

THE IMPORTANCE OF VARIETY TO SOUTHERN DEER ¹

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The adaptability of deer to changing food conditions and the diversity of their food habits may not be fully appreciated. The concept that deer are browsers and that browse is their principal food deserves elaboration, especially in the South.

Interest in this subject developed over a period of years, during which time penned deer were being observed under good browse conditions. There was little overstory hardwood in the fully stocked pine stand and the study had been planned as an evaluation of browse species and browse carrying capacity.

In an earlier paper Lay (1956) reported all southern browse is not deer food and pressure heavy enough to produce a browse line requires serious overstocking and rarely occurs before a die-off reduces the pressure. Quality is more important than quantity and there is a general shortage of palatable and nutritious evergreen browse for the winter period. Deer rarely make much use of the leafless twigs of deciduous species.

The present paper is a review of the varied nature of deer diet as indicated by studies in eastern Texas and by reports from other parts of the South. Many editorial comments and suggestions were contributed by L. K. Halls, P. D. Goodrum, and R. E. Van Cleave; and these were gratefully acknowledged.

DEER PEN STUDY

The presence of about 75 pounds per acre (air-dry basis) of yaupon (*Ilex vomitoria*), a palatable evergreen in a 58-acre deer pen at Kirbyville, Texas, together with a few overstory hardwoods, gave an opportunity to observe deer use of browse under exceptional conditions. Few places have more of an acceptable evergreen browse species plus a mixture of other species.

The study in this deer pen was based on forage removal from permanent and temporary plots by one to six buck deer. For a time a pet deer also was observed.

Forage consumption was estimated quarterly. Adjustments were made for seasonal moisture content differences. Calculations of the forage requirement of the confined deer were based on a factor of 2.5 pounds of air-dry food requirement per 100 pounds of deer per day.

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Weights of the deer were estimated. The 2.5 pounds is the approximate mid-point of the quantity requirements found by three studies: 2.3 pounds (Davenport, 1939), 2.35 pounds (Nichol, 1938), and 2.7 pounds (Smith, 1950).

Less than one-half of the required intake of forage by the penned deer at Kirbyville could be accounted for. One weakness of estimates of browse removed from plots is that evidence of bite removal is not always clear, and new growth may obscure an early bite.

Yet, it seemed unlikely that the method was producing results which were 100 per cent or more in error. An alternate thesis was that deer were eating significant amounts of other items which were not being measured.

Fruits of various woody species were available in the deer pen and inspection of deer pellets revealed a high frequency of seed. A systematic monthly collection of pellet groups was started which revealed 58 identifications of fruit species per 100 samples. This was the year-round mean of 679 samples. All species available were found in the droppings except two or three species with tiny or soft seeds.

So, the Kirbyville deer seemed to be demonstrating that deer could get along without much overstory hardwoods—stocked with at least 1 deer to 15 acres—but; also, that browse was not their only sustenance.

OTHER STUDIES

The numerous reports of deer food habits from southern states are varied in form and content. Many show species without distinguishing fruit from browse. Oaks are frequently listed as being represented in stomachs by acorns and leaves. Much of the woody plant material reported as deer foods may not be assumed to be browse.

One of the most fitting studies found was Korschgen's (1954) report of 440 deer stomachs collected over a 5-year period in Missouri. "Most striking was the clear indication that in the absence of oak mast, deer turned for food to the agricultural crops of corn, lespedeza, wheat, alfalfa, and to the wild fruits of sumac and coralberry, rather than twig browse A shortage of acorns was clearly associated with increased damage to agricultural crops and forest plantations."

A study of 195 deer stomachs collected in Alabama during December and examined by the U. S. Fish and Wildlife Service showed that oaks provided approximately one-half of the volume and this was comprised principally of acorns. The next three most important items were fruit, twigs, and leaves of greenbriers, sumacs, and dogwood. (Pearson, 1943) Browse appeared to be less than one-half of the volume.

That browse is significant enough to be the basis of range appraisal and management for deer has been questioned for such areas as the Ozarks where browse is mostly deciduous species which are used only during the growing season. (Dunkeson, 1955). Winter browse, except unpalatable cedar (*Juniperus*) and pine (*Pinus*), is not generally available.

That variety is the one common aspect of deer food studies is further shown by Harlow's work in Florida (1961). The summary of the contents of 423 stomachs collected in the fall and winter disclosed 40.79 per cent fruit (mostly acorns and palmetto berries), 37.63 per cent browse, and 9.2 per cent mushrooms, the three major groups.

Mushrooms are eagerly sought by deer, according to many reports. Although they are sporadic in production, their total weight at times may be significant. That part of the Florida series of 423 stomachs which was collected on the Ocala Wildlife Management Area contained 25 per cent mushrooms and only 5 per cent browse.

Ripley and McClure (1963), in their report on the deer browse resources of north Georgia suggest another facet of the importance of

browse. The amounts of deer browse found in their survey was sufficient to carry 1 deer to 52 acres of National Forest land, or 33 acres of private land for 100 days. The question arises: What do deer eat the other 265 days? Also, 1 deer to 52 acres is hardly a manageable density. Many ranges in the South carry more deer.

There are areas in the pine-hardwood forests of Texas with estimated populations of 1 deer to 10 acres. There, the browse supply is much too low to account for the 182 pounds of air-dry forage required to carry one 100-pound deer to 10 acres, with 50 per cent utilization.

Halls and Ripley (1961) indicate 350 pounds of available forage per acre is needed for practicable management.

The one way to reconcile high deer numbers and inadequate browse supplies is that they eat something else, perhaps a majority of the time.

The Georgia study revealed an average of 36 pounds of air-dry browse forage per acre—16 pounds from desirable species and 20 pounds from plants providing emergency or stuffing foods.

A few oaks might have surpassed that in acorn production.

DISCUSSION

Just as the apple is one of the most sought after deer foods in the North and is used even when it must be dug from under the snow (Taylor, 1956, p. 199), there are comparable southern examples in the year-round use of various species of hawthorn. In April when May hawthorns (*Crataegus aestivalis*) ripen and in August when the blueberry hawthorns (*C. brachyacantha*) drop, it is almost useless to look elsewhere for the deer.

Any student of deer, including most hunters, know that the fall distribution of deer is likely to be determined by the location of acorn crops. Goodrum and Reid (1962) summarized the value of acorns, their availability and nutritive content.

Productivity of fruits may also be high. An earlier report outlined the high productivity of dogwood and several other species (Lay, 1961). Domestic fruit crops may attain levels of several tons per acre. Wild crops are less and some results of measurements taken in Texas are given in Table 1, as examples of productive potential.

The high moisture content of some fruits, the undigested seed in some, and the irregular production, are factors that reduce somewhat the apparent productivity of fruits. It is likely the concentrated sugars and other nutrients in fruits have special significance to deer nutrition out of proportion to their weights. Certainly, the deer seek fruits avidly and do well on them.

In the management of southern deer, attention should be given to the diverse kinds of food used. Forestry practices, which favor variety and not just browse, may be expected to increase deer carrying capacity. There are no "worthless" hardwoods. The forest with the maximum mixture of stand types, ages, species and treatments, together with well-distributed clearings, will produce more food for deer than even-age pine stands in large blocks.

CONCLUSION

Deer management should be adapted to the diverse nature of deer food habits.

Many other items may be major foods at one time or another. These include: fruits, forbs, mushrooms, grasses, browse, and various agricultural crops.

The implication for management of deer in southern forests is clear: mixture of species, age classes, and treatments of forest stands in the smallest practicable units, with some clearings, will yield more

Table 1. Summary of East Texas Fruit Production Data

| Species | No. | Diameter | Fruit per tree No. | Pounds per tree | Pounds per Foot Basal Area | Fruit per Pound |
|--|-----|----------|-----------------------|--------------------|----------------------------------|--------------------|
| American beautyberry (<i>Callicarpa americana</i>) | 42 | 0.47 | 1,771 | 0.24 | — | 7,322 |
| White fringetree (<i>Chionanthus virginicus</i>) | 41 | 1.75 | 692 | 1.1 | 65 | 631 |
| Flowering dogwood (<i>Cornus florida</i>) | 26 | 4.0 | 3,500 | 3.3 | 37.9 | 1,083 |
| Blueberry hawthorn (<i>Crataegus brachyacantha</i>) | 10 | 3.0 | 2,278 | 2.4 | 46 | 936 |
| Parsley hawthorn (<i>Crataegus marshalli</i>) | 10 | 2.04 | 4,296 | 1.24 | 56.4 | 3,446 |
| Common persimmon (<i>Diospyros virginiana</i>) | 1 | 4.1 | 455 | 13.4 | 146 | 34 |
| American beech (<i>Fagus grandifolia</i>) | 1 | 15.0 | 25,641 | 14.25 | 11.6 | 1,800 |
| Possumhaw (<i>Ilex decidua</i>) | 8 | 1.8 | 6,151 | 2.2 | 122.2 | 2,792 |
| Gallberry (<i>Ilex coriacea</i>) | 5 | 0.7 | 232 | 0.18 | — | 1,261 |

Figure 1 (Continued)

| Species | No. | Diameter | Fruit per tree No. | Pounds per tree | Pounds per Foot Basal Area | Fruit per Pound |
|---|-----|----------|-----------------------|--------------------|----------------------------------|--------------------|
| Yaupon (<i>Ilex vomitoria</i>) | 5 | 1.7 | 5,587 | 2.18 | 136 | 2,564 |
| Blackgum (<i>Nyssa sylvatica</i>) | 1 | 11.9 | 11,402 | 5.77 | 7.6 | 1,975 |
| Red bay persca (<i>Persea borbonia</i>) | 6 | 2.56 | 910 | 0.93 | 26.6 | 981 |
| Black cherry (<i>Prunus serotina</i>) | 1 | 3.05 | 2,016 | 1.73 | 34.6 | 1,168 |
| Flatwoods plum (<i>Prunus umbellata</i>) | 8 | 3.1 | 578 | 1.18 | 22.6 | 491 |
| Chinese tallowtree (<i>Sapium sabiniferum</i>) | 3 | 4.88 | 16,065 | 5.75 | 44.9 | 2,792 |
| Common sweetleaf (<i>Symplocos tinctoria</i>) | 38 | 2.4 | 1,398 | 0.64 | 20 | 2,168 |
| Farkleberry (<i>Vaccinium arboreum</i>) | 7 | 2.29 | 1,806 | 1.05 | 36.2 | 1,720 |
| Kentucky viburnum (<i>Viburnum molle</i>) | 51 | 0.87 | 415 | 0.08 | — | 5,000 |
| Muscadine (<i>Vitis rotundifolia</i>) | 1 | 2.4 | 8,827 | 53.8 | — | 164 |

food for deer than uniform treatment of large blocks of even-age pure pine.

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