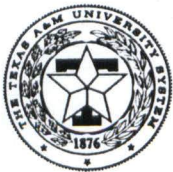
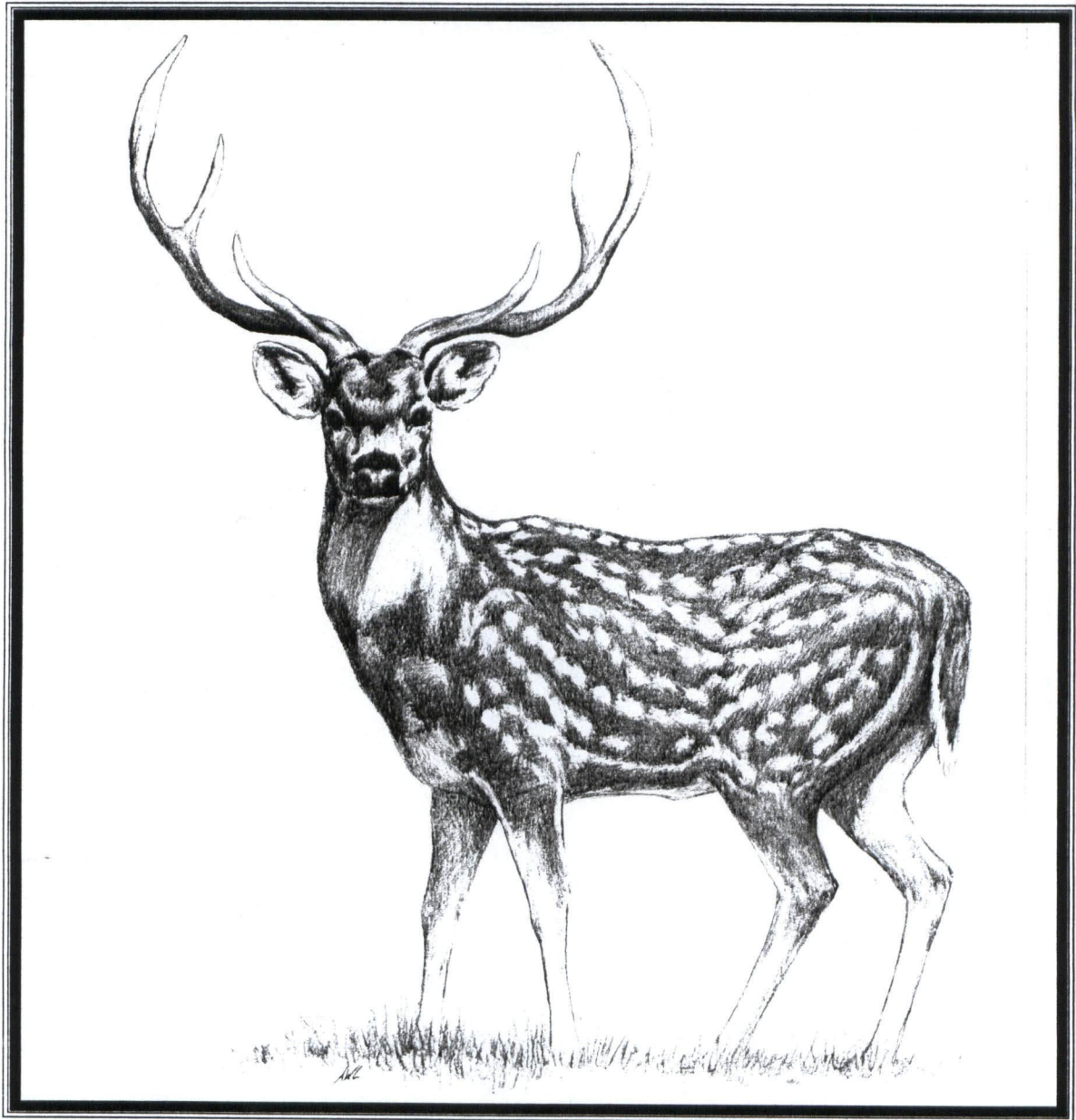


Non-Native Deer Farming Symposium



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CHAPTER 6

PASTURE SYSTEMS FOR DEER

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Deer and elk are ruminants (four compartment stomachs) like sheep, goats, and cattle. Hofmann (1985) has classified wild ruminants as grazers (consuming grasses and sedges), browsers (concentrate selectors consuming primarily forbs and shrubs) and intermediate or opportunistic feeders which can use either grasses, sedges, forbs, or shrubs (Fig. 1). This allows the opportunistic feeders to adjust their diet to whatever type of forage is available. Cattle and sheep are examples of grazers which have a large rumen that allows for a slow rate of fermentation and passage through the digestive system. This enables them to use high fiber diets of moderate digestibility. Grazers have about three major feeding periods a day. In contrast, browsers have a small rumen with a high rate of diet passage and fermentation which requires them to have many small feeding periods (8 to 12) throughout the day. Because of this faster rate of passage, browsers require a higher quality diet low in fiber. White-tailed deer, mule deer, and moose are examples of browsers. Intermediate feeders have a digestive system between grazers and browsers which allows them to use most plants with about six feeding periods per day. Elk, red deer, fallow deer, axis deer, sika deer, and goats are examples of intermediate feeders. The ability of these species to utilize a higher fiber diet than deer classified as browsers allows them to be farmed as domestic livestock on grass and legume pastures.

A deer's diet can consist of grass, browse, forbs, hard and soft mast (fruits of woody plants), and fungi (mushrooms). Browse includes the young, tender stem tips and leaves of shrubs and trees. Forbs are broadleaf plants which include legumes such as clovers and cowpeas. White-tailed deer prefer browse and forbs but use very little warm-season grass. Warm-season grasses constituted less than 5% of their diet under range conditions (Henke et al., 1988). In contrast, warm-season grasses constituted from 60 to 90% of the diet of the axis deer and from 25 to 65% of the diet of fallow deer under range conditions. Forbs were the second largest component of the non-native deer's diet. White-tailed deer will consume the higher quality cool-season annual grasses (oats, wheat, ryegrass, etc.) in winter when available browse and forbs have been depleted.

Narrow jaws and a thin row of incisor teeth permit smaller deer such as fallow and axis to graze close and be selective grazers (Haigh and Hudson, 1993). Elk are about four times larger

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Summer Pastures

Although low in quality, warm-season perennial grasses are the predominant forages grown in the southern US because they are well adapted to the mild winter and hot summer temperatures. The grazing season is from April till first frost. Unfortunately, seasonal breeders such as fallow deer, red deer and elk give birth in May-June or later. Therefore, females are nursing fawns during the summer and early autumn when they have high nutritional requirements and forage quality is poor. The challenge to deer and elk farmers is to maintain the highest nutritive value possible by keeping these grasses in a young growing stage with a high percentage of leaf. If these grasses reach a height of about 8 inches, they should be mowed down to a 2-to 3-inch height to remove old mature growth and enhance new leaf growth. With continuous grazing, mow only half the pasture and allow it to regrow before mowing the other half. A good fertilization program based on an annual soil test is required to maintain vigorous grass growth. Carrying capacity is about 1200 to 1500 lb animal weight per acre. Carrying capacity or stocking rate is given in lbs body weight/acre because of the wide range in body size of non-native deer species.

There is a seasonal decrease of forage quality in warm-season perennial grasses with increasing summer temperatures (Chapter 5). A management practice used at the Overton Center is to supplement with energy and protein from mid-July to mid-September for does nursing fawns. A soybean:corn supplement (1 part soybean meal:3 parts cracked corn) is fed at 1% of the does' body weight daily.

During the summer of 1999, two groups of bred fallow and red deer females were grazed on Coastal bermudagrass. Beginning in May, one group of each deer species was supplemented at 1% of body weight with a 1:3 ratio of soybean meal:cracked corn daily. One-third of the supplemented red deer hinds lost their fawns because of abortion, the fawn was born dead, or died shortly after birth. Although we have only one year's data, it would be prudent for red deer farmers to delay supplementation of bred red deer hinds until after fawning if they have experienced a low fawning percentage. Supplementation did not affect fawning percentage of the fallow does.

An alternative summer pasture to warm-season perennial grasses is planting annual grasses or legumes which have higher nutritive value. Cafeteria grazing trials with warm-season annual grasses and legumes have been conducted at the Overton Center using fallow, axis, red deer, and elk. There appears to be an inverse relationship between deer size and forage selectivity. Fallow and axis bucks, the smallest deer species used, had a strong preference for the large seeded legumes soybean, cowpea, and lablab (Table 1) (Evers et al., 1998). Annual grasses were the least desired with the small seeded legumes being intermediate. More of the forage sorghum with the brown midrib

(BMR) characteristic was eaten than the regular forage sorghum. None of the pearl millet was eaten by the fallow and axis. Red deer, which are about 2 ½ times larger than fallow and axis deer, also preferred the large seeded legumes (Table 2). They did eat more of the forage sorghums, particularly the brown midrid (92-100%) than the fallow and axis. But pearl millet and browntop millet were also avoided by red deer.

Elk are about twice the size of red deer and were the least selective of the deer species used by eating all entries in the test. During the first grazing period in June the large seeded legumes and forage sorghums were completely defoliated (Table 3). Except for the phaseybean, from 68 to 75% of the other forage entries were consumed. At the beginning of the second grazing period, cowpea, soybean, phaseybean, and BMR forage sorghum were defoliated the most. By the third day, over 72% of all entries except for lablab and aeschynomene had been consumed. Elk were the only species which grazed pearl millet. These results support statements by Thorleifson et al. (1998) that elk forage more like cattle than other deer.

All deer and elk have shown a high preference for soybean, cowpea, and lablab. Iron and clay cowpea has been used successfully at the Overton Center because it is well adapted to sandy East Texas soils. It remains vegetative during the summer because short daylengths in autumn are

Table 1. Defoliation of summer annual forages by fallow and axis bucks (Evers et al., 1998).

Forage	June 27 to 30	July 20 to 22	to July 28
-----%-----			
Cowpea	100 a†	93 a	100 a
Soybean	100 a	100 a	100 a
Lablab	100 a	68 b	100 a
Alyceclover	23 e	23 c	35 b
Aeschynomene	50 cd	33 c	43 b
Phaseybean	38 d	3 d	93 a
Forage sorghum	58 c	0 d	0 c
Brown midrid sorghum	80 b	0 d	8 c
Pearl millet	0 f	0 d	0 c

†Values in a column followed by the same letter are not significantly different at the 0.05 level by Fisher's protected LSD test.

Table 2. Defoliation of summer annual forages by yearling red deer.

Forage	June				July		
	15	16	17	18	28	29	30
	----- % -----						
Cowpea	3 d-f	49 cd	100 a	100 a	15 c	69 b	95 a
Soybean	97 a†	100 a	100 a	100 a	58 a	89 a	97 a
Lablab	11 bc	85 ab	100 a	100 a	31 b	67 b	95 a
Phaseybean	0 f	1 f	8 d	54 c	0 d	18 cd	35 c
Forage sorghum (BRM)	15 b	64 bc	93 a	100 a	28 b	71 b	92 a
Forage sorghum	8 cd	26 de	67 b	88 b	2 d	22 c	60 b
Pearl millet	0 f	1 f	1 d	2 d	0 d	0 e	0 d
Browntop	0 f	1 f	2 d	2 d	0 d	0 e	0 d
Crabgrass	6 c-e	13 ef	26 c	51 c	1	1 de	31 c

†Values in a column followed by the same letter are not significantly different at the 0.05 level by Fisher's protected LSD test.

Table 3. Defoliation of summer annual forage by elk cows.

Forage	June			July		
	15	16	17	19	20	21
	----- % -----					
Cowpea	44 c†	98 a	99 a	32 a-d	70 ab	79 ab
Soybean	83 a	96 a	98 a	46 a-c	70 ab	86 a
Lablab	63 b	93 a	96 a	36 a-d	49-ad	56 bc
Aeschynomene	28 de	55 c	75 b	4 d	10 d	35 c
Alyceclover	29 de	68 b	74 bc	24 a-d	47 b-d	72 ab
Phaseybean	19 e	38 d	41 d	57 a	83 ab	88 a
Forage sorghum (BMR)	78 a	100 a	100 a	50 ab	88 a	96 a
Forage sorghum	65 b	95 a	99 a	13 cd	65 a-c	83 ab
Pearl millet	30 de	53 c	73 bc	26 a-d	71 ab	88 a
Browntop millet	34 cd	50 c	73 bc	18 b-d	26 cd	77 ab
Crabgrass	32 d	50 c	68 c	40 a-c	76 ab	92 a

†Values in a column followed by the same letter are not significantly different at 0.05 level by Fisher's protected LSD test.

required for flowering and seed production. Soybeans are better adapted to loam and clay soils. The high cost of lablab seed makes it more expensive to grow than cowpeas or soybeans. These summer legumes should be planted in pure stands because deer will selectively graze them out of a legume-grass mixture. Current recommendations are to plant summer legumes on prepared land in early May. Allow growth to reach 16 to 18 in. before grazing. They should be grazed rotationally because continuous grazing will restrict regrowth. A four pasture system with a once a week grazing period and a three week rest period has worked well at Overton. Estimated stocking rate is about 1000 lb animal weight per acre.

Winter Pastures

Cool-season forages are higher quality than warm-season forages and can meet the nutritional requirements of all growth stages of deer (Chapter 5, Fig. 1). Annual ryegrass is the best species for winter pastures because it tolerates close grazing and is adapted to a wide range of soil types. If grown in an annual rainfall of less than 30 inches, irrigation will be necessary to obtain high yields. Other cool-season annual grasses (rye, wheat, oats) can be used but should not be grazed shorter than 3 in. or be grazed rotationally to permit a rest period for regrowth. A rotational grazing system would also enhance annual ryegrass regrowth. Cost of winter pasture is about \$135 to \$150/acre (land preparation, seed, fertilizer). Cool-season winter pastures are best utilized for growing weaned deer fawns and elk calves for venison production or breeding stock. These winter pastures can also be used for mature does and bucks but the forage nutritive value would exceed the animal's nutrient needs. Normal grazing season is from December 1 to late May depending on location and pasture management. Growth is slow during the cold winter months when a stocking rate of about 600 lb animal weight/acre is recommended. Warm spring temperatures enhance growth rate which should support a stocking rate of 1200 to 1800 lb animal weight per acre.

Winter pasture grazing studies at the Overton Center have demonstrated that weaned fallow bucks stocked at 12 hd/acre about December 1 will reach slaughter weight by the end of the ryegrass grazing season about June 1 (Evers et al., 1997). A stocking rate up to 20 fawns/acre can be used if the deer are removed from early January to about March 1 when ryegrass regrowth is poor because of low temperatures. During this time the deer can be fed good quality bermudagrass hay and a soybean:cracked corn (1 part soybean meal:4 parts cracked corn) supplement at 2.5 to 3.0% of body weight daily. All hay, whether grown or purchased, should be tested for protein and digestibility.

Mature fallow and axis does and bucks can graze excess spring growth of winter pastures. However, bred does could get too fat which may result in fawning difficulties caused by oversized fawns. An alternative approach to winter pasture is to overwinter mature does and bucks with good quality hay (12% protein, >55% digestibility) and a protein-energy supplement. The Overton Center has used a pelleted 14% protein dairy ration fed at 1 to 2% of body weight daily.

Literature Cited

- Evers, G. W., A. D. Davidson, D. A. Neuendorff, and R. D. Randel. 1998. Preference of warm-season annual forage species by non-native deer. p. 79-80. *In*: Research Center Technical Report No. 98-1. Texas Agric. Exp. Stn.
- Evers, G. W., R. D. Randel, D. S. Doctorian, and D. A. Neuendorff. 1997. Influence of stocking rate, forage utilization, and weight gain of weaned fallow bucks grazing ryegrass pasture. p. 96-103.

In: Forage Research in Texas, 1996. Texas Agric. Exp. Stn. CRP-5258.

Haigh, J. C., and R. J. Hudson. 1993. Farming wapiti and red deer. Mosby-Year Book, Inc. St. Louis, MO.

Henke, S. E., S. Demarais, and J. A. Pfister. 1988. Digestive capacity and diets of white-tailed deer and exotic ruminants. *J. Wildlife Management* 52:595-598.

Hofmann, R. R. 1985. Digestive physiology of the deer - their morphological specialization and adaptation. p. 393-407. *In: 1983 International Symposium on the Biology of Deer Production. New Zealand.*

Keating, S. 1999. Elk foraging and nutrition. p. 74-76. *In: North American Elk. Vol. 10, No. 4.*

Thorleifson, I., T. Pearse, and B. Friedel. 1998. Elk farming handbook. The North American Elk Breeders Assoc. Platte City, MO.

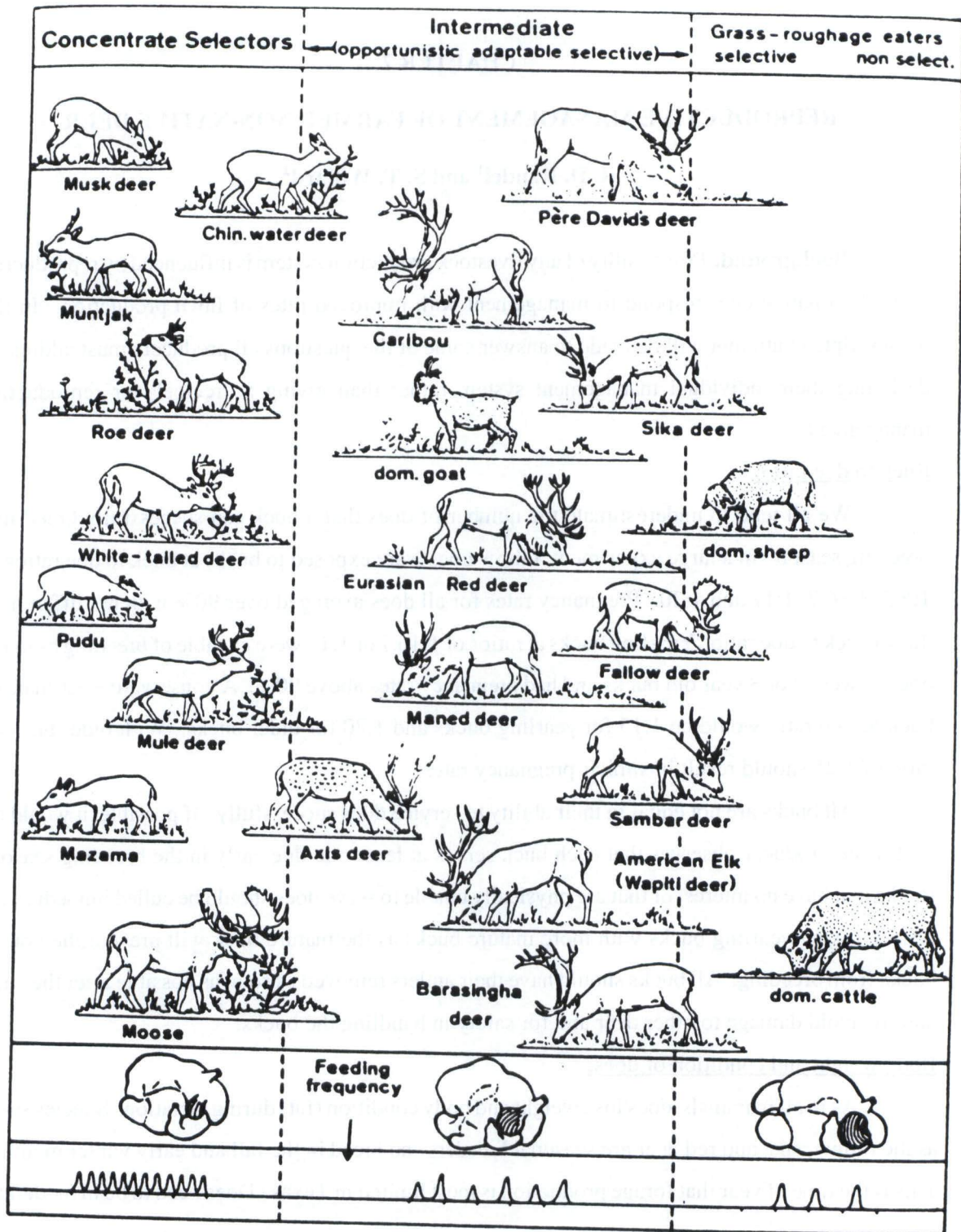


Figure 1. Classification of the world's deer according to morphophysiological feeding types (Hofmann, R. R., 1985).