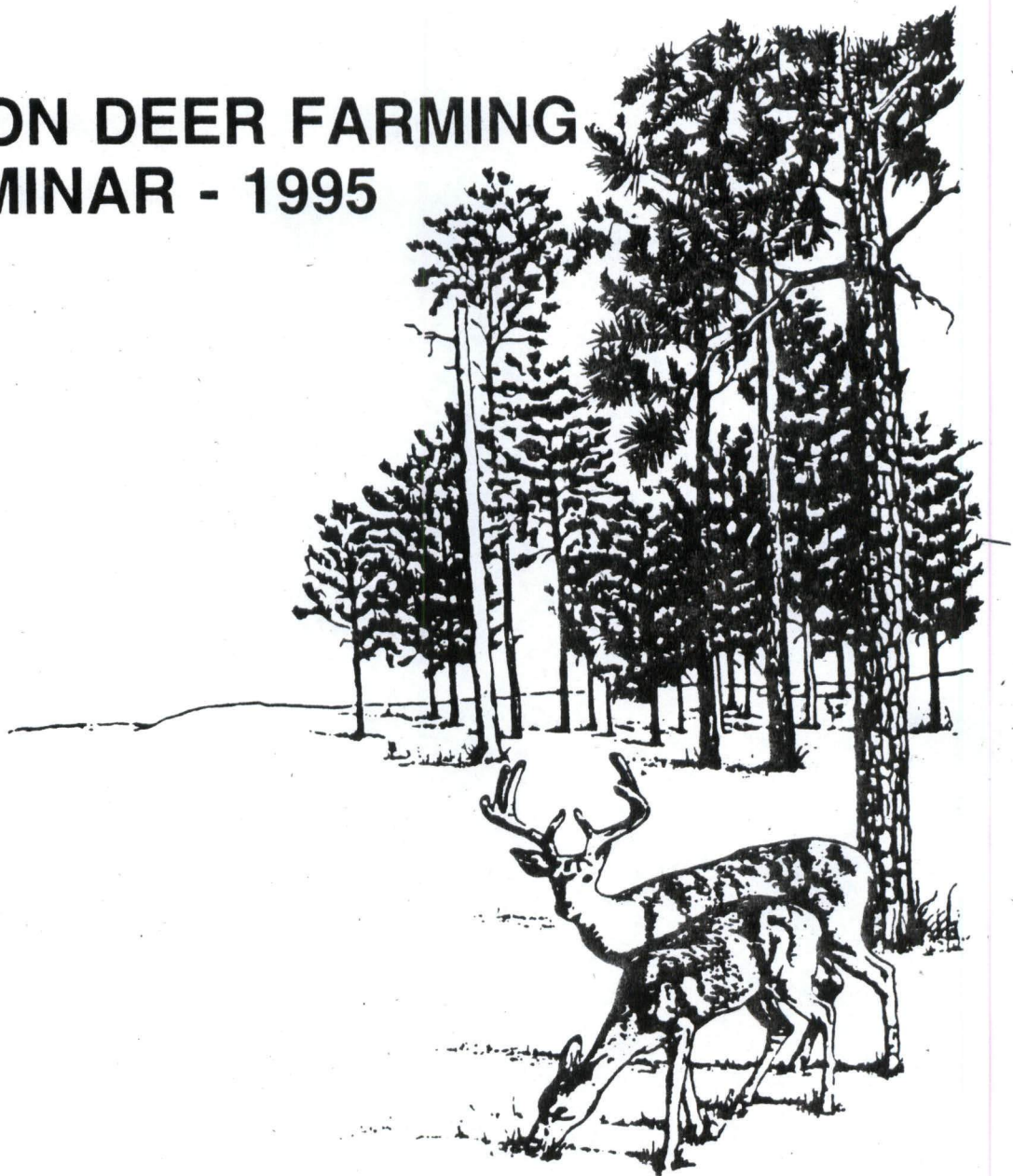




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PASTURE SYSTEMS FOR FARMING EXOTIC DEER

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Background. Deer farming, raising deer in confinement on improved pastures, is a new agricultural enterprise that is gaining popularity in the United States. Removal of inhibitory laws for deer farming, development of improved capture and handling techniques, and high prices for velvet antler and live animals have led to a rapid increase in exotic deer numbers in Texas (Table 1). A deer's diet can consist of grass, browse, forbs, hard and soft mast (fruits of woody plants),

Table 1. Population of exotic deer in Texas.

Year	Axis	Fallow	Sika
1966	6,450	455	875
1974	19,518	4,483	2,800
1988	39,040	14,163	11,879

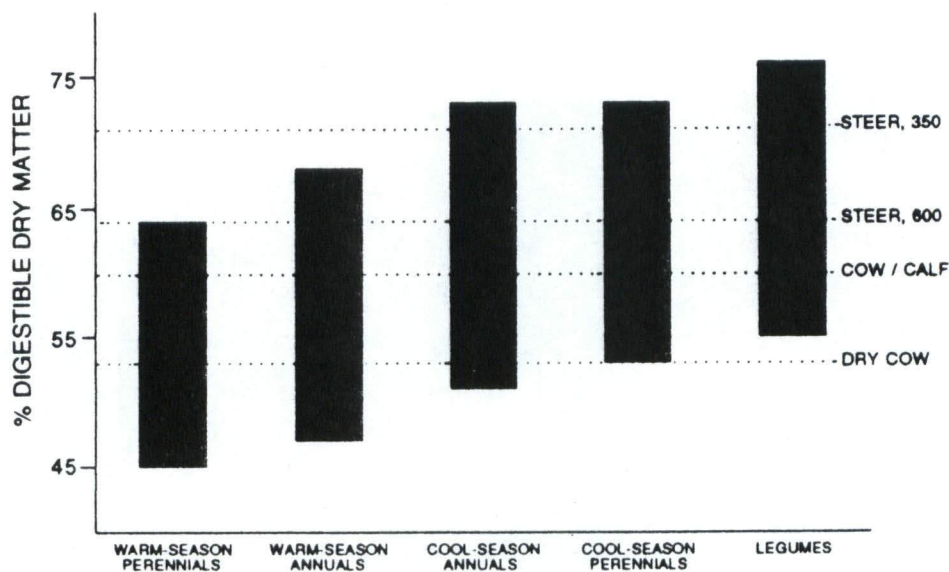
and fungi (mushrooms). Browse includes the young, tender stem tips and leaves of shrubs and trees. Forbs are broadleaf plants which are considered weeds in improved pastures and cool- and warm-season legumes such as clovers and cowpeas. White-tailed deer (*Odocoileus virginianus*) prefer browse and then forbs. Grass generally constitutes less than 5% of the diet under range conditions. White-tailed deer will consume cool-season annual grasses (oats, wheat, ryegrass, etc.) in winter when available browse and forbs have been depleted. In contrast, grass will constitute from 60 to 90% of the diet of axis deer (*Axis axis*) and from 25 to 65% of the diet of fallow deer (*Dama dama*) under range conditions. Forbs were the second largest component of the exotic deer's diet. The ability of most exotic deer to utilize cool- and warm-season grasses effectively allows them to be raised in confinement.

Farming exotic deer can be a profitable enterprise for both small and large land owners. The potential for venison production is good considering the industry estimates 90% of the venison consumed in the U.S. is imported from New Zealand. Present price of a deer carcass ranges from \$2.75 to \$3.00/lb. Six deer are equivalent to one cow when estimating stocking rates of exotic deer. In northeast Texas, a 10-acre pasture would support a minimum of 30 to 45 deer

if planted to improved forages and managed properly. The small acreage requirement for deer farming is ideal for East Texas where most of the land is devoted to timber production with small open pastures that were once planted to cotton. Because deer farming is such a new industry in Texas, there is essentially no information on how well grasses and legumes adapted to Texas meet the nutrient requirements of different exotic deer species. Areas of adaptability and nutritive quality of forages used in Texas and preliminary forage studies with exotic deer at the Overton Center will be discussed.

Current Information. Based on digestibility, forages can be divided into the following five categories: 1) warm-season perennial grasses (bermudagrass, bahiagrass, dallisgrass, etc.); 2) warm-season annual grasses (sudangrass, millet); 3) cool-season perennial grasses (tall fescue, timothy, orchardgrass, etc.); 4) cool-season annual grasses (small grains, ryegrass); and 5) cool- and warm-season legumes (alfalfa, clovers, cowpea, etc.). Ranges of digestible dry matter of the five forage classes and the requirements of four classes of beef cattle are shown in Fig. 1.

Figure 1. Digestible dry matter percentages for five forage groups and requirements of four classes of beef cattle (Lippke & Riewe).



Warm-season perennial grasses, which form the basis of pasture systems in Texas and the southeastern U.S., have the lowest digestibility, therefore, white-tailed deer do not select them. White-tailed deer can be farmed in the northern U.S. and Canada because adapted forages are high quality cool-season perennial grasses. The highest quality forages that can be grown in Texas are

cool-season pastures composed of small grains, ryegrass, clovers, and other legumes.

Protein, energy, and mineral requirements of exotic deer are not well defined and deer performance (weight gain, conception rate, etc.) on well managed introduced forages such as bermudagrass, ryegrass, and legumes is not known. At this point, recommendations on pasture systems and stocking rates are educated guesses. We do know that for forages to be productive and profitable, they must be adapted to local soils and climates. Nutritional requirements of deer do vary with age and reproductive status. A weaned fawn needs a diet higher in protein and energy than a mature deer. A doe nursing a fawn has higher nutritional needs than a doe with no fawn. Influence of season on food intake of some exotic deer must also be considered in developing pasture systems. Fallow and red deer (*Cervus elaphus*) have reduced intake in late fall and winter which results in weight loss. This is more pronounced in bucks than in does.

Preliminary grazing studies were conducted at the Texas A&M University Agricultural Research and Extension Center at Overton to determine species preference by fallow deer for cool- and warm-season annual forages overseeded in Coastal bermudagrass. Cool-season forages, overseeded on Coastal bermudagrass in October were 'Yuchi' arrowleaf clover, 'Dixie' crimson clover, 'Mt. Barker' subterranean clover, 'La.S-1' white clover, 'TAM 90' ryegrass, and 'Elbon' rye. All cool-season forages were grazed by deer during the first grazing period from 25 January to 9 February (Table 2). There was very little clover available during this period. More clover

Table 2. Available forage at the beginning and end of two grazing periods and estimated utilization percentage of six cool-season annual forages.

Species	25 Jan.	9 Feb.	Utilization	18 Mar.	9 Apr.	Utilization
	-----lb/ac-----		%	-----lb/ac-----		%
Arrowleaf clover	75	28	63	883	119	87
Crimson clover	85	29	66	867	53	94
Subclover	106	26	76	399	83	79
White clover	19	12	36	295	30	90
Ryegrass	970	186	81	1058	1044	1
Rye	1104	194	82	1629	3239	0

growth was present at the beginning of the second grazing period on 18 March. Fallow deer had a definite preference for the clovers, followed by the ryegrass. Available ryegrass was the same before and after the grazing period, but some ryegrass was consumed because of its rapid growth

rate during this period. Very little, if any, rye was eaten during the spring grazing period. This was probably due to its earlier maturity and corresponding drop in digestibility.

Warm-season legumes evaluated were 'Iron and Clay' cowpea, matt bean, aescynomene, alyceclover, phasey bean, and 'Serala' lespedeza. They were seeded in a lightly disked Coastal bermudagrass sod in May. Growth of these warm-season legumes was poor because of the competing bermudagrass, but all were readily consumed by fallow deer. Preference by exotic deer for both cool- and warm-season legumes is probably due to their being a forb and providing some variability in the diet in a predominantly grass pasture. Besides being more digestible than grasses, legumes contain higher levels of protein and phosphorus which are critical for growth of fawns, milk production in does, and antler development in bucks.

Adapted forage legumes should be part of any pasture system for exotic deer because they are high in digestibility, protein, and phosphorus and are preferred over grasses. Legumes do require more management and are more soil specific than grasses. Optimum soil types for growing the major cool-season species in the eastern half of Texas are reported in Table 3. Information on seeding rates, planting methods and dates, and management should be available from the local county Extension office. The number of warm-season legume species adapted to Texas are more limited. Cowpeas do well on the sandy acid soils of East Texas. Alyceclover and phasey bean are options as you move south to the Gulf Coast. Alfalfa requires a higher level of management, a soil pH of 6.5 or higher, and a well-drained soil. All legume plantings should be divided into 3 to 4 pastures and grazed rotationally since deer prefer legumes and can selectively graze them. Allowing deer to graze each pasture about a week would provide a 2 to 3 week recovery time between grazing periods.

Winter pastures of oats, wheat, or rye should be seeded at 75 to 100 lb/acre on disked land from mid-September through October. Annual ryegrass can be seeded in a prepared seedbed or overseeded on a warm-season perennial grass at 25-30 lb/acre in mid-autumn. A more detailed article on annual winter pasture establishment, management, and utilization will be available at this conference.

Although poor quality, warm-season perennial grasses are productive and well adapted to Texas soils and climate. Hybrid bermudagrasses (Coastal, Brazos, Jiggs, etc.) are best adapted to deep, sandy soils in northeast Texas. Bahiagrass is adapted to level sandy soils from Lufkin south to Interstate 10. Dallisgrass is grown on poorly drained clay soils in southeast Texas and creek and riverbottoms throughout the eastern third of the state. Bermudagrass is also used on sandy loam soils in the 30 to 40-in rainfall belt in central Texas. Kleingrass and bluestems are

the major improved grasses used on clay and loam soils in central Texas. Information on the best varieties and species adapted to your area can be obtained from the local county Extension office. How well exotic deer perform on these different warm-season perennial grasses is not known. They will probably have to be supplemented with energy (grain) because of low quality. Estimated stocking rate would be about 6 deer on the number of acres required by one cow.

The only cool-season perennial grass grown in the eastern half of Texas is tall fescue. It is limited to loam and clay soils in creek and riverbottoms in northeast Texas. Since these soils are wet part of the year, they would not be good sites for exotic deer pastures. Warm-season annual grasses are varieties of millet grown on sandy soils in East Texas and forage sorghums (sudangrass, sudangrass x sorghum hybrids) grown in central Texas and on the heavier soils in eastern Texas. They are expensive to grow because they must be seeded each year in April or May and require a prepared (disked) seedbed. They are also difficult to stock properly because production is sensitive to rainfall which is unpredictable.

Recommendations. Very little information is available on how well forages adapted to Texas meet the nutritional requirements of various exotic deer species. If adequate quantities are available, cool-season annual grasses and cool- and warm-season legumes should be adequate for most exotic deer species. Although warm-season perennial grasses are the most productive and best adapted to Texas, they have the lowest nutritive quality and will have to be supplemented with grain and probably protein.

TABLE 3. PREFERRED SOILS AND PLANT ATTRIBUTES OF FORAGE LEGUMES GROWN IN TEXAS

	Preferred Soil Attributes			Plant Attributes			
	pH	Texture	Drainage	Maturity	Bloat potential	Hardseededness	Cold tolerance
Alfalfa	>6.5	loam	good	perennial	high	low	good
Arrowleaf (Yuchi)	6.0-7.0	sand, loam	good	late	low	high	good
Ball	>6.5	loam, clay	fair	late	low	high	good
Berseem (Bigbee)	6.5-8.0	loam, clay	poor	late	low	low	poor
Crimson	6.0-7.0	sand, loam, clay	good	early	medium	low	good
Persian	6.0-8.0	loam, clay	poor	medium	high	medium	fair
Red	6.5-8.0	loam, clay	good	late/biennial	low	low	good
Rose (Overton R18)	5.5-8.0	sand, loam, clay	good	medium	low	high	good
Subterranean subterraneum sp. (Mt. Barker, Woogenellup)	6.0-7.3	loam, clay	fair	early-late	medium	low	fair
brachycalycinum sp. (Clare, Koala)	7.0-8.0	loam, clay	fair	medium	medium	low	poor
Sweetclover (Hubam)	>6.5	loam, clay	good	late	low	low	good
Vetch (Hairy)	5.0-8.0	sand, loam, clay	fair	late	low	medium	good
White (La. S-1)	6.0-7.5	loam, clay	poor	late/perennial	medium	high	good