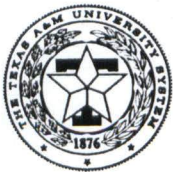
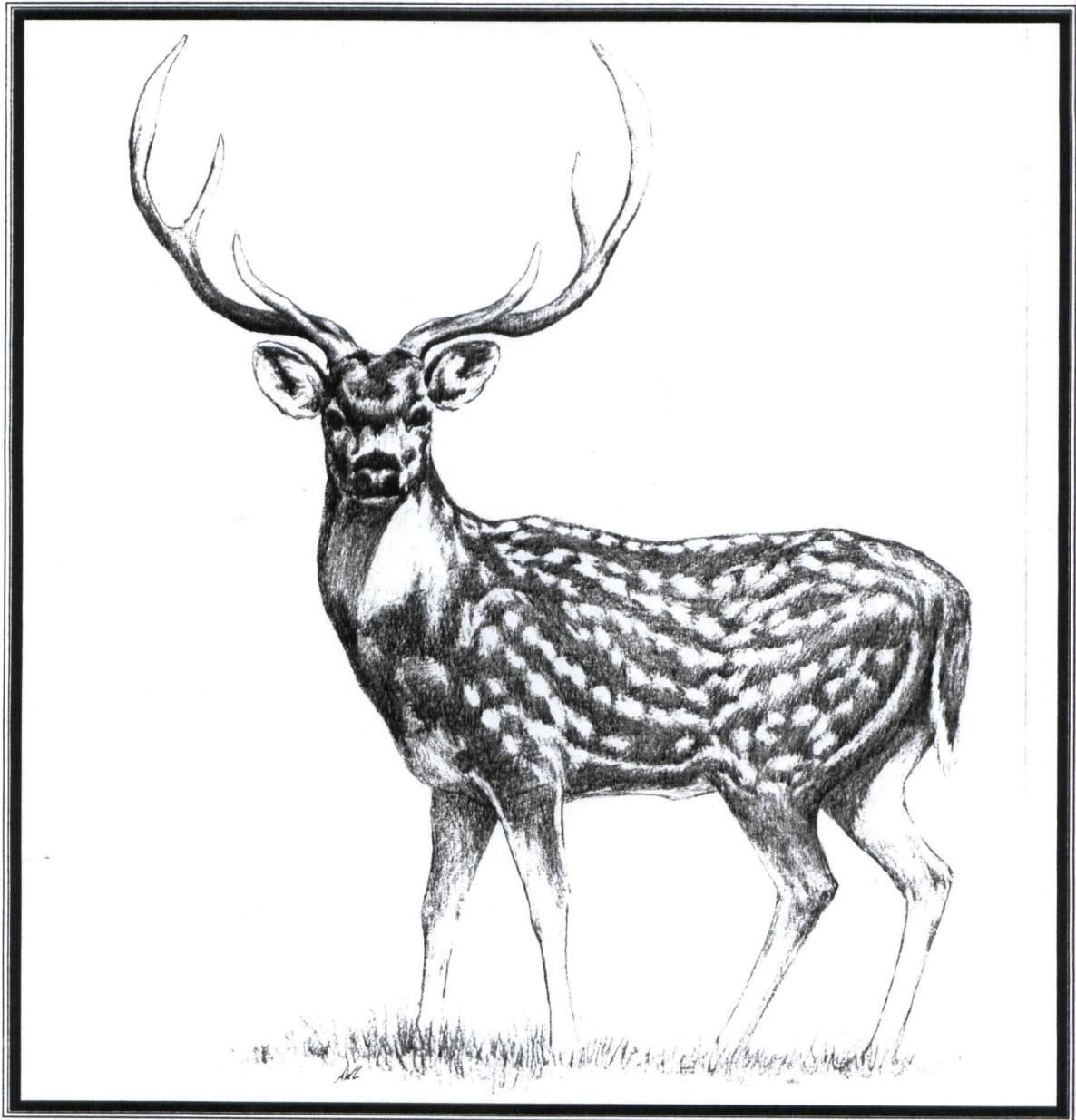


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CHAPTER 2

DEER SPECIES

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Introduction

The following information is meant to provide the deer farmer with an understanding of the species which are currently being utilized in deer farming systems. Each species has a unique niche to fill within the deer farming industry and it is up to the individual depending on their goals and personal preference regarding which deer species to use. For each species their origin, general management, production characteristics and their potential importance in deer farming is provided as a starting point for determining which species may work best for you.

Axis Deer (*Axis axis*). Often called the spotted deer, or chital, the axis deer is native to India and Ceylon, while free-ranging populations have become established in Australia, Hawaii and in the continental U.S. Axis deer were introduced into Texas beginning in 1932 and have increased steadily over the past 30 years from 2,196 in 1964 to 51,878 in 1994.

Mature axis deer are similar in size to fallow deer (Table 1), however, fawns at birth are generally smaller. As axis deer do not have the same seasonal restrictions with regard to their reproductive capabilities as other species of deer (Table 2), therefore it is possible to obtain 3 fawns within a 26 month period given their rapid return to estrus and conception following fawning. The non-seasonal reproductive characteristics of axis deer may prove to be beneficial for year-round venison production, enabling the development of breeding systems tailored to forage management or environmental constraints. In addition, axis deer do not appear to exhibit the seasonal fluctuations in live weight and fat content that other species of deer experience. The dressing percentage for axis bucks at 13 to 18 months of age is 60% which is comparable to fallow deer of the same age (50 to 61%). An added advantage of axis deer is that the often higher priced

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Table 1. Relative comparisons of body weight and size for various species of farmed deer.*

Species / Subspecies	Relative Body Weight (lbs.)		Average Height at Shoulder (ft.)
	Male	Female	
Axis Deer	120 - 180+	80 - 110	2.5 - 3.0
Fallow Deer			
European	125 - 180+	80 - 110	2.5 - 3.0
Mesopotamian	150 - 210+	110 - 150	3.0 - 3.6
Sika Deer			
Japanese	105 - 130	70 - 95	2.5 - 2.7
Formosan	160 - 180	90 - 120	2.8 - 3.2
Manchurian	160 - 220	90 - 135	2.8 - 3.2
Dybowski	120 - 288	80 - 140	3.5 - 3.7
Wapiti (Elk)			
Rocky Mountain	600 - 1000	300 - 600	4.0 - 5.0
Roosevelt's	600 - 1000	300 - 600	4.0 - 5.0
Red Deer			
Scottish	250 - 420	180 - 210	3.3 - 3.7
New Zealand	350 - 550	200 - 250	3.5 - 4.0

*Note that body weights and heights for deer reported in this table are for relative comparisons of the size of one species to another. These parameters may differ greatly depending on age, region, diet, management and genetics.

Table 2. Reproductive characteristics of farmed deer.

Species	Estrous Cycle (days)	Gestation Length (days)	Breeding Season
Axis Deer	18 - 20	230 - 240	All Year
Fallow Deer	21	230 - 240	Sept. - Feb.*
Sika Deer	21	220 - 240	Sept. - Feb.*
Wapiti (Elk)	19 - 25	250 - 260	Sept. - Feb.*
Red Deer	18 - 21	230 - 240	Sept. - Feb.*

*Generally, the peak of the breeding season occurs in Sept., Oct. or Nov. depending on your location and the condition of males and females prior to the breeding season. Many farmers restrict the breeding season to a 45 to 90 day interval depending on the desired timing for fawns to be born, weaned and females prepared for the next year's breeding season.

hindquarter cuts comprise a greater proportion of the axis deer carcass than in fallow or red deer. The reproductive potential of axis deer, coupled with their carcass characteristics and attractive presence make the axis deer desirable to many deer farmers. However, the handling difficulties encountered with axis deer often result in high deer mortality and frustration by the deer owner. The intensive farming of axis deer is best undertaken by those with extensive experience in handling and farming deer.

Fallow Deer (*Dama dama*). There are two recognized subspecies of fallow deer, the European fallow deer (*Dama dama dama*) and the Persian or Mesopotamian fallow deer (*Dama dama mesopotamica*). Fallow deer are native to the Mediterranean region of southern Europe, including Anatolia and the Island of Rhodes (European fallow deer), Iraq, and southern Iran (Mesopotamian fallow deer). The European fallow deer has since been introduced to the British Isles, many European countries, North America, South America, Australia, New Zealand, Africa, and the West Indies. The Mesopotamian fallow is currently an endangered species, partially due to its war-torn habitat which includes the regions of Iran, Iraq, Israel, Jordan and Lebanon. The Mesopotamian fallow deer is considerably larger than the European fallow deer (Table 1); therefore, semen of Mesopotamian fallow bucks is being utilized for cross-breeding through artificial insemination (AI) to increase carcass yields. Artificial insemination also provides a cheaper and safer means of importing or exporting genetic material from these Mesopotamian sires. With effective methods for estrous synchronization and AI, conception rates of 76 to 90% can be achieved in fallow deer.

Fallow deer are presently farmed or ranched in over 35 countries and are semi-domesticated and managed primarily for venison production. Fallow deer have strong herding instincts and are generally not as flighty as the axis deer. European fallow deer are found in many different colors, including a sandy or rust color, menial, black and white, and males have unique palmate antlers unlike most other deer species. In contrast to axis deer, fallow deer are strict seasonal short-day breeders (Table 2). Male fallow deer are normally harvested for venison at 12 to 24 months of age with a carcass dressing percentage of 50 to 61%. Careful selection of the season and age of the animal for slaughter must be considered due to the variation in fat content of the carcass of fallow deer during the year. Fallow deer are an excellent species for the beginning deer farmer due to the ease to which they can be domesticated and managed within an intensive venison production system.

Sika Deer (*Cervus nippon*). Sika deer are native to eastern Asia from Manchuria to Vietnam. There are 13 recognized subspecies of sika deer and the first account of their presence in the U.S. was the introduction of Japanese sika onto James Island, Maryland in 1916. Since that time sika deer have advanced onto the mainland and have flourished along the Maryland, Virginia and North Carolina coastal marshlands. Japanese sika were introduced into Texas in 1932 followed by Formosan sika sometime after the 1930s. It has been estimated that 90% of the sika deer in the U.S. are currently Japanese sika (*Cervus nippon nippon*) x Formosan sika (*Cervus nippon taiouanus*) hybrids. There is a considerable amount of variation in size among the different subspecies of sika with Japanese sika being somewhat smaller than their Manchurian counterparts (Table 1). While sika deer population numbers are considerably lower in the U.S. than other non-native deer species, sika deer may gain additional popularity in the future as hybridization of sika deer with wapiti and red deer continues for greater carcass weights and enhanced venison production.

Sika deer are known for their ability to survive on scant resources in harsh environments due to their diverse foraging strategies and what has been described as their "scrappy nature". While sika deer have a reputation for being tenacious, they adapt well to intensive deer farming circumstances and, as in the fallow, their natural herding instincts and behavior aid in their management. Sika deer exhibit definite seasonal reproductive cycles similar to other short-day seasonal breeding deer species (Table 2). Sika deer carcasses are slightly different from other species of deer in that the fat is distributed throughout the muscle tissue in contrast to being deposited on the surface of the muscle. As a result, sika females in captivity have a tendency to become obese if their diet is not restricted or controlled. The dressing percentage of adult males has been reported to be 54.3%; however, extensive data on age and liveweight influences on carcass weights and dressing percentages have not been reported as in the fallow and axis deer. Sika deer will readily cross with red deer and elk to produce hybrids. As the venison market expands, the production of larger fawns at weaning using sika does and a larger terminal sire, such as a red deer or sika x elk hybrid stag, may reduce inputs associated with doe management and increase carcass weights for greater returns to deer producers using such breeding systems. However, further investigation is needed regarding the potential use and production of sika hybrids for commercial deer farming applications.

Wapiti or Elk (*Cervus elephus* spp.): Wapiti, also known as elk, are currently found in this hemisphere in the Pacific Northwest (4 subspecies), the most prevalent being the Canadian or

Roosevelt's elk (*Cervus elephus roosevelti*) and the Rocky Mountain elk (*Cervus elephus nelsoni*). Several subspecies (7) are found in Asia from North Afghanistan throughout Russia and in parts of China and Tibet. Two subspecies, the American Wapiti (*C. c. canadensis*) and Merriam's elk (*C. c. merriami*), have become extinct. North American elk populations once numbered 10 million, distributed from coast to coast and from southern Canada to Mexico. By 1900, animal numbers were reduced to about 90,000 or about 1% of original stocks, but numbers have since increased to about 500,000 as a result of relocation efforts and regulated harvests under the control of wildlife agencies. As elk and red deer hybridize freely, the exact numbers of captive and free-ranging pure subspecies of elk in some regions of the U.S. are not known.

Elk are considered to be the largest of the Cervidae (Table 1) and inhabit many parts of the world over a wide range of habitats. Elk are short-day, seasonal breeders similar to fallow, sika and red deer (Table 2). Calf mortality in elk has been reported to be higher than for other species of deer, reaching 15% (7 to 10% in red deer), which usually occurs shortly after birth. Dystocia and lactation failure have been reported to be the primary causes of neonatal loss and it has been suggested that overfeeding of concentrates late in gestation may contribute to this condition. Farming elk in the U.S. has not progressed to an enormous venison market primarily because of the limited numbers of elk being farmed and the historically higher cost of these animals. The sale of quality bulls and cows for breeding stock has dominated the elk industry and velvet antler production has been undertaken by a number of elk farmers in this country. Markets for velvet antler have been hard to establish in the U.S. and the foreign markets are dominated by New Zealand, German and Australian producers. Elk, being rather large animals, require handling facilities slightly more sophisticated than those for smaller deer species, and therefore the capital costs for establishing an elk farm are somewhat higher. Elk, as stated previously, cross freely with red deer and sika deer and the future of elk in the venison production industry will probably involve the use of elk sires to increase the carcass weights of these somewhat smaller and more "cost-effective" deer species. Production data has shown that elk x red deer hybrid calves grow more rapidly than red deer calves. Under commercial farming conditions, it has been suggested that utilizing the elk x red deer (F1) stag as the sire for red deer females may be more "cost-effective" and reduces management requirements, with the 1/4-elk progeny producing a 25% larger carcass than the typical red deer calf at 15 months of age.

Red Deer (*Cervus elephus*). There are 12 subspecies of red deer which range from Scotland and Spain across the Mid-East to Manchuria and Mongolia. Red deer have been introduced into a

number of countries and in some areas feral populations have become established, including Africa, Australia, New Zealand, South America, and in the U.S. The first known introduction of red deer into the U.S. was in Texas in the 1930s. Over the next 30 years, the population remained relatively small with only 21 individuals reported in 1964. In the 15 years following the 1964 survey, the population increased to 434 animals in 1979. Small feral populations were also reported in California and Kentucky between the 1950s and 1980s, but these populations have remained small or have become extinct over the last decade.

Red deer have been domesticated in many countries, are relatively easy to handle and have been widely utilized for venison and velvet antler production. Red deer subspecies may vary considerably in size (Table 1), and like their close relatives, sika deer and elk, red deer are short-day seasonal breeders (Table 2). Technologies for advancing the breeding season and for AI and embryo transfer have been extensively developed for red deer and are commercially available in some regions. Red deer are popular in deer farming systems due to their adaptability to various grazing systems, their strong herding instincts and their large size which results in a relatively large carcass. Significant liveweight gains can be achieved on winter pasture despite seasonal influences which may negatively affect the maintenance of body weight in red deer during this time. Farmed red deer produce a carcass weighing approximately 166.5 lbs. at 27 months of age with the fat content of farmed red deer being less than half of that reported in sheep. The use of red deer in the U.S. has increased considerably for venison production, velvet antler production and specialized breeding programs, including cross-breeding. For the beginning deer farmer with ample land area and a desire to manage a relatively large species of livestock, red deer are an appropriate choice.

In summary, the species of deer you choose for your deer farming operation will largely depend on your overall goals, experience, personal preference and the amount of money you want to invest. The product you wish to produce, whether it's venison, velvet antler, stocker animals, superior breeding stock or a combination of these, will also greatly impact your decision of which deer species to farm. It is important to be familiar with the industry trends and current markets prior to making your selection. One species of deer is not necessarily better than another for a particular deer farming or ranching operation. All of the deer species mentioned above have their place in the deer industry; however it is up to the deer farmer to be knowledgeable about the advantages and disadvantages of each species and determine which best suits his or her needs.