. Subsequently, deer numbers are reduced or supplemented as needed to adjust to the appropriate target density.

The Data Collection

The effects of the density and feed combinations on the deer and the native plants are monitored in a variety of ways. Deer in enclosures are live-captured and released to monitor their weight and other health measures. Similar data are collected from deer harvested to adjust to target densities. The trail cameras provide estimates of fawn survival. Plants are sampled several times per year, including canopy cover of shrubs, cover of herbaceous plants, density of herbaceous plants, dry weight of different classes of plants, and use of the Stem Count Index of browsing pressure.



Photo by David Hewitt

Tame deer are being used to study how deer density and supplemental feed impact deer foraging behavior.

The Caution

Below we give progress reports on various aspects of the study. It should be emphasized that these are long-term studies, and herein we are presenting preliminary findings. Included are several “spin-off” studies where we are using the basic study design to test census methods and other techniques. We are not ready to make management recommendations until there are more data. It is possible that some results will be different as more years pass.

Assessing Density Effects on Feed Consumption and Behavior

Digital cameras were placed at feeder sites in low, medium, and high density enclosures on both ranches. Feed consumption and visitation rate by sex and age of deer at feeder sites were monitored. Preliminary findings suggested that Comanche Ranch deer consumed feed at a higher rate in the high-density enclosure; however, at the Faith Ranch, deer ate the most feed in the medium density enclosure. This was possibly due to a temporary imbalance in target densities in some enclosures at the Faith Ranch. Regardless of density treatment, more does were seen consuming supplemental feed than bucks and fawns at both ranches. At the Faith Ranch, 80% of all deer seen on camera at feeder sites actually ate feed, whereas at the Comanche Ranch, 70% of all deer seen actually fed.

Impact of Deer Density and Supplemental Feeding on Vegetation

Canopy cover of forbs and shrubs, along with the number of forb species is monitored each summer. Also, the dry weight of forbs, shrubs, and grasses is estimated annually in March and July–August. Preliminary results indicate that supplemental feeding of deer has not affected the canopy cover of palatable forb and browse species. Moderate and high deer densities resulted in reduced forb canopy regardless of supplemental feeding. The dry weight of browse, forbs, and grasses was similar in enclosures with and without feed in 2004, and was similar among deer densities. In 2005, forb weight was greater in enclosures with feed than encl-

tures without feed at low deer densities, but forb weight was similar in enclosures with moderate and high densities, whether or not feed was present.

Estimating Browse Utilization at Three Deer Densities with the Stem Count Method

The Stem Count Method is used by the Texas Parks and Wildlife Department to estimate use of browse plants and determine whether deer densities are within carrying capacity of the habitat. In the method, browse species are classed according to palatability with first choice plants the most palatable and third choice plants the least palatable. The percentage of browsed twig tips is determined on a minimum of 100 twigs per plant species. To date, we have conducted browse surveys in the enclosures in February and August, 2004 and 2005, and January 2006.

Use of first and second choice browse species was not affected by provision of supplemental feed on the 5 sampling dates. Use of third choice browse was greater in enclosures with no feed only in February 2005. Use of first, second, and third choice browse species was generally greatest in high density enclosures. Use of second choice browse species was strongly correlated with deer density.

Effects of Deer Density and Supplemental Feed on Doe Diets

This segment of the study utilizes data from tame does living in enclosures at the Faith Ranch. There were not enough tame does for sampling both ranches. Tame does are followed while feeding and the plants from each bite they take are identified to species. Preliminary analysis indicated that does in low density enclosures ate more forbs compared to does in high density areas. Does in enclosures with supplemental feed also ate more forbs than does without access to feed.

Effects of Deer Density and Feed on Fawn Growth

We have weighed 99 fawns as they were harvested or captured in the enclosures over the past 2 years. Figure 2 shows that fawn weight gain is higher in enclosures with supplemental feed. At this early stage in the study, there seems to be a trend toward a density effect in enclosures with feed. That is, fawn weight gain was higher for low density areas with feed versus high-density areas with feed.

Evaluating the Use of Spotlight Counts and Camera Surveys at Different Deer Densities

Taking advantage of the different deer density treatments on both study ranches, we are evaluating spotlight count and camera survey techniques for estimating deer population densities. Spotlight counts over 2 October's produced variable estimates compared to the expected number of deer in each enclosure. There was a trend toward a difference in estimates in enclosures of the same density, depending on the presence of feed. Twelve-day camera surveys at baited sites in enclosures without feed indicated an underestimate of the expected deer population for most enclosures. Preliminary camera data resulted in doe:buck ratios that were 70–80% lower than expected. This was possibly due to the dominance of bucks around baited camera locations.

Influence of Relative Browse Cover, Deer Density, and Supplemental Feed on Stem Count Indices

A question that has arisen regarding the Stem Count Index is whether or not the availability of shrubs in each palatability class influences the results of the Index. Deer might eat one class of woody plants simply because they are more abundant than another class; therefore, the Stem Count Index might reflect differences in plant abundance rather than deer density. To address this question, we estimated canopy cover of shrubs in each palatability class during summer 2005. We then conducted the Stem Count Index of each palatability class during January 2006.

Deer density was the only factor that affected the number of bites on first and second choice browses. Canopy cover of first, second, and third choice browses had no influence on stem count indices. Neither deer density nor canopy cover affected the number of bites on third choice browses.

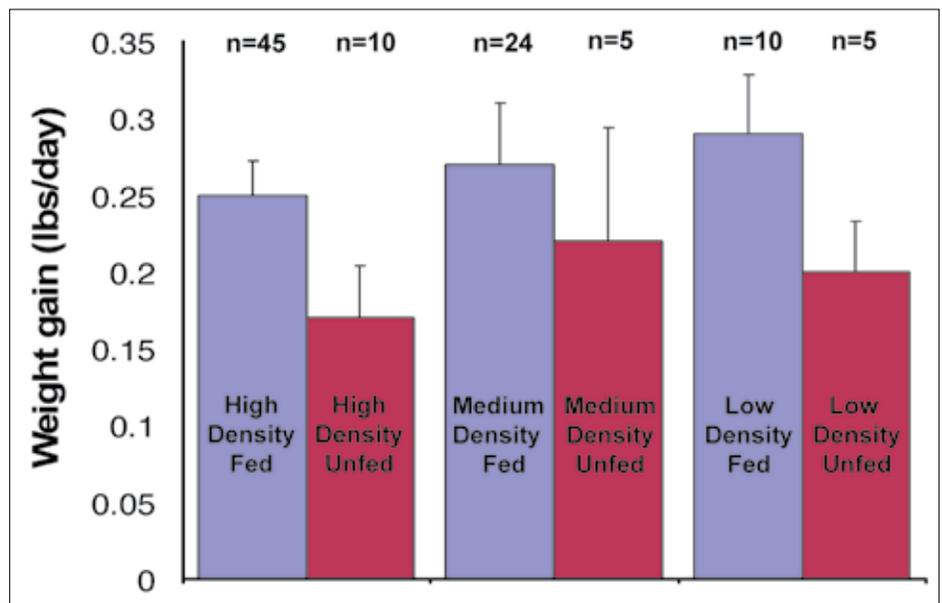


Figure 2. Daily weight gain by 99 fawns in 200-acre enclosures with various feeding and density levels on the Comanche and Faith ranches, South Texas, 2004–2006.

Use of Stable Isotopes to Estimate Supplemental Feed Consumption

Carbon and nitrogen occur with a small number of molecules as “stable isotopes.” These are not radioactive substances like those used in the nuclear industry. They are just molecules in a different form, and they occur in different percentages in different feeds. This makes it possible to analyze animal tissue for the isotopes and estimate what feeds were eaten. We are using hair and antler samples to estimate supplemental feed consumption of deer. On the Comanche Ranch, diets varied from 6–60% supplemental feed compared to a range of 46–81% feed consumed on the Faith Ranch. Given these promising preliminary results, this study will continue with a larger sample of deer, including using those in unfed treatments as controls.

Summary Bullets

Below are some of the more important results. Once again, we caution that these findings are preliminary and the studies are ongoing. Management recommendations based on these results are not warranted until there are more data.

- Supplemental feed has a strong effect on growth of fawns but deer density is also a factor. That is, building up herd density with supplemental feed may come at some cost in performance.
- Supplemental feeding has had little measurable effect on palatable deer forages. This could mean that fed deer continue to eat approximately “normal” amounts of native plants and eat supplement in addition. Thus, the increase in performance in fed populations may come from an overall increase in consumption.
- The Stem Count Index used by the Texas Parks and Wildlife Department appears to be a reliable index of



Patterns of supplemental feed use by deer of different ages and sexes are assessed with automatically triggered cameras.

deer density, even when there are variable amounts of first, second, and third choice browses.

- 12-day infrared camera surveys over baited sites appear to underestimate deer numbers.

News about the Deer Research Team at CKWRI

Effective September 1, 2006, David Hewitt assumed the Stuart W. Stedman Chair for White-tailed Deer Research. Charlie DeYoung has been occupying the Stedman Chair since 2001. Charlie will remain with the deer program as a Research Scientist. Charlie was recently awarded honorary membership in The Wildlife Society at its September 2006 meeting in Anchorage, Alaska. Also, Charlie will receive the Harvey Weil award in the professional category in spring 2007. Randy DeYoung was promoted to Assistant Professor/Research Scientist beginning September 1. Randy had been in a temporary grant-funded position for 2 years.



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