2003

Diet similarity of pen-raised versus native, Louisiana white-tailed deer in southeastern Louisiana

Kristopher Scott Davis
Louisiana State University and Agricultural and Mechanical College

DIET SIMILARITY OF PEN-RAISED VERSUS NATIVE, LOUISIANA WHITE-TAILED DEER IN SOUTHEASTERN LOUISIANA

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

In

The School Of Renewable Natural Resources

By
Kristopher Scott Davis
B.S, Louisiana State University, 2002
December 2003

ACKNOWLEDGEMENTS

I would like to thank my major professor, Dr. Mark Johnson, Professor of Wildlife, School of Renewable Natural Resources for his support during my stay as a graduate student in the school. I appreciate the invaluable guidance, advice, and the opportunities that Dr. Johnson entrusted me with.

I would also like to thank my graduate committee members: Dr. Andy Nyman, Associate Professor, School of Renewable Natural Resources, and Dr. Lowell Urbatsch, Director of LSU Herbarium, and Professor of Biological Sciences for their knowledge and expertise in areas of plant species identification and wetland ecology.

Gratitude is given to Mr. John Brady Jr., for allowing me to conduct my research on his private property Da Bunch, and allowing me to enjoy the outdoors by inviting me to come and hunt and fish on his property located in St. Charles Parish, Louisiana.

Special thanks go to Seth Laborde, for helping me with my project during collection and monitoring of the deer and for his friendship during my years as a graduate student. I would also like to thank Lee Womack for his support and friendship as well as his input on the project.

Finally, I would like to thank my parents, James M. Davis and Vicki L. Davis for their love, encouragement, monetary support and enthusiasm in the pursuit of fulfilling my dreams of obtaining a masters degree. I also give them credit for making me the man I am today. Above all, I would like to dedicate my work to God and to the most important person in my life, my wonderful wife and best friend, Becky Davis whose undying love and support have given me the strength and drive to accomplish my goals in life while inspiring me to become a better man along the way.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Previous studies have shown that pen-raised deer may be already predisposed to malnutrition at a higher rate then their native counterparts because they are normally raised on a pelleted ration and may not forage efficiently once released into wild habitats. Therefore, twenty pen-raised white-tailed deer that were offspring of deer obtained from Missouri (*Odocoileus virginianus*) were released onto a marsh pump-off habitat in southeast Louisiana (Da Bunch) to compare their diets to the diets of the native, wild, white-tail deer population already established in the area over four consecutive seasons to test this hypothesis. The microhistological analysis technique was used to estimate the botanical compositions of fecal pellets collected from both populations of deer located in the same range, over four consecutive seasons (Spring, Summer, Fall, and Winter) to account for seasonal variability.

Native, wild and pen-raised deer diets averaged 78.2% similar during the year of the study, and were significantly associated to one another during each of the four seasons ($P < 0.00001$), indicating that all deer foraged on similar plant species in similar proportions. Differences were found in species frequencies per fecal sample, but for only five of the fifty-one species utilized significant differences were found ($P \leq 0.001$) between populations. Those species were *Diodia virginiana* in the spring, *Aeschynomene americana*, *Ambrosia* spp. during fall, and *Berchemia scandens* and *Celtis laevigata* in the winter. Both deer populations were predominantly grazers, with forbs constituting for a yearly average of 41.20% the deer diets. This study agrees with previous studies that concluded that translocated deer released into a new environment will adapt to the area

and forage just as efficiently as the pre-existing deer population in the area assuming carrying capacity is not compromised.

INTRODUCTION

During the late 1950's and early 1960's restocking programs for white-tailed deer (*Odocoileus virginianus*) took place throughout the country. This was due to large-scale eradication of local deer populations in the early 1900's resulting from over-harvest and lack of protection (McCabe and McCabe 1984, Ellsworth et al. 1994). In Louisiana alone, about 2,895 white-tailed deer were released at 94 locations statewide (Ellsworth et al. 1994). The fates of these translocated deer were not specifically studied and remain in question. Previous research has adequately shown that pen-raised and translocated deer released into new surroundings sometimes are prone to experience higher mortalities than native counterparts because of factors such as hunting mortality, vehicle collisions, disease, lack of immunity to parasites, and malnutrition (O'Bryan and McCullough 1985, McCall et al. 1988, Ozoga et al. 1992). McCall et al. (1988) noted that pen-raised deer may be already predisposed to malnutrition at a higher rate then their native counterparts because they are normally raised on pelleted rations and may not forage efficiently once released into wild habitats.

Considerable interest has been shown over the last forty years in obtaining dietary information for free-ranging ungulates as a means to assess the nutrient intake and forage competition among various herbivores. According to Hodgman et al. (1996), monitoring the nutritional well being of free-ranging ungulates has become an essential part of all big game management plans. Smith and Shandruk (1979) noted that effective management of wild ruminants and their habitats primarily depends upon a working knowledge of plants selected and the composition of diets during each season. This information is required to optimally manage forage allocations to different herbivores, selecting types of grazing animals that will be compatible with the forage resources, predicting the outcome

of overgrazing, and identifying new species on which to base management resources (Holechek et al. 1982a). It is not possible to directly measure forage consumption by free-ranging wildlife species. Hence, any diet estimate method that is used should precisely identify the plant species consumed even though it may only estimate relative amounts of plant matter ingested rather than actual intake rates.

Species in the wild are not easily observed in an undisturbed state and we may only be able to obtain limited information on food habits through direct observation. To help solve this problem, scientists have resorted to indirect measures of forage consumption by wild species. Fecal studies of large ungulates have been used to determine dietary compositions since the early 1900's (Adams 1957). Microhistological techniques are required for plant species identification because herbivorous mammals masticate and degrade plant items so finely (Zyznar and Urness 1969). The microhistological analysis technique quantifies botanical compositions of herbivore diets by identification of plants from epidermal characters of ingested species (Sparks and Malechek 1968, Holechek et al. 1982). Analysis of fecal samples has become one of the more prominent techniques to directly determine diets selected by both small and large herbivores because it is nondestructive to the animal. The first use of the microhistological technique was developed by Baumgartner and Martin (1939) to analyze squirrel (*Sciurus* spp.) stomach contents. By comparing stomach contents with previously created reference slides of stained leaf and stem epidermises of known plant taxa in the given study area, Baumgartner and Martin (1939) were able to analyze the squirrels dietary compositions. The technique was further adapted by Dusi (1949), for fecal pellet analysis of cottontail rabbits (*Sylvilagus* spp.).

Microhistological analysis has been used in many different habitats around the country to quantify diets of white-tailed deer (Chamrad and Box 1968, Short 1971, Everitt and Drawe 1974, Arnold and Drawe 1979, Kie et al 1980, McCullough 1985, Johnson et al. 1987, Keegan et al. 1989, Gallina (1993), Johnson and Dancak 1993, Zielinski 1999, Meyers 2001).

The objectives of this study were to quantify and compare seasonal diet compositions and diet diversities between native, Louisiana and pen-raised white-tail deer originally from Missouri gene pools when both populations were allowed to forage freely together on the same range in southeastern Louisiana.

LITERATURE REVIEW

DEER IMPACT

During the last 3 centuries, sweeping uses of land for agriculture, silviculture, and to a lesser degree, game management have improved and expanded habitat for white-tailed deer across much of the landscape in the eastern United States (Waller and Alverson 1997). Many studies have shown that dense populations of white-tailed deer in forested regions can alter forest stand development and reduce wildlife habitat by reducing or eliminating young tree seedlings, herbaceous plants, and shrubs (Tierson et al. 1966, Jordan 1967, Marquis 1981). Impacts on plant species compositions (deCalesta 1997) and controversy over management of deer populations increased dramatically during the 20th century.

DEER NUTRITION

Generally, deer habitat is evaluated on the basis of the quality of winter cover and the quantity of woody twigs that are available for winter browsing. Herbaceous foods used during fall, spring and summer are generally considered less important than winter browsing. Many biologists today, now recognize that food availability and quality each season are equally important for deer, and that food quantity during traditional winter hard times is probably no more important than during other seasons (Snider and Asplun 1974, Mautz, 1978), especially on Southern ranges.

Nutritional quality of forage is determined by the nutrients contained within the food and also the animal's ability to digest or utilize these nutrients (Meyers 2001). According to Short et al. (1969) seasonal variations in species abundance, phenology, and nutrient quality of range plants can cause deer diets to vary dramatically during each season and can lead to nutritional stress for the animal. Therefore deer food consumption

rates vary throughout the year, even when high quality forage is readily available. Close observation of selection of native plants and plant parts by tame deer can give reliable information on food selection when monitoring food consumption between tame and wild populations (Dunkeson 1955, Healy 1971, Crawford et al. 1975, 1982). Crawford (1982) found pen-raised deer to be highly selective when feeding in the wild. According to Short et al. (1969) this indicates a need for a deer to select easily-digestible foods to meet their dietary needs. Healy (1971), Wallmo and Neff (1970), Zielinski (1999), and Meyers (2001) compared forages selected by tame and wild deer and found that similar plants were used.

MICROHISTOLOGICAL ANAYLSIS

Holechek and Gross (1982b) provided a comprehensive review of the microhistological technique. Sparks and Malechek (1968), and Vavra and Holechek (1980), demonstrated the accuracy of the microhistological technique. Microhistological analysis of fecal samples has been utilized to determine food habits of many cervids besides white-tailed deer including black-tailed deer (O'Bryan 1983, Kirchhoff and Larsen 1998), mule deer (Gill et al. 1983, Kucera 1997), and elk (Gogan and Barrett 1995, Kingery et al. 1996, Kirchhoff and Larsen 1998). There is considerable variation in accuracy between technicians even when properly trained when conducting microhistological analysis. This was discussed by Holechek and Gross (1982a) in detail. Vavra et al. (1978) and McInnis et al. (1983) also indicated that some differences in diet estimates between fecal and rumen samples resulted from differential digestion of epidermal material found in deer diets. Differential digestibility and fragmentation have been implicated as two major factors that may serve to bias potential estimates of herbivore diets when using fecal samples to study plant materials (Smith and Shandruk

1979). While identification variation is considerable between technicians, preparation of material for microscopic identification has also varied. Holechek (1982) determined the influence of sample preparation procedures on the ratio of identifiable to non-identifiable fragments and concluded that sample preparation for microhistological analysis can improve the number of identifiable fragments by soaking in 0.05 m sodium hydroxide (bleach) in conjunction with the use of Hertwig's clearing solution.

Sparks and Malechek (1968) adapted the frequency sampling method reported by Fracker and Brischle (1944) to quantify botanical compositions using microscopic techniques. The basic assumption of this method outlined by Sparks and Malechek (1968) is that a 1:1 relationship exists between relative particle density (i.e., the number of fragments per microscope field) and relative dry weight of identifiable fragments ground to a uniform size through a 1 mm screen. After evaluating limitations of other techniques, Holechek et al. (1982c) reported that fecal analysis is the preferred method of choice for analyzing wild ruminant diets. However, fecal analysis methodology incorporates four assumptions: (1) fragments of nearly every ingested plant species and all plant parts within species are recoverable and identifiable in fecal samples (Storr 1961), (2) recovery or identification rates of plant fragments are consistently proportional to ingestion rates of plant species and plant parts or that digestion correction factors can be developed to account for differential digestion biases (Dearden et al. 1975), (3) results are repeatable among technicians with similar training (Sparks and Malechek 1968), and (4) there is a predictable relationship between frequency of occurrence of dietary items in the sample and the weight of or density of those fragments (Sparks and Malehek 1968, Havstad and Donart 1978, Marshall and Squires 1979, Gill et al. 1983). Furthermore,

Fecal analysis has several disadvantages that include large labor inputs and the need for an extensive reference slide collection to properly identify plant fragments. There have been several reasons postulated for the disparity in results of fecal analysis, including: (1) different rates of digestion among plant taxa and parts (Slater and Jones 1971, Dearden et al. 1975, Vavra and Holechek 1980, Johnson and Wofford 1983), (2) differential detection and recognition of plant taxa during microscopic evaluation (Hoover 1971, Westboy et al. 1976, Havstad and Donart 1978, Sanders et al. 1980, Kie et al. 1980), (3) differential particle size reduction and recognition induced during sample preparation (Westboy et al. 1976, and Holechek 1982), (4) differences in experience and training among analysts (Holechek and Gross 1982b, Holechek and Gross 1982b), and (5) analytical biases (Anthony and Smith 1974, Holechek and Vavra 1981, Holechek and Gross 1982a, Johnson 1982, Gill et al. 1983).

Fecal analysis provides several advantages over other food habit analysis methods when used to estimate the diets of free-ranging herbivores. Smith and Shandruk (1979) discussed the major advantages of fecal sampling which included; unlimited numbers of fecal samples can be obtained without intensive animal observation, animals need not be harvested or their feeding habits altered, 15 fecal samples gives the same level of dietary precision as 50 deer rumen samples (Anthony and Smith 1974), and topography or dense vegetations does not hinder collection of fecal samples, and animal movements are unaffected.

Plant Fragment Identification

Drawings and reference slides made from native forages occurring on study sites are used to identify plant fragments found in fecal samples. These drawings can be constructed by hand or with the aid of a microscopic drawing tube, which allows the

novice to draw by outlining the microanatomy of a representative plant fragment accurately (Johnson et al. 1983). Micro-anatomy of monocots and dicots provide the basis for histological comparison through the identification of structures such as: veination, cell wall contour, trichomes, glands, stomatal arrangement, silica cells, crystals, and epidermal cells (Johnson et al. 1983). Within these individual plant features, there also consist large amounts of variation among species. For example, trichomes can be either stellate (segmented) or ligulate (Figure 1). The complexity of the breakdown between primary plant structures allows for accurate identification of plant fragments when conducting fecal analysis of fecal matter. Cell wall structure (Figure 2) can be used to distinguish pronounced differences between monocots and dicots. According to Johnson et al. (1983), the ability to distinguish between various dicots requires consistent recognition of cell patterns and anatomical features. Other diagnostic structures such as the presence of distinctive trichomes provide key evidence for identifying plant fragments. But, trichomes also may separate from the plant fragment, in which case other structures must be documented for accurate identification. Johnson et al. (1983) found that in most cases, 1 to 3 micro-anatomical features are needed for the accurate determination of plant species.

Differential Digestion and Fragment Discernability

According to Johnson et al. (1983), some plant fragments are unidentifiable. There have been attempts to account for differences among species as to proportions of fragments that can be identified and to account for affects of differential digestion of fragments. Such adjustments have been widely discussed as one of the primary causes for error when using fecal samples to estimate herbivore diets. Some researchers have gone to great lengths to account for the effects of differential digestion (Voth and Black

1973) even without significant documentation that digestion introduces sampling bias. Moreover, Holechek et al. (1982c) concluded that fecal analysis tends to underestimate forbs in the diets in a variety of ruminants, although some studies have reported this not to be the case (Todd and Hansen 1973, Anthony and Smith 1974, Kie et al. 1980).

According to Fre-Wyssling and Muhlentahler (1959), there are no known microorganisms that have cutin degrading enzymes. Subsequently histological analysis is based solely on the micro-anatomical features of the indigestible cutin and cells underlying the cutin that avoid the digestion process (Johnson et al. 1983). This allows for identification made from only the cutin, because it retains the impression of epidermal tissues. Johnson et al. (1983) recorded the number of fragments and proportions identified for a variety of undigested and digested plants and found that for 47 plant species tested, digestion increased discernability for 3 while decreasing it for 9 with 3 plant species showing little effect and 32 remaining unchanged. Regardless of the plant species, digestion had little or no influence on the ability to estimate botanical compositions of herbivore diets. Obviously, the degree of bias depends on the specific mix of plant species involved.

Frequency Sampling

Sparks and Malechek (1968) first used frequency sampling as a viable alternative to counting each plant fragment when quantifying botanical composition on microscopic slides. As a result of their research, many researchers have used this "frequency conversion" technique to estimate herbivore diets (Todd and Hansen 1973, Dearden et al. 1985, Johnson 1979, Gill et al. 1983, Johnson et al. 1983, McCullough 1985). After the fecal sample is ground to a uniform size, a predetermined number of fields is systematically examined and the presence of each species is recorded per microscopic

field (Sparks and Malechek 1968). Johnson et al. (1983) determined that as long as the amount of ground fecal matter on each slide averages 1 to 3 fragments per field, average relative frequency of occurrence represents average relative abundance of the different species in the mixture. Consequently, the measure of relative abundance provides and estimates the relative dry weight for each food item quantified in the herbivore's diet Johnson (1982). Fracker and Brischle (1944) reported that frequency might then be converted to estimates of density for shrubs on rangeland by using a relationship; $F= 1-e^{d}$. This same rationale can be used to estimate populations of plant particles dispersed on microscope slides. Johnson (1982) discussed the mathematical rationale for converting frequency to density when using this technique.

Johnson (1982) provided a detailed description of this mathematical theory, but the standard form of the relationship between frequency and density is expressed as:

$$F = 100\ (1-e^{-d}),$$

where F is relative frequency, e is the natural logarithm and d is the mean particle density determined by the number of fragments (n) and the number of microscope fields examined (k) so that:

$$d = n / k$$

If fragments from m different plant species are randomly distributed in the microscope field the particle density of each is independent from the others.

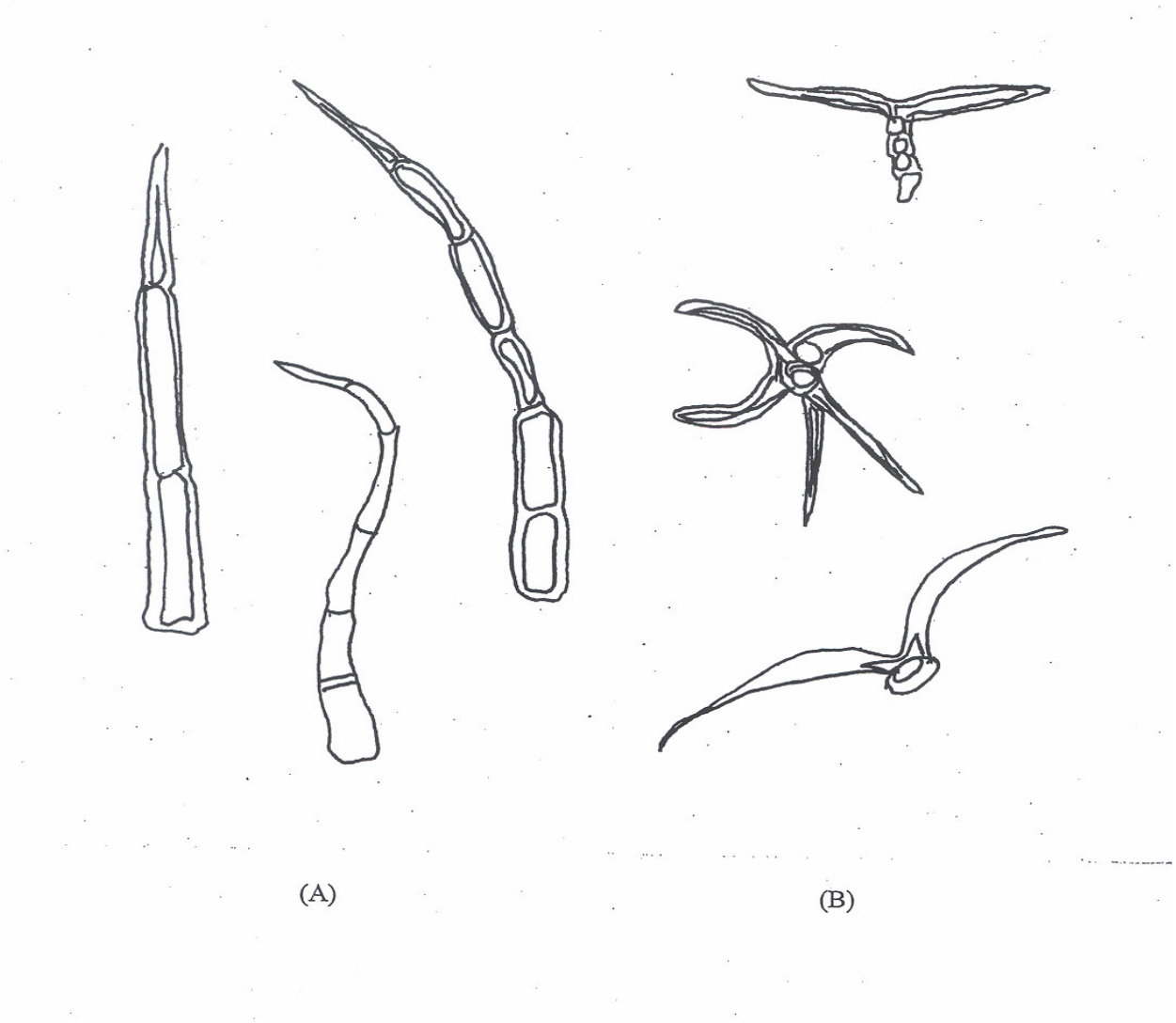
Thus, the density (d) of fragments per field may be converted to relative density (RD),

$$RD = \frac{\text{density of discerned fragments for a species}}{\sum \text{ of densities of discerned fragments for all species}} \times 100$$

The relationship between RD and dry weight for most plant species is highly associated

Figure 1

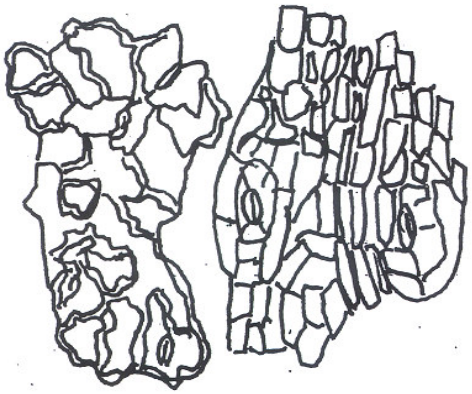
Drawing that shows distinction between (A) segmented and (B) branched plant trichomes from (Johnson et al. 1983).

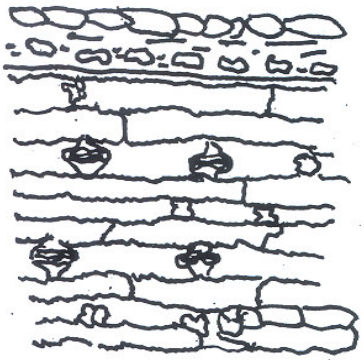


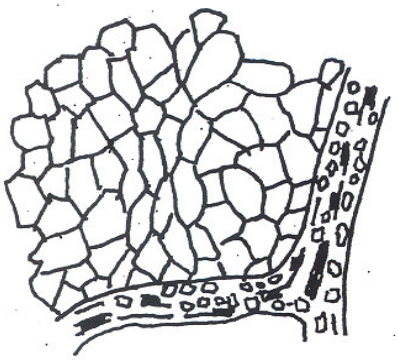
(A) (B)

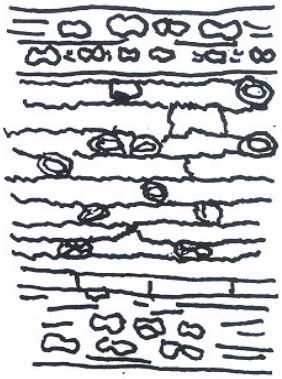
Figure 2

Drawing that shows pronounced difference in cell was structure between (A) dicots and (B) monocots from (Johnson et al. 1983).









(A)

(B)

as long as each microscopic field may be treated as an individual sampling unit. The following assumptions must be true for this to occur; (1) micro fragments of plants are randomly distributed on the microscope slide, (2) micro fragments from different plant taxa are the same average size, and (3) dry weight bulk densities of different plant taxa are the same Johnson (1982). Johnson (1982) reported that assumptions are valid because the distribution, size, and average number of fragments per microscopic field are controlled in the slide making process. Johnson (1982) also noted there are no apparent significant differences in dry weight bulk densities among leaf tissues of different plants, which also validates the relationship between RD and relative dry weight.

DESCRIPTION OF STUDY AREA

LOCATION

This study was conducted on Da Bunch property located in St. Charles Parish, Louisiana. The property was originally owned by LL and E before the company was aquired by Burlington Resources based in Houma, Louisiana, before being acquired by Mr. Brady for recreational use. This area was considered to be consistent with floating fresh marsh in the 1940's (Oneil 1949) and is approximately 1294.99 ha in size. The site was leveed and drained during 1964. It is pumped off daily to remove rainfall and excess water that seeps through the ground from surrounding marsh. There are three other similar sites in Louisiana created by Louisiana Land and Exploration Company during the 1960's, two of which are located in St. Charles Parish and the other in Lafourche Parish. Da Bunch is the largest of the 4 pump-offs originally created for recreation and agriculture.

Food Plot Management

Food plots were established throughout the year as part of the deer management conducted on Da Bunch. During the spring of 2002, a 2 ha food plot of American jointvetch (*Aeschynomene americana*) and cow pea (*Vigna unguiculata*) was planted in April to serve as supplemental summer forage, and to provide Da Bunch opportunities to monitor and observe whether these supplemental plantings would impact the deer. During October, 12 food plots totaling approximately 12 ha together, were planted with Blue Chicory (*Chicorium intybus*), Winter Wheat (*Triticum* aestivum), and Plantain (*Plantago lanceolata*) to help provide deer with forage supplements during the fall, winter and spring.

SOILS

St. Charles parish is entirely located within the Mississippi River Delta. The natural levees consistent with the Mississippi River and its distributaries are dominated by firm, loamy and clay soils. These soils make up 20 percent of the total land area of the parish with the remaining 80 percent of the land area consisting mainly of ponded and frequently flooded mucky and clayey soils in marshes and swamps (McDaniel 1984). Although there are 10 different soil series present in the parish, Commerce-Sharkey, Convent-Commerce, Sharkey-Commerce, Barbary-Fausse, Kenner-Allemands, Lafitte, Maurepas, Allemands-Maurepas, Drained, Commerce-Harahan-Allemands, Drained and Harahan, the study site was composed almost entirely of the Kenner-Allemands series. This soil series is level very poorly drained and have a mucky surface layer and a mucky and clayey underlying material layer that is consistent with freshwater marshes (McDaniel 1984). Included with this soil were a few small areas of Barbary, Allemands, and Larose soils. These soils are not suited to crops, pasture, woodland, urban uses, or as intensively used recreation areas (McDaniel 1984). This series is generally suited to use for recreation and as a habitat best suited for wetland wildlife. A small portion of this area is contained for oil and gas wells. This series is almost continuously flooded with fresh water and may reach depths of over 2 feet during floodwaters or storms when not impounded.

CLIMATE

The closest weather station to my study site was in Houma, Louisiana. Da Bunch climate is influenced the Gulf of Mexico and the North American continental

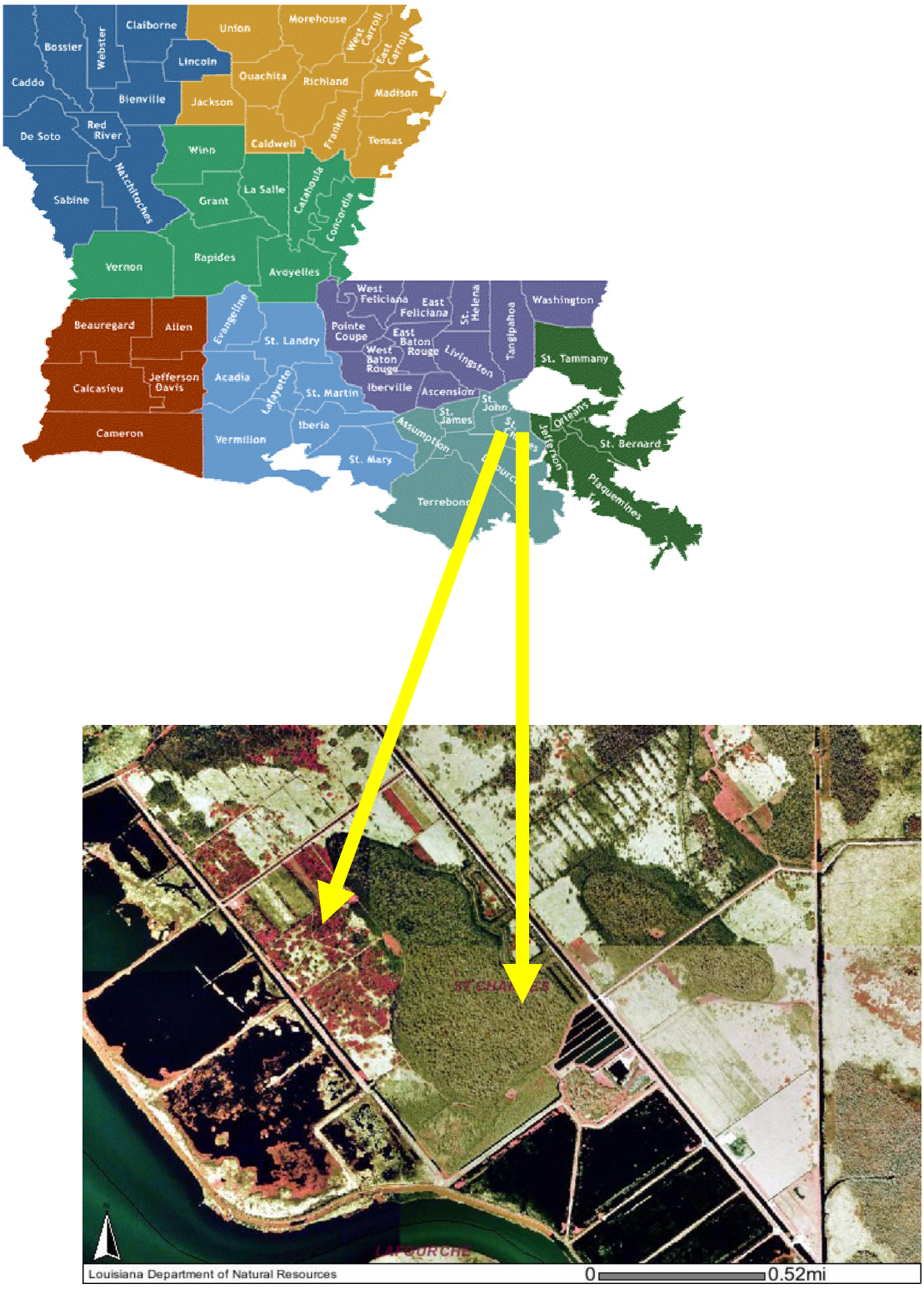


Figure 3. Location of Da Bunch in St. Charles Parish, Louisiana

land mass. Summer months are semi-tropical in nature with relatively high afternoon precipitation brought on by moist air from the Gulf of Mexico (Calhoun 1997). Winter months in general consist of alternating periods of cold and warm brought by cool continental winds sweeping in from the northwest and by tropical winds from the south (Day 1998).

During the study period, March 2002 to March 2003, average monthly temperatures ranged from 11.67 °C to 28.33 °C (Louisiana Monthly Climate Review, National Oceanic and Atmospheric Administration, Houma, Louisiana). Spring months (March-May) had an average temperature of 20.37 °C, with a mean low occurring in March of 16.67 °C. Summer (June-August) averaged 27.67 °C, with a minimum mean temperature of 27.22 °C occurring in June. The fall (September- November) averaged 21.30 °C, but reached a high of 26.11 °C during September. The winter (December-February) averaged the coldest overall 12.60 °C as expected with a mean low temperature of 11.67 °C recorded in January.

Mean monthly precipitation from March 2002 to March 2003 was found to be 13.69 cm (Louisiana Monthly Climate Review, Nation Oceanic and Atmospheric Administration, Houma, Louisiana). Fall was the wettest season averaging 26.06 cm of rainfall, while spring was the driest season averaging just 6.95 cm of rainfall. Similarly, winter and summer averaged 17.12 cm and 16.06 cm of rainfall respectively, during this study period.

FLORA AND FAUNA

Da Bunch contains a vast array of native and introduced invasive plant species. The surrounding marsh is predominately composed of American lotus (*Nelumbo lutea*), cardinal flower (*Lobelia cardinalis*), soft-stem rush (*Juncus effus*), pickerel weed

(*Pontedaria odorata*), and American water lily (*Nymphea odorota*), water hyacinth (*Eichornia crassipes*), bald cypress (*Taxodium distichum*) and alligator weed (*Alternanthera philoxeroides*). Before the study site was leavied and drained in 1964, the study area was assumed to have similar vegetation.

Species composition of the forested study area canopy is predominantly comprised of sweet gum (*Liquidambar styraciflua*), willow (*Salix nigra*), sugarberry (*Celtis laevigata*), tallow-tree (*Triadica sebifera*), and red maple (*Acer rubrum* var. drummondii). Immature oaks (*Quercus* spp.), were planted for oil exploration mitigation projects on about 10 ha of the property. Sub-canopy species include wax myrtle (*Myrica cerifera*), button bush (*Cephalanthus occidentalis*), saltbush (*Baccharis halimifolia*), elderberry (*Sambucus canadensis*), and muscadine (*Vitis rotundifolia*). The remaining under story consists primarily of blackberry (*Rubus spp*.), waterprimrose (*Ludwiga spp*.), blazing star (*Liatris spp*.), boneset (*Eupatorium serotinum*) and vervain (*Verbena spp*.). Grass in the study site include: crab grass (*Digitaria ciliaris*), knotroot bristlegrass (*Seteria geniculata*), giant foxtail (*Seteria magna*), maiden cane (*Panicum hemitomon*), Johnson grass (*Sorghum halepense*), and vasey grass (*Paspalum urvillei*). Other types of miscellaneous forage include: golden-rod (*Solidago canadensis*), pokeweed (*Phytolacea Americana*), viola (*Viola spp*.), deer pea (*Vigna lutoula*), poison ivy (*Toxicodendron radicans*), sorrel (*Oxalis* spp.), virginia buttonweed (*Diodia virginia*) and creeping mallow (*Modiola caroliniana*).

Da Bunch is also home to an abundance of wildlife including aquatic furbearers, waterfowl, alligators (*Alligator mississipiensis*), small carnivores and birds of prey. Otter (*Lutra canadensis*), nutria (*Myocastor coypus*), and muskrat (*Ondatra zibethicus*) were common. Waterfowl included such species as mallards (*Anas platyrynchos*), gadwall

(*Anas strepera*), blue-winged teal (*Anas discors*) and ringnecks (*Aythya collaris*). Alligators could be readily found throughout the property in ponds, ditches and canals. Small carnivores included raccoons (*Procyon loctor*), coyotes (*Canis latrans*) and bobcats (*Lynx rufus*).

METHODOLOGY

PEN-RAISED DEER

To provide a pen-raised deer population for this study, twenty fawns ranging in age from 8-9 months old were selected from within the Idlewild Research Station captive deer herd, which is owned and operated by the Louisiana State University Agricultural Center located in Clinton, Louisiana. All of these fawns were females and were born at Idlewild, but were 2nd generation offspring of deer originally translocated from Missouri (*O. v. macrourus*). After birth some fawns were fed lamb-milk substitute until approximately 4 months of age, then weaned. Other fawns were not bottle raised and were instead tit-raised by their mother until natural weaning. After deer were weaned, both groups received a consistent diet of pelleted food containing 18% crude protein. Korschgen et al. (1980) found that foods selected by deer in the Missouri Ozarks during spring and summer consisted mainly of winter and summer grape (*Vitis* spp.), red clover (*Trifolium pratense*), Virginia creeper (*Parthenocissus quinquefolia*), white and red elm (*Ulmus* spp.), dwarf and fragrant sumac (*Rhus aromatica*), and oaks (*Quercus* spp.). He also found that grasses comprised only a small proportion of Ozark deer diets and those of dietary importance were agricultural crops with high levels of protein and minerals.

RELEASE OF PEN-RAISED DEER

Fawns were fitted with radio-collars MOD-305 Telonics transmitters, and 3 x 2 plastic ear tags. The pen-raised deer where released in mid March of 2002.
Pen-raised deer were monitored and their location recorded 4 times monthly to obtain fresh fecal samples.

Figure 4. Fawns after being released.

VEGETATION SAMPLING AND ANALYSIS

Samples of plant species occurring on the study site were collected to make reference slides of food species occurring on the study site. Criterion for classifying a plant as a deer forage species was based on both visual evidence of consumption by white-tailed deer and by previous research conducted by Myers (2001) and Zielinski (1999). Samples were collected during June, September, January, and March in the middle of the months to account for variability among each season. Samples of each plant species available to the deer for consumption during spring were randomly collected to be used for reference material. Fruit potentially utilized by deer also was collected during the season of most abundance. Samples of each forage fruit were placed in separate paper bags for transportation to the laboratory. Each plant sample then was taxonomically classified and placed in a reference folder in the lab. Each plant specimen was identified with the aid of Dr. Lowell Urbatsch, Professor of Biological Sciences to ensure proper identification. The most succulent portions of each plant such as leaves and stems were removed as forage samples. The plant specimens were further dried at 60º C for 48 hours, or until each specimen reached a constant weight. Approximately 15 g of dry plant material was ground in a Wiley mill (40mm-mesh screen). Five reference slides per species were prepared and mounted in accordance with Sparks and Malechek (1968) and Holechek and Vavra (1981). The plant material used for mounting was placed in a 50/50 water/bleach solution for approximately 5-15 minutes to remove pigments. The material was then placed in a microwave for 20 seconds and left to sit for another 5 minutes with occasional agitation. These plant fragments were then passed

through a 100-mesh sieve, flushed thoroughly with water, and then placed into a 1 dram vile and passed through the following 4 steps before mounting:

Step 1. 50% water / 50% alcohol,

Step 2. 100% alcohol,

Step 3. 50% alcohol / 50% xylene,

Step 4. 100% xylene

The alcohol dehydrated the plant fragments and facilitated uptake of xylene. The Xylene solution was used in combination with Permount mounting media to help provide for a long lasting, clear specimen mount because it is miscible with the Permount mounting media solution. My training for quantifying deer diets was completed in 3 phases according to the procedures described by Holechek and Gross (1982a). I also was able to create descriptions and accurate hand drawings of plant fragment characteristics with the help of a microscopic drawing tube attached to a binocular microscope. A taxonomic style key based on anatomical differences of characteristics of each plant species was developed to further assist in the accurate identification of fragments (Zielinski 1999).

FECAL SAMPLING AND ANALYSIS

Fecal pellet groups consisting of at least 10 individual pellets were collected mid-month during March 2002 (Spring), June 2002 (Summer), October 2002 (Fall), and January 2003 (Winter) from March 2002 through March 2003 to account for variability among seasons. Thirty pellet groups were collected from translocated Missouri deer and from native Louisiana deer once in each 3-month season (Holechek and Gross 1982a). Pellet groups for translocated Missouri deer were collected whenever and wherever possible, but only after physical observation of defecation of ear-tagged deer to ensure a

pure sample from the released deer. Pellet groups from native deer also were collected after observing defecation of deer lacking ear tags, and directly from animals harvested during the hunting season (October and January). A study quadrant was established across Da Bunch property and each quadrant was assigned a unique number and GPS coordinates were recorded. These numbers were then placed in a random number generator to insure randomization of fecal collections. Fecal pellets were randomly collected across these study quadrants from native deer lacking radio collars and ear tags to increase the chance of collecting feces from different individuals. Each sample was placed in its own individual paper bag, and then placed on ice to prevent contamination and reduce microbial action during transport. In the lab, fecal samples were oven-dried at 60°C for 48 to 72 hours to remove all water, and then ground through a Wiley mill fitted with a 40 mm mesh screen to allow for uniform fragment size among all plant fragments in fecal pellet groups.

Approximately 0.25g of ground fecal matter from each sample was placed in a 50:50 water-bleach solution for 5 to 10 minutes to remove plant pigments Meyers (2001), and rinsed through a 100-mesh sieve. The fecal matter was then placed onto 5 slides, diluted with water, and covered with a microscope cover slip for analysis. A compound binocular microscope at 100 X was used to identify fragments but with 200 X was used when the particle characters were unclear (Holechek and Valdez 1985). Enough sample was placed on the slide to provide for an average of 3 identifiable plant fragments per microscopic field in accordance with Litvaitis et al. (1996). I obtained at least 20 frequency observations per slide to insure high repeatability between slides (Holechek and Vavra 1981), and thus 100 fields were examined for each fecal pellet group. To

obtain accurate results, small particles were disregarded and a discernable fragment was defined as having at least 2 distinct anatomical characteristics, such as silica bodies, trichomes, or stomates (Holechek and Gross 1982a, Johnson and Wofford 1983). Particles that I identified were then placed in 3 categories of analysis: grass and grass-like, forbs, and woody browse, with remaining unknowns being grouped together. Frequency of occurrence of each species were calculated, and divided by frequency of observations for all species. This value was then be multiplied by 100 to estimate the relative percentage by weight that each species represents in the diet (Holechek and Gross 1982b). There may have been biases due to reasons discussed above, but as samples from both treatment groups would have the same biases, thus deaming results of comparisons between treatments as being statistically valid.

STATISTICAL ANALYSIS

Plant fragment frequency was used to estimate botanical diet composition for deer from each pellet group collected. In accordance to Fracker and Brischle (1944), after the frequency of occurrence of each plant species was calculated, it was then converted to particle density using the formula, $F = 1\text{-}e^{-d}$, described earlier. Next, relative particle densities for each plant taxa were calculated, while assuming these relative densities to be equal to percent relative dry weight of the whole sample (Fracker and Brischle 1944, Sparks and Malecheck 1968, Holechek and Gross 1982b). The percent dry weight of each plant species from individual pellet groups then was averaged ($\pm$ SE) across all fecal samples for native, southern and northern, pen-raised deer within a given season to provide estimates of diet compositions (Zielinski 1999).

Kulczynski's Similarity Index (SI) (Oosting 1956) was used to determine diet similarities between both populations of deer located at Da Bunch. This index was calculated to quantify diet similarity among the two populations on a species only basis. To detect whether the degree of diet similarity among shared plant species was significantly associated among native and translocated deer, Spearman's rank-order correlation coefficient was used (Siegel and Castellan 1988, Freund and Wilson 1997: 606). Plants were ranked in ascending order based on the estimated percent dry weight each comprised in the diet per season. The most consumed forage species found in the diet per season was assigned a rank of 1. If ties occurred, they were also incorporated to ensure equal importance of plant species having the same percent dry weight values in the diet. I used a Chi-Square test for homogeneity using SAS (SAS Institute Inc. 2002) to compare the frequency of occurrence of identified forages selected per season by native, southern and northern, pen-raised deer populations because previous research has shown that a deer's diet changes seasonally (Mendenhall and Beaver 1994). In accordance with the test statistic distribution approximately equaling x^2, an individual plant species needed to occur at least 6 times among all 60 fecal pellet samples during any given season (Freund and Wilson 1997) to be used for statistical comparison

By quantifying botantical compositions for each fecal sample, I calculated average diet forage diversity for each population for each season. I then was able to calculate whether plant diversity per fecal group during a given season varied significantly between native, southern and northern, pen-raised white-tails by performing paired t-tests using SAS (SAS Institute Inc. 2002). Unless otherwise noted, statistical significance was accepted at the 0.05 level of probability of a Type I error.

RESULTS

DIET COMPOSTION

Over the course of the study, fifty-one plant taxa were positively identified among both populations of deer. Native, Louisiana and released, pen-raised northern deer consistently foraged on the most species during spring and the fewest during winter (Table 1). The highest diversity of (43 and 25) plant taxa were consumed during spring and summer, respectively. During winter, the fewest (19 and 18) plants were consumed by native and pen-raised deer, respectively. Both populations consumed the most plants during spring, while sharing 34 plant taxa. Shared plant taxa during the summer, fall, and winter seasons were 23, 22, 18 respectively. During this study, on average, 87% of plant species of native deer diets were accurately identified, with dry weights of plants ranging from 0.13 to 14%, while 86% of pen-raised released deer diets where quantified with dry weights of plants ranging from 0.07 to 14%. Both populations were primarily grazers of forbs during the spring, fall, and winter with native deer forbs diets accounting for 51% in the spring, 39% in fall, and 43%, of native deer diets during winter. Diets of northern, pen-raised deer were similar during the same time periods with forbs also accounting for 56%, 37%, and 43% of diets, respectively. On average, native deer ate more grass and grass-like species, whereas translocated deer ate significantly more forbs and browse and fruit on a dry weight basis. Native deer also consumed more ware season grasses in similar studies reported by Zielinski (1999) and Myers (2001) for two other Louisiana habitats.

Table 1. Estimated botanical compositions (% dry weight ± standard error) of fecal pellets from Native, Southern and Pen-raised, Northern white-tailed deer on Mr. John Bradys, St. Charles Parish, Louisiana during Spring, Summer, Fall, and Winter 2002-2003, (n=30/population/season).

* Denotes Absence During Any Given Season

	Spring				Summer				Fall				Winter			
	Southern		Northern		Southern		Northern		Southern		Northern		Southern		Northern	
Plant taxa	**%**	**SE**	%	SE	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**
Grass and Grass-like:																
Arundinaria gigantea	0.67	0.91	*	*	1.17	1.09	0.57	0.53	*	*	*	*	*	*	*	*
Bromus spp.	1.47	0.70	1.2	0.84	*	*	*	*	*	*	*	*	4.13	0.95	3.03	0.84
Digetaria spp.	1.80	0.84	1.27	0.89	13.30	0.48	13.06	0.73	7.47	0.58	6.27	0.49	*	*	*	*
Echinochloa colona	0.43	0.79	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Panicum spp.	7.73	0.54	5.8	0.58	9.17	0.58	10.76	0.35	6.37	0.44	5.93	0.41	4.03	0.82	3.23	0.89
Paspalum spp.	2.97	0.63	2.23	0.59	7.40	0.49	7.66	0.36	3.90	0.46	3.33	0.47	*	*	*	*
Tillandsia usneoides	*	*	0.67	0.87	*	*	*	*	*	*	*	*	*	*	*	*
Triticum aestivum	*	*	*	*	*	*	*	*	*	*	*	*	5.67	0.44	4.63	0.54
(%) Totals:	**15.07**		**11.17**		**31.04**		**32.05**		**17.74**		**15.53**		**13.83**		**10.89**	
Forbs:																
Aeschynomene americana	*	*	*	*	*	*	*	*	1.10	1.19	1.73	0.64	*	*	*	*
Alternathera philoxeroides	*	*	*	*	*	*	*	*	1.37	0.45	1.66	0.56	1.33	0.62	1.53	0.80
Ambrosia spp.	2.47	0.70	3.20	0.75	1.77	0.84	1.72	0.50	2.77	0.75	*	*	*	*	*	*
Berchemia scandens	0.50	0.92	*	*	*	*	*	*	*	*	*	*	2.23	0.71	*	*
Campis radicans	2.03	0.91	1.63	0.70	*	*	*	*	*	*	*	*	*	*	*	*
Cassia fasciculata	1.77	0.73	2.07	0.69	2.67	0.72	2.83	0.59	3.47	0.40	3.23	0.47	2.33	0.63	2.70	0.81
Chicorium intybus	4.70	0.80	4.83	0.54	*	*	*	*	*	*	*	*	14.00	0.89	13.93	1.17

Forbs Continued

	Spring				Summer				Fall				Winter			
	Southern		Northern		Southern		Northern		Southern		Northern		Southern		Northern	
Plant taxa	**%**	**SE**	%	SE	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**
Diodia virginiana	*	*	*	*	0.13	0.73	1.20	0.50	*	*	*	*	*	*	*	*
Eichhornia crassipes	0.83	0.62	0.53	0.73	0.77	1.42	*	*	*	*	*	*	*	*	*	*
Eupatorium spp.	3.33	0.61	3.80	0.61	3.90	0.49	4.42	0.57	6.13	0.28	5.50	0.39	*	*	*	*
Hibiscus lasiocarpos	1.53	0.74	1.23	0.65	*	*	*	*	*	*	*	*	*	*	*	*
Ipomea spp.	*	*	0.53	0.96	*	*	*	*	*	*	*	*	*	*	*	*
Liatris spp.	0.40	0.75	0.40	0.70	0.76	0.58	1.02	0.96	*	*	*	*	*	*	*	*
Ludwigia spp.	1.67	0.77	1.91	0.72	1.07	1.40	*	*	4.13	0.43	4.93	0.45	2.17	0.60	3.50	0.68
Medicago arabica	0.47	0.84	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nymphea odorata	*	*	0.70	0.91	*	*	*	*	*	*	*	*	*	*	*	*
Oenothera speciosa	0.63	0.84	0.67	0.87	*	*	*	*	*	*	*	*	*	*	*	*
Oxalis spp.	1.07	0.77	0.63	0.84	1.33	0.85	0.94	0.71	*	*	*	*	*	*	*	*
Plantago lanceolata	2.47	0.74	2.97	0.73	*	*	*	*	*	*	*	*	6.30	0.89	5.57	0.56
Phyla spp.	1.20	0.76	0.60	0.49	*	*	*	*	*	*	*	*	*	*	*	*
Phytolacca americana	0.30	0.85	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ranunculus spp.	0.80	0.83	0.20	1.09	*	*	*	*	*	*	*	*	*	*	*	*
Rubus spp.	11.40	1.03	12.27	0.62	6.03	0.40	4.90	0.60	6.90	0.27	6.83	0.52	7.83	0.22	7.93	0.49
Solanum caroliniaum	1.33	0.70	1.13	0.64	1.10	0.60	1.39	0.40	1.20	0.56	1.43	0.45	*	*	*	*
Solidago spp.	3.00	0.64	3.07	0.59	3.33	0.56	3.51	0.60	2.93	0.39	3.53	0.51	*	*	*	*
Taraxacum officinale	0.97	0.81	0.33	0.89	*	*	*	*	*	*	*	*	*	*	*	*
Trifolium spp.	3.90	0.68	3.87	0.60	3.73	0.59	4.94	0.53	*	*	*	*	5.47	0.56	5.27	0.44
Verbena braziliensis	2.43	0.68	2.33	0.72	1.00	0.59	1.09	0.62	4.03	0.45	3.80	0.49	*	*	*	*
Vicia spp.	*	*	0.73	0.97	*	*	*	*	*	*	*	*	*	*	*	*
Vigna spp.	2.17	0.74	4.07	0.50	2.47	0.81	1.54	0.65	4.77	0.48	4.43	0.51	*	*	*	*
Viola spp.	1.07	0.76	2.23	0.61	*	*	*	*	*	*	*	*	1.87	0.64	2.90	0.89
Total:	**51.37**		**55.93**		**30.06**		**29.50**		**38.80**		**37.07**		**43.53**		**43.33**	

Table 1 Continued

	Spring				Summer				Fall				Winter			
	Southern		Northern		Southern		Northern		Southern		Northern		Southern		Northern	
Plant taxa	**%**	**SE**	%	SE	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**
Browse/ Fruit:																
Acer rubrum	0.50	0.89	*	*	1.20	0.94	1.02	0.69	1.43	0.58	2.57	0.69	*	*	*	*
Baccharis halimofolia	1.67	0.79	1.57	0.65	*	*	*	*	*	*	*	*	6.76	1.06	5.90	0.71
Celtis laevigata	0.27	0.72	0.63	0.84	0.67	1.80	0.53	0.45	1.90	0.45	2.26	0.63	0.77	0.55	1.53	0.81
Cephalanthus occidentalis	1.10	0.79	0.80	0.70	*	*	*	*	*	*	*	*	*	*	*	*
Liquidamber styraciflua	0.37	0.99	0.53	0.70	*	*	0.07	0.18	0.20	0.57	0.57	0.85	*	*	*	*
Lonicera japonica	2.87	0.82	2.83	0.77	*	*	*	*	*	*	*	*	3.43	0.79	3.80	0.71
Myrica cerifera	3.17	0.82	2.03	0.66	2.83	0.69	2.08	0.71	8.40	0.29	6.90	0.58	8.23	0.72	7.67	0.48
Quercus spp.	0.60	0.80	*	*	*	*	*	*	2.90	0.82	3.20	0.89	4.77	0.64	5.20	0.44
Salix nigra	2.80	0.73	3.20	0.53	10.43	0.44	10.38	0.52	6.63	0.36	7.00	0.44	4.17	0.65	5.00	0.48
Sambucus canadensis	0.73	0.80	0.50	0.89	2.60	0.80	1.28	0.96	3.57	0.54	3.50	0.50	*	*	*	*
Triadica sebifera	2.47	0.74	2.40	0.66	8.17	0.57	8.95	0.43	5.40	0.33	5.83	0.36	*	*	*	*
Vitis spp.	1.17	0.84	1.37	0.82	0.80	0.72	0.91	0.59	0.83	0.48	2.77	0.58	2.17	0.56	3.47	0.58
Total:	**17.72**		**15.86**		**26.70**		**25.22**		**31.26**		**34.60**		**30.30**		**32.57**	
Total Unidentified:	**15.80**		**17.03**		**12.20**		**13.25**		**12.17**		**12.77**		**12.33**		**13.23**	
Grand Total:	**100.0**		**100.0**		**100.0**		**100.0**		**100.0**		**100.0**		**100.0**		**100.0**	

DIET SIMILARITY

Diets of native and pen-raised deer were significantly associated during spring (r_s= .86, P< .000001), summer (r_s= .91, P< .00001), fall (r_s= .94, P< .000001), and winter (r_s= .90, P< .000001) indicating both populations of deer selected similar forages in like amounts during all seasons. Kulczynski's similarity index indicated that native and pen-raised translocated deer fed on similar forages during all seasons and averaged 78% similar while ranging from a low of 73% during spring, to a high of 80% during winter (Table 2). After conducting a Chi-square test for homogeneity, there were no significant differences in the frequency of occurrence of shared plants ingested by native versus pen-raised deer during spring (χ^2 = 48.57, α = .01, 35df), summer (χ^2 = 17.40, α = .01, 22df), fall (χ^2 =26.54, α = .01, 21df), or winter (χ^2 = 24.18, α = .01, 18df).

DIET DIVERSITY

On average, the average number of species identified per fecal sample ranged from a high of 16.13 $\pm$ 0.39 and 15.17 $\pm$ 0.20 in fall to a low of 12.53 $\pm$ 0.20 and 12.23 $\pm$ 0.36 during winter, for native and pen-raised released deer, respectively (Table 3). Diets were most diverse during spring, when fecal pellets of native and pen-raised released deer were comprised of 12 to 19 species and 11 to 18 species per sample, respectively. During winter, diets of pen-raised deer were the least diverse with samples ranging from 13 to 17 species while, diets of native deer were least diverse during fall 14 to 18 species and summer 10 to 14 species. A significant difference was detected only during fall (P = .022) between deer populations when Student's *t*-tests were performed.

Table 2. Percentage diet similarity, average number of identified plants ± standard error per fecal sample, plant diversity per fecal sample, and t-value using a= 0.05 with associated probability for Student's t-test by season for deer on Da Bunch, St. Charles Parish, Louisiana, (n = 30/population/season).

	Kulcxynski's SI	Wild Deer		Pen-raised Deer		Student's t-test	
Season	% Diet Similarity	Avg + SE	Plant Diversity	Avg + SE	Plant Diversity	t-value	Pr> t
Spring	72.8	14.67 ± .35	12 to 19	14.77 ± .21	11 to 18	0.24	0.814
Summer	80.2	12.53 ± .20	10 to 14	12.23 ± .36	12 to 18	0.74	0.467
Fall	79.7	16.13 ± .39	14 to 18	15.17 ± .20	13 to 17	2.42	0.022
Winter	80.1	12.27 ± .31	9 to 16	12.30 ± .16	11 to 14	0.93	0.927

Table 3. Chi-square test for homogeneity for frequency of occurrence of shared plants identified in fecal pellet samples from Native Southern and Northern Released, Pen-raised white-tailed deer during Spring ($\chi 2 = 48.57$, a = 0.01 ,35df) summer ($\chi^2 = 40.29$, $\alpha = 0.01$, 22df), Fall ($\chi 2 = 38.93$, a = 0.01, 21df), and Winter ($\chi 2 = 34.81$, $\alpha = .01$, 18df). Da Bunch, St. Charles Parish,Louisiana, during 2002-2003, (n=30/population/season).

	Spring Frequency		Summer Frequency		Fall Frequency		Winter Frequency	
Plant Taxa	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**
Grass and Grass-like:								
Arundinaria gigantea	*	*	6	5	*	*	*	*
Bromus spp.	10	7	*	*	*	*	18	15
Digitaria spp.	10	7	30	30	28	27	*	*
Panicum spp.	28	25	30	30	28	28	18	15
Paspalum spp.	18	16	30	30	25	23	*	*
Triticum aestivum	*	*	*	*	*	*	27	25
Forbs:								
Aeschynomene americana	*	*	*	*	5	21	*	*
Alternanthera philoxeroides	*	*	*	*	14	13	10	9
Ambrosia spp.	16	17	10	9	11	0	*	*
Berchemia scandens	*	*	*	*	*	*	14	0
Campis radicans	11	11	*	*	*	*	*	*
Cassia fasciculata	12	14	16	17	25	22	16	14
Chicorium intybus	20	24	*	*	*	*	28	26
Diodia virginiana	*	*	1	11	*	*	*	*
Eichhornia crassipes	7	4	*	*	*	*	*	*

Table 3. Cont'd.

	Spring Frequency		Summer Frequency		Fall Frequency		Winter Frequency	
Plant Taxa	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**
Eupatorium spp.	19	21	24	23	30	28	*	*
Hibiscus lasiocarpos	10	9	*	*	*	*	*	*
Liatris spp.	3	3	7	5	*	*	*	*
Lonicera japonica	15	15	*	*	*	*	17	20
Ludwigia spp.	10	12	*	*	25	26	16	18
Oenothera speciosa	4	4	*	*	*	*	*	*
Oxalis spp.	7	4	8	6	*	*	*	*
Phyla spp.	8	8	*	*	*	*	*	*
Plantago lanceolata	14	16	*	*	*	*	23	27
Ranunculus spp.	5	1	*	*	*	*	*	*
Rubus spp.	27	29	29	24	30	27	30	28
Solanum caroliniaum	9	9	9	14	11	15	*	*
Solidago canadensis	18	19	21	20	19	23	*	*
Taraxacum officinale	6	2	*	*	*	*	*	*
Trifolium spp.	20	21	21	25	*	*	25	27
Verbena braziliensis	15	14	9	8	25	23	*	*
Viola spp.	7	15	*	*	*	*	13	13
Vigna spp.	13	23	14	10	26	24	*	*

Table 3. Cont'd.

	Spring Frequency		Summer Frequency		Fall Frequency		Winter Frequency	
Plant Taxa	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**	**Northern**
Browse/ Fruit:								
Acer rubrum	*	*	7	7	12	16	*	*
Baccharis halimifolia	10	9	*	*	*	*	22	26
Celtis laevigata	2	3	2	6	17	16	7	0
Cephalanthus occidentalis	7	15	*	*	*	*	*	*
Liquidamber styraciflua	2	12	*	*	*	*	*	*
Myrica cerifera	16	4	16	13	30	27	26	23
Quercus spp.	*	*	*	*	13	15	23	26
Salix nigra	16	8	30	30	29	28	22	26
Sambucus canadensis	5	16	14	6	23	22	*	*
Triadica sebifera	14	15	29	30	29	28	*	*
Vitis spp.	7	29	6	7	9	18	16	20

	Spring	Summer	Fall	Winter
Chi-square	**48.57**	**17.40**	**26.54**	**24.18**
Degrees of Freedom	**35**	**22**	**21**	**18**
P-Value	**0.063**	**0.74**	**0.187**	**0.149**

DISCUSSION

DIET COMPOSITION AND DIET SIMILARITY

I identified few differences in plant selection between deer populations at Da Bunch. Significant differences in the frequency of occurrence of plants within fecal pellets were deemed marginal. In fact, I only detected 3 plant taxa (*Berchemia scandens* during winter, *Diodia virginiana* during summer, and *Vitis spp*. during fall) that were consumed differently by the two deer populations $P > (.05)$. It is important to note that these 3 species represented less than 3% of diets for both populations of deer, suggesting that they were of little biological significance.

To date, only 3 studies have documented food habits of intraspecific species after translocation of one population has occurred (O'Bryan 1983, Zilenski 1999, and Meyers 2001). O'Bryan (1983) noted that diets of translocated black-tailed deer were almost identical to those reported for the resident population of deer by Longhurst et al. (1979). O'Bryan (1983) also noted that translocated populations of deer may have a predisposition to select the same diets to those of native animals even after relocation has confronted the deer with entirely new foraging habitat availability. This seems reasonable to me, because Spalinger et al. (1997) also suggested that foraging behavior in white-tailed deer specifically was largely due to genetically innate behavior. Crawford (1982) found that tame deer fed a pelleted ration released into the wild fed highly selectively and were observed to have nuzzled or held plant species parts in the mouth and then rejected. Several factors have contributed to the starvation of pen-raised released white-tails. O'Bryan and McCullough (1985) noted that when the population was at carrying capacity and released deer were in poor condition, which lead to 85% of

those deer dying within the 1st year from malnutrition. McCall (1988) also noted that pen-raised released deer were used to being feed pelleted rations and water daily which tends to make starvation more prevalent after release when pen-raised deer are required to forage for themselves. Additional, Zielinski (1999) and Meyers (2001) and suggest that deer released into new habitats have an inclination to select diets similar to the resident wild deer population.

Although the number of plant taxa shared differed between both populations, with native deer selecting for 2 more in spring, and 1 in each other season, I feel these differences can be contributed to the smaller population size of pen-raised deer as compared to the wild deer population. Wild deer fecal samples were presumably collected from a larger population that ranged over a wider area containing more available plant taxa to forage on than there released counterparts. Moreover, native and translocated deer consumed 4, 5, 1, and 1 plant species in like frequencies during spring, summer, fall, and winter, respectively (Table 2). However, of the 11 forages ingested similarly by both populations, only *Digitaria spp*., *Panicum spp*., *Paspalum spp*., and *Salix nigra* during the summer were identified in all 60 fecal samples during the season. But, a difference was detected ($P \leq 0.001$) between populations in the use of *Diodia virginiana* ($P = 0.001$) in spring, *Aeschynomene americana* ($P = 0.001$), *Ambrosia spp*. ($P = 0.001$) in fall, and *Berchemia scandens* ($P = 0.001$) and *Celtis laevigata* ($P = 0.001$) in winter.

Results of my study were inconsistent with white-tailed deer being predominantly browsers, since forbs were highly favored by both populations all year. My data were inconsistent with previous food habit studies done in hardwood bottomland habitat

throughout Louisiana. Myers (2001) found that white-tailed deer were predominantly browsers, because browse and fruit was highly favored by all deer during spring, summer, fall, and winter. Thill (1984) found that diets of deer in Grant Parish, Louisiana were found to be >85% dominated by woody browse during all seasons. Additionally, Sheffield (1957) and Murphy (1974) both reported that deer in Tensas Parish, Louisiana consumed mostly browse. More recently, Rains (1999) found that browse comprised more than 70% of deer diets at Avery Island, Louisiana.

Consistent with my study, deer from the Welder Refuge in Texas were reported to be primarily grazers rather than browsers (Chamrad and Box 1968, Drawe 1968). Zielinski (1999) also reported that wild and translocated deer on his study site in Gheens, Louisiana relied more on forbs (43% and 47% annually), and less on browse (25% and 25%), respectively. Deer on Da Bunch where also found to favor forbs (41% and 41% annually) more than browse (19% and 17%). Because of habitat similarities between my study area and Zielinski's (1999), a comparison between plant taxa among studies is readily available. Use of forbs by both populations in our studies of deer was very high during spring, summer and fall while browse use during spring and summer was consistently lowered when compared to Meyers (2001).

Research has proven that deer utilize agronomic and supplemental forage species to a high degree when available (Korschgen 1962, Flyger and Thoerig 1965, Delany 1985, Dancak 1990), and foraging behavior by native and translocated deer on Da Bunch did not behave differently. Chickory (14%) and Lancelot Plantain (6%) represented 20% of average deer diets during winter, and were found in 90% and 84% of all fecal groups, respectively. Similarly, Johnson et al. (1987) found that the deer diets on Blairstown

Plantation were comprised of about 20% of supplemental food plot forages during winter which is similar to my findings at Da Bunch. Short (1975) suggested that introduced forages are highly palatable and nutritious for deer when compared to most native forages available during summer or winter when mature forbs, grasses or woody twigs are low in nutrient concentrations but high in fiber. This is, however, in contrast to previous research which found summer to be the most nutritionally stressful period in the South, because of low forage quality, heat, and reduced forage intake (Ockenfels and Bissonette 1982, Blair et al. 1984).

DIET DIVERSITY

I found no significant difference in diet diversity between deer populations during the year of the study. These similarities were surprising in nature considering the fact that during the study period there were no observed interactions between the two populations at any time and distinct social groups were prominent, although both native and translocated deer where sympatric to each other (Day 1998). Both populations of deer consumed a greater variety of plant taxa during fall. The greatest diversity of plant ingestion occurred during the spring, in which fecal pellets of native and pen-raised deer contained 12 to 19 and 11 to 18 species per sample, respectively. Zielinski (1999) found that wild and translocated deer fecal samples contained an average of 18.80 ± 0.29 and 19.73 ± 0.24 taxa per sample, respectively during spring. This is similar to research that reported deer consume a greater variety of plant taxa during spring (Everitt and Drawe 1974, Arnold and Drawe 1979, and Everitt and Gonzalez 1981). In contrast, Meyers (2001) found that summer resulted in the highest diversity of plant taxa in fecal samples of wild and pen-raised deer which ranged from 11 to 20 and 10 to 20 taxa per sample,

respectively. The average number of forages identified per fecal sample during Meyers study ranged from a high of 16.00 $\pm$ 0.43 and 15.37 $\pm$ 0.44 and was found during summer. My data as well as Gheens data indicates that deer on Da Bunch selected fewer plant taxa than Blairstown data.

CONCLUSIONS

I found that both populations of deer consumed similar diets during all seasons of the year. Thus, pen-raised deer released into the wild select diets similar to their native counterparts, and consequently should possess a similar body condition within genetic constraints. Simply stated, if wild deer foraging on good range are healthy, presumably pen-raised deer released onto that area also will be healthy as long as the carrying capacity is not exceeded. My study also further strengthened prior evidence for the theory that foraging behavior by deer is largely an genetically innate behavior (Spaliner et al. 1997, Zielinski 1999, and Meyers 2001). As a result of my study, I feel that landowners who translocate pen-raised deer to a new environment must understand that a high degree of intraspecific competition for food resources may occur due to the similarity among native and translocated released deer. Although I conclude that deer eat deer food, this intraspecific competition would not be great enough to affect the survival of pen-raised deer released into a natural environment, once again, assuming carrying capacity is not exceeded or approached. Although my results are consistent with Zielinski (1999) and Meyers (2001) that northern deer showed high similarities in dietary habits to native deer, I feel that research is needed on long-term survival and performance of translocated deer is vital for future management.

LITERATURE CITED

Adams, L. 1957. A way to analyze herbivore food habits by fecal examination. Trans. N. Amer. Wildl. Conf. 22:152-159.

Anthony, R. G., and N. S. Smith. 1974. Comparison of rumen and fecal analysis to describe deer diets. J. Wild. Manage. 38:535-540.

Arnold, L. A. Jr., and D. L. Drawe. 1979. Seasonal food habits of white-tailed deer in the South Texas Plains. J. Range Manage. 32:175-178.

Baumgartner, L. L., and A. C. Martin. 1939. Plant histology as an aid in squirrel food-habits studies. J. Wildl. Manage. 3:266-268.

Blair, R. M., and L. E. Brunett. 1987. Deer Habitat Potential of Pine-Hardwood Forests in Louisiana. U. S. Dept. of Agriculture. SO-136.

Calhoun, M. Ed. 1997. Louisiana almanac, 1997-1998 edition. Pelican Publishing Company, Inc., Gretna, Louisiana. 697 pp.

Campbell, R. S., E. A. Epps, Jr., C. C. Moreland, J. L. Farr, and F. Bonner. 1954. Nutritive values of native plants on forest range in central Louisiana. Louisiana Agric. Exp. Stn. Bull. 488. 18pp.

Chamrad, A. D., and T. W. Box. 1968. Food habits of white-tailed deer in south Texas. J. Wildl. Manage. 21:158-164.

Crawford, H. S., J. B. Whelan, R. F. Harlow, and J. E. Skeen. 1975. Deer range potential in selective and clearcut oak-pine stands in southwestern Virginia. U.S. Dep. Agric., For. Serv. Res. Pap. SE-134. 12 pp.

Crawford, H. S. 1982. Seasonal food selection and digestibility by tame white-tailed deer in central Maine. J. Wildl. Manage. 46(4):974-982

deCalesta, D. S. 1997. Deer and ecosystem management. Pages 267-279 in W. J. MeShea, H. B. Underwood, and J. H. Rappole, eds. The science of overabundance: deer ecology and population management. Smithsonian Inst. Press. Washington D.C.

Dancak, Kenneth D. 1990. Effects of food plots on selected growth parameters, Productivity, and harvesting of white-tailed deer in a national forest. Dissertation -Louisiana State University, School of Forestry, Wildlife and Fisheries. 184pp.

Day, J. W. 1998. A preliminary study of translocated northern white-tailed deer in southeastern Louisiana. M.S. Thesis, Louisiana State Univ., Baton Rouge, 63 pp.

Dearden, Boyd L. R. E. Pegau, and R. M. Hansen. 1975. Precision of microhistological estimates of ruminant food habits. J. Wildl. Manage. 39:402-407.

DeLany, B. W., Jr. 1985. Effects of cool-season food plots on white-tailed deer. M. S. Thesis, Louisiana State Univ., Baton Rouge, 46 pp.

Drawe, D. L. 1968. Mid-summer diet of deer on the Welder Wildlife Refuge. J. Range Manage. 21:164-166

Dunkeson, R. L. 1955. Deer range appraisal for the Missouri Ozarks. J. Wildl. Manage. 19:358-364.

Ellsworth, D. L., R. L. Honeycutt, N. J. Silvy, M. H. Smith, J. W. Bickham, and W. D. Klimstra. 1994. White-tailed deer restoration to the southeastern United States: evaluating genetic variation. Journal of Wildl. Manage. 58:688-697.

Everitt, J. H., and D. L. Drawe. 1974. Spring food habits of white-tailed deer in the South Texas Plains. J. Range Manage. 27:15-20.

Everitt, J. H., and C. L. Gonzalez. 1981. Seasonal nutrient content in food plants of white-tailed deer on the South Texas Plains. J. Range Manage. 34:506-510.

Fracker, S. B., and J. A. Brischle. 1944. Measuring the local distribution of *Ribes*. Ecology 25:283-303.

Flyger, V. F., and T. Thoerig. 1965. Crop damage caused by Maryland deer. Proc. Ann. Conf. Southeast. Assoc. Game and Fish Comm. 16:45-52.

Freund, R. J. W. J. Wilson. Statistical Methods. New York: Academic Press, 1997.

Frey-Wyssling, A., and K. Muhlentahler. 1959. Uberdas submikroskopische Geschehen bei der Kuntinisierung pflanzhler Lellwande. Naturf. Gesell in Zurich, Vrtlyschr. 104:294-299.

Gallina, S. 1993. White-tailed deer and cattle diets at La Michilia, Durango, Mexico. J. Range Manage. 46:487-492.

Gill, R. B., L. H. Carpenter, R. M. Bartman, D. L. Baker, and G. G. Schoonveld. 1983. Fecal analysis to estimate mule deer diets. J. Wild. Manage. 47:902-915.

Gogan, P. J., and R. H. Barrett. 1995. Elk and deer diets in a coastal prairie-scrub mosaic, California. J. Range Manage. 48:327-335.

Havstad, K. M., and G. B. Donart. 1978. The microhistological technique: testing two central assumptions in south central New Mexico. J. Range Manage. 31:469-470.

Healy, W. M. 1971. Forage preferences of tame deer in a northwest Pennsylvania clearcutting. J. Wild. Manage. 35:717-722.

Hodgman, T. P., B. B. Davitt, and J.R. Nelson. 1996. Monitoring mule deer diet quality and intake with fecal indices. J. Range Manage. 49:215-222.

Holochek, J. L. and M. Vavra. 1981. The effect of slide and frequency observation numbers on the precision of microhistological analysis. J. Range Manage. 34:337-338.

Holochek, J. L. 1982. Sample preparation techniques for microhistological analysis. J. Range Mange. 35:541-542.

Holochek, J. L. and B. D. Gross. 1982a. Training needed for quantifying simulated diets from fragmented range plants. J. Range Manage. 35:644-647.

Holochek, J. L. and B. D. Gross. 1982b. Evaluation of different calculation procedures for microhistological analysis. J. Range Manage. 35:721-723.

Holochek, J. L., L. M. Vavra, and R. D. Pieper. 1982b. Methods for determining the nutritive quality of range ruminant diets: a review. J. Anim. Sci. 54:363-376.

Holochek, J. L., L. M. Vavra, and R. D. Pieper. 1982c. Botanical composition determination of range herbivore diets: a review. J. Range Manage. 35(3):309-315.

Holochek, J. L., and R. Valdex. 1985. Magnification and shrub stemmy material Influence on fecal analysis accuracy. J. Range Manage. 38: 350-352.

Hoover, J. P. 1971. Food habits of pronghorn antelope on Pawnee Grasslands. M.S. Thesis, Colorado State Univ., Fort Collins. 285pp.

Johnson, M. K. 1979. Foods of primary consumers in southcentral Idaho. J. Range Manage. 32:365-368.

Johnson, M. K. 1982. Frequency sampling for microscopic analysis of botanical compositions. J. Range Manage. 35:541-542.

Johnson, M. K. and H. Wofford. 1983. Digesion and fragmentation: influence on herbivore diet analysis. J. Wildl. Manage. 47:877-879.

Johnson, M. K., H. Wofford., and H. A. Pearson. 1983. Microhistological techniques for food habits analyses. Res. Pap. SO-199. New Orleans, La.:USDA For. Serv., Southern For. Exp. Stn. 40 pp.

Johnson, M. K., B. W. DeLany, Jr., S. P. Lynch, J. A. Zeno, S. R. Shultz, T. W. Keegan, and B. D. Nelson. 1987. Effects of cool-season agronomic forages on white-tailed deer. Wildl. Soc. Bull. 15:330-339.

Johnson, M. K., and K. D. Dancak. 1993. Effects of food plots on white-tailed deer in Kisatchie National Forest. J. Range Manage. 46:110-114.

Jordan, J. S. 1967. Deer browsing in northern hardwoods after clearcutting: effect on height, density, and stocking of regeneration of commercial species. U.S. For. Serv. Res. Pap> NE-57. 15pp.

Keegan, M.K. Johnson, and B. D. Nelson. 1989. American jointvetch improves summer range for white-tailed deer. J. Range Manage. 42:128-134.

Keegan, T. W. 1988. White-tailed deer use of American jointvetch food plots. M. S. Thesis, Louisiana State Univ., Baton Rouge. 94 pp.

Ketchen, S. F. 199. Analysis of morphological characteristics and variation between captive reared Missouri and Louisiana white-tailed deer. M. S. Thesis. Louisiana State University, Baton Rouge. 72 pp.

Kie, J. G., D. L. Drawe, and G. Scot. 1980. Changes in diet and nutrition with increased herd size in Texas white-tailed deer. J. Range. Manage. 33:28-34.

Kingery, J. L., and J. C. Mosley, and K. C. Bordwell. 1996. Dietary overlap among cattle and cervids in northern Idaho forests. J. Range Manage. 49:8-15.

Kirchhoff, M. D., and D. N. Larsen. 1998. Dietary overlap between native Sitka black-tailed deer and introduced elk in southeast Alaska. J. Wildl. Manage. 62(1):236-242.

Korschgen, L. J. 1962. Foods of Missouri deer, with some management implications. J. Wildl. Manage. 26:164-172.

Korschgen, L. J. 1980. Spring and Summer foods of deer in the Missouri Ozarks. J. WIldl. Manage. 44(1):89-97.

Kucera, T. E. 1997. Fecal indicators, diet, and population parameters in mule deer. J. Wildl. Manage. 26(2):550-560.

Litvaitis, John A., K. Titus, and E. M. Anderson. 1996. Measuring vertebrate use of terrestrial habitats and foods. Pp. 254-274. In T. A. Bookout. Ed. Research and Management Techniques for Wildlife and Habitats. The Wildlife Society, Bethesda, Maryland.

Longhurst, W. M., G. E. Connolly, B. M. Browning, and E. O. Garton. 1979. Food inter-relationships of deer and sheep in parts of Mendocino and Lake Counties, California. Hilgardia 47:191-247.

Marquis, D. A. 1981. Effect of deer browsing on timber production in Allegheny hardwood forest of northwestern Pennsylvania. U.S. For. Serv. Res. Pap. NE-475. 10pp.

Marshall, J. W., and V. R. Squires. 1979. Accuracy of quantitative methods used for the botanical analysis of esophageal fistula samples. Trop. Grass. 13:140-148.

Mautz, W. W. 1978. Sledding on a bushy hillside: the fat cycle in deer. Wildl. Soc. Bull. 6:88-90.

McCabe, R. E. and T. R. McCabe. 1984. Of slings and arrows: An historical retrospection. Pages 15-45 in L. K. halles ed. White-tailed deer Ecology and Management. Stackpole Brooks, Harrisburg, Pa.

McCall, T. C., R. D. Brown, and C. A. DeYoung. 1988. Mortality of pen raised and wild white-tailed deer bucks. Wildl. Soc. Bull. 16:380-384.

McCullough, D. R. 1985. Variables influencing food habits of white-tailed deer on the George Reserve. J. Mamm. 66(4):682-692.

McDaniel, D. 1984. Soil Survey of St. Charles Parish, Louisiana. USDA, Soil Conservation Service. Coop Louisiana Agricultural Experiment Station.

McInnis, M. S., M. Vavra, and W. C. Krueger. 1983. A comparison of four methods used to determine diets of large herbivores. J. Range Manage. 36:302-306.

Mendenhall, W., and R. J. Beaver. 1994. Introduction to Probability and Statistics. Duxbury Press, Belmont, California. 704 pp.

Myers, R. J. 2001. Diets of wild versus released, pen-raised white-tailed deer in Southeastern Louisiana. M. S. Thesis, Louisiana State Univ., Baton Rouge.

Murphy, D. A., and J. A. Coastes. 1966. Effects of dietary protein on deer. Trans. N. Amer. Wildl. And Nat. Resour. Conf. 31:129-139.

Murphy, P. K. 1974. The monthly availability and use of browse plant by deer on a bottomland hardwood area in Tensas Parish, Louisiana. M. S. Thesis, Louisiana State Univ., Baton Rouge. 171pp.

O'Bryan, M. K. 1983. The outcome of the 1981 Angel Island Deer Relocation. M. S. Thesis, Univ. of California, Berkley, 87 pp.

O'Bryan, M. K., and D. R. McCullough. 1985. Survival of black-tailed deer following relocation in California. J. Wildl. Manage. 49:115-119.

Ockenfels, R. A., and J. A. Bissonette. 1982. Estimates of white-tailed deer activity levels in Oklahoma. Proc. Ann. Conf. Southeast. Assoc. Fish and Wildl. Agenc. 36:445-453.

Oosting, H. J. 1956. The study of Plant Communities. W. H. Freeman and Company, San Francisco. 440p.

Ozoga, J. J., R. V. Doepker, and R. D. Earle. 1992. Hunter-harvest of captive raised male white-tailed deer, released in upper Michigan. Can. Field. Nat. 106:357-360

Rains, N. D. 1999. Diets of white-tailed deer at Avery Island, Louisiana. M.S. Thesis, Louisiana State Univ. Baton Rouge, 30 pp.

Sanders, K.D., B. E. Dahl, and G. Scott. 1980. Bite-count vs. fecal analysis for range Animal diets. J. Range Manage. 32:146-149.

Sheffield, W. J. 1957. A summer deer food study in Tensas Parish, Louisiana. M.S. Thesis, Louisiana State Univ., Baton Rouge. 87 pp.

Short, H. L., J. D. Newsom, G. L. McCoy, and J. F. Fowler. 1969. Effects of nutrition and climate on southern deer. Trans. N. Amer. Wildl. And Nat. Resour. Conf. 34:137-145.

Short, H. L. 1971. Forage digestibility and diet of deer on southern upland range. J. Wildl. Manage. 35:698-706.

Short, H. L. 1975. Nutrition of southern deer in different seasons. J. Wildl. Manage. 25:66-70.

Siegel, S. and N. J. Castellan, Jr. 1988. Nonparametric Statistics for the Behavioral Sciences. McCraw-Hill, Inc., Mexico. 399 pp.

Slater, J., and R. J. Jones. 1971. Estimation of the diets selected by grazing animals from microscopic analysis of feces. J. Australian Inst. Agr. Sci. 37:238-239.

Smith, A. D., and L. J. Shandruk. 1979. Comparison of fecal, rumen and utilization methods for ascertaining pronghorn diets. J. Range Manage. 32:275-279.

Snider, C. C., and J. M. Asplund. 1974. In vitro digestibility of deer foods from the Missouri Ozarks. J. Wildl. Manage. 38:20-31.

Spalinger, D. E., S. M. Cooper, D. J. Martin, and L. A. Shipley. 1997. Is social learning an important influence on foraging behavior in white-tailed deer? J. Wildl. Manage. 61:611-621.

Sparks, D. R., and J. C. Malechek. 1968. Estimating percentage dry weight in diets using a microscopic technique. J. Range Manage. 21:264-265.

Storr, G. M. 1961. Microscopic analysis of feces, a technique for ascertaining the diet of herbivorous mammals. Aust. J. Biol. Sci. 14:157-164.

Thill, R. E. 1984. Deer and cattle diets on Louisiana pine-hardwood sites. J. Wildl. Manage. 48:788-798.

Tierson, W. C., E. F. Patric, and D. F. Behrend. 1966. Influence of white-tailed deer on a northern hardwood forest. J. For. 64:801-805.

Todd, J. W., and R. M. Hansen. 1973. Plant fragments in the feces of bighorns as indicators of food habits. J. Wildl. Manage. 37:363-366.

Vavra, M., and J. L. Holechek. 1980. Factors influencing microhistological analysis of herbivore diets. J. Range Manage. 33:371-74.

Vavra, M., K. W. Rice and R. M. Hansen. 1978. A comparison of esophageal fistula and fecal material to determine steer diets. J. Range Manage. 31:11-13

Voth, E. H. and H. C. Black. 1973. A histological technique for determining feeding of small herbivores. J. Wildl. Manage. 37:223-231.

Waller, D. M, and Alverson, W. S. 1997. The white-tailed deer: a keystone herbivore. Wildlife Society Bulletin. 2:217-226.

Wallmo, O. C., and D. J. Neff. 1970. Direct observations of tamed deer to measure their consumption of natural forage. Pp. 105-110 in Range and wildlife habitat evaluation, a research symposium. U.S. Dep. Agric., For. Serv. Publ. 1147.

Westboy, M., G. R. Rost, and J. A. Weis. 1976. Problems with estimating herbivore diets by microscopically identifying plant fragments from stomachs. J. Mamm. 57:167-172.

Wheaton, C., and R. D. Brown. 1983. Feed intake and digestive efficiency of south Texas white-tailed deer. J. Wildl. Manage. 47:442-448.

Zielinski, B. M. 1999. Diet overlap of native and translocated northern white-tailed deer in southeastern Louisiana. M.S. Thesis, Louisiana State Univ., Baton Rouge. 82 pp.

Zyznar, E. and P. J. Urness. 1969. Qualitative identification of forage remnants in deer feces. J. Wildl. Manage. 33:506-510.

APPENDIX:
PLANT TAXA IDENTIFIED IN DIETS

Table 4. List of scientific and corresponding common names for plant taxa identified in fecal samples of Native Southern and Northern Released, Pen-raised white-tailed deer collected from Da Bunch, St. Charles Parish, Louisiana, 2002-2003.

Plant Taxa	
Scientific Name[1]	**Common Name**
Grass and Grass-like:	
Arundinaria gigantea	Cane
Bromus spp.	Rescue Grass
Digitaria spp.	Crab Grass
Echinochloa colona	Jungle Rice
Panicum spp.	Panic Grass
Paspalum spp.	Paspalum
Plantago lanceolata	Lancelot Plaintain
Tillandsia usneoides	Spanish Moss
Triticum aestivum	Wheat
Forbs:	
Aeschynomene americana	American Jointvetch
Alternanthera philoxeroides	Alligator weed
Ambrosia spp.	Ragweed
Berchemia scandens	Rattan Vine
Campis radicans	Trumpet Creeper
Cassia fasciculata	Sleepingplant
Chicorium intybus	Blue Chickory
Diodia virginiana	Buttonweed
Eichhornia crassipes	Water Hyacanith
Eupatorium spp.	Thoroughwort
Hibiscus lasiocarpos	Hibiscus
Liatris spp.	Blazing Star
Lonicera japonica	Honeysuckle
Ludwigia spp.	Primrose

Table 4. Continued

Medicago arabica	Spotted Medick
Nymphea odorata	American Waterlilly
Oenothera speciosa	Pinkladies
Oxalis spp.	Sorrel
Plantago lanceolata	Lancelot Plaintain
Phyla spp.	Fog Fruit
Phytolacca americana	Poke Salad
Ranunculus spp.	Buttercup
Rubus spp.	Dewberry
Solanum caroliniaum	Horse Knettle
Solidago spp.	Goldenrod
Taraxacum officianle	Dwarf Dasey
Trifolium spp.	Clover
Verbena braziliensis	Vervain
Vicia spp.	Vetch
Vigna spp.	Cowpea
Viola spp.	Viola
Browse/ Fruit:	
Acer rubrum var. drummondii	Maple
Baccharis halimifolia	salt bush
Celtis laevigata	Sugarberry
Cephalanthus occidentalis	Buttonbush
Liquidamber styraciflua	Sweetgum
Myrica cerifera	Waxmyrtle
Quercus spp.	Oak
Salix nigra	Black Willow
Sambucus canadensis	Elderberry
Triadica sebifera	Tallow Tree
Vitis spp.	Muscadine or Wild Grape

[1]Scientific and common names follow http://plants.usda.gov

VITA

Kristopher Scott Davis was born on November 11, 1980, in Spring, Texas, to James M. and Vicki L. Davis. He attended and graduated from Woodlawn High School, Baton Rouge, Louisiana, in 1998.

In August of 1998, he began his collegiate career at Louisiana State University and Agricultural and Mechanical College of Baton Rouge, Louisiana. In May of 2002 he graduated with a bachelor of science degree, in wildlife and fisheries from Louisiana State University and Agricultural and Mechanical College and decided to pursue a master's program in wildlife science.

In August of 2002 he enrolled in the Graduate School at Louisiana State University and Agricultural and Mechanical College in Baton Rouge, Louisiana. While working on his thesis, he was employed by the School of Renewable Natural Resources as a Graduate Research Assistant.

In May of 2003, he married his long-time fiancée Rebecca. J. Morris and made her his wife. He is presently a candidate for the degree of Master of Science in wildlife.