# NON-NATIVE DEER PREFERENCE FOR SUMMER ANNUAL FORAGES

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## Summary

Six legume and three grass species were planted in a small plot study and grazed for three and eight days by fallow (*Dama dama*) and axis (*Axis axis*) bucks. These non-native deer preferred legumes over grasses and the large seeded legumes over small seeded legumes. Species order for defoliation were cowpea (*Vigna unguiculata* (L.) Walp.)=soybean (*Glycine max* (L.) Merr.) >lablab (*Lablab purpureus* (L.) Sweet)>alyceclover (*Alysicarpus vaginalis* (L.) DC.)=aeschynomene (*Aeschynomene americana* L.)=phaseybean (*Macroptilium lathyroides* (L.) Urb.)>brown midrib forage sorghum (*Sorghum bicolor* (L.) Moench)>forage sorghum>pearl millet (*Pennisetum americanum* (L.) Leeke). Cowpea, soybean, and lablab were the preferred summer annual forages for non-native deer.

## Introduction

Farming of non-native deer is a new emerging agricultural enterprise in the United States. The highest concentration of deer farmers is in Texas with a reported 100,000 head of non-native deer in 1998. Expansion of deer farming is being driven by the demand for venison and deer byproducts (antlers, hide, etc.). Venison is a low-fat, lean meat which appeals to health conscious consumers, especially those on low cholesterol diets. Of the venison marketed in the US, over 80% is imported from New Zealand. Infrastructure for marketing venison is developing in the US. Venison marketing companies in Texas are presently paying deer farmers from $2.25 to $2.50 per lb of carcass.

There are several advantages to non-native deer farming. It is well suited for small land owners. In the eastern third of Texas only 5 to 10 acres of improved pasture are sufficient for a one buck herd of 25 does and growing the weaned fawns to slaughter weight. It could also add diversification to larger ranches and farming operations. Non-native deer have been taken from birth to slaughter weight on well managed pastures with a minimum of grain feeding. This eliminates the need for concentrated animal feeding operations associated with poultry, swine, dairy, and beef production. Dependence on purchased grain is minimal and there are no

environmental problems associated with animal waste disposal. Therefore, deer farming is an environmentally friendly agricultural enterprise.

Available information on acceptable pastures for deer farming is limited to New Zealand which utilizes cool-season forage species. Preference of non-native deer for warm-season annual forages adapted to the southeastern US is not known. A cafeteria style grazing study using warm-season annual species was conducted at the Overton Center to determine acceptability by non-native deer.

## Procedure

The study was planted on a Kirvin very fine sandy loam (clayey, mixed, thermic, Typic Hapludults) at the Texas A&M University Agricultural Research and Extension Center at Overton. Forage species and the respective variety, seed weight, seed per pound, and seeding rate are reported in Table 1. Plots were 5 by 15 ft and arranged in a randomized complete block with four replications. Legume seed were inoculated with their appropriate inoculant strain immediately before planting. Seed were drilled in 7-in. rows into a prepared seed bed on May 19, 1997. Soil analysis disclosed a pH of 6.1, and high rates of nitrate-N (28 ppm), P (53) ppm, and K (557 ppm). No additional P or K were added, but 68 lb N/acre were applied to the grass entries on May 30, 1997.

Table 1. Summer annual forage entries in cafeteria grazing trial.

| Entry | Variety | Seed wt. | Seed/ lb | Seeding rate |
|---|---|---|---|---|
| | | mg | | lb/acre |
| Cowpea | Iron and Clay | 103.1 | 4,400 | 70 |
| Hay type soybean | PA BU 2-2 haytype | 171.2 | 2,650 | 100 |
| Lablab | Tecomate | 257.4 | 1,800 | 50 |
| Alyceclover | common | 1.6 | 283,800 | 20 |
| Aeschynomene | common | 3.6 | 126,100 | 15 |
| Phaseybean | common | 8.8 | 51,600 | 15 |
| Forage sorghum | 4 Ever Green | 13.2 | 35,000 | 35 |
| Brown midrib sorghum | Sweetstem | 26.1 | 17,400 | 35 |
| Pearl millet | Teafleaf II | 6.8 | 66,800 | 20 |

Plant densities were determined 16 days after planting (DAP) by counting seedlings in a 12 by 14 in. quadrate in each plot. Five seedlings from each plot were cut off at ground level at 24 DAP (June 12) and 37 DAP (June 25). Seedlings were dried in a forced air oven at 140°F for two days and weight per seedling and yield per acre calculated. Two fallow bucks and two axis bucks

grazed the study beginning 39 DAP (June 27) for three days and again 62 DAP (July 20) for eight days. Two individuals recorded visual estimates of the percent defoliation of each plot on June 30 and July 22 and 28. Percent defoliation was estimated as percent of total leaf area eaten. The young tender stem tips of the legumes were also eaten by the deer. Defoliation estimates of the two individuals were averaged. Seedling density, shoot weight, yield, and defoliation percentage were analyzed by ANOVA with PC-SAS. Species mean separation was at the 0.05 level using ANOVA protected LSD test.

## Results and Discussion

There was a large variation in seed weight among forage species ranging from 1.6 mg for alyceclover to 257 mg for lablab (Table 1). Therefore the number of seed per lb and seeding rates were also quite variable. Lablab had the heaviest shoot weight at the first sampling date, 24 DAP, but did not have the greatest yield per acre because of the lower plant density (Table 2). Shoot weights of the three grass entries were similar to cowpea and soybean, but had higher yields per acre because of greater plant density. Alyceclover, aeschynomene, and phaseybean had the lightest shoot weights and lowest yields.

The second sampling date, 37 DAP, was two days before the first grazing period. The three grasses and lablab had the heaviest shoot weights but the grass yields were six to eight fold greater because of higher plant density (Table 2). Cowpea and soybean seedling weights were less than lablab but had similar yields of 2,000 to 3,000 lb DM/acre because of greater plant density.

At the end of the first grazing period, all of the leaves and some of the stem tips of cowpea, soybean, and lablab were eaten (Table 3). Only 23 to 50% of the leaf area of the small seeded legumes, alyceclover, aeschynomene, and phaseybean, were eaten by the deer. This may be due to the lower yields of these species. Of the three grasses, the deer preferred the brown midrib sorghum with 80% defoliation. Only 58% of the regular sorghum was eaten. The brown midrib character is associated with lower lignin concentration and higher digestibility in sorghum, corn, and millet. Pearl millet was completely avoided by the deer.

Table 2. Plant density and shoot growth of summer annual forages before grazing by non-native deer.

| Forage | 16 DAP† | 24 DAP | | 37 DAP | |
|---|---|---|---|---|---|
| | plant/ft$^2$ | g/plant | lb DM/acre | g/plant | lb DM/acre |
| Cowpea | 7.4 cd‡ | 1.41 c | 1029 b | 4.33 c | 3,045 b |
| Hay type soybean | 6.9 cd | 1.17 cd | 751 bc | 3.96 c | 2,706 b |
| Lablab | 2.3 d | 2.22 a | 509 bcd | 9.72 ab | 2,125 b |
| Alyceclover | 35.4 a | 0.03 e | 108 d | 0.16 d | 579 b |
| Aeschynomene | 24.9 b | 0.11e | 317 cd | 0.18 d | 458 b |
| Phaseybean | 6.5 cd | 0.14 e | 91 d | 0.74 d | 463 b |
| Forage sorghum | 12.2 c | 1.83 b | 2130 a | 11.35 a | 13,136 a |
| Brown midrib sorghum | 13.1 c | 1.48 c | 1865 a | 9.90 ab | 12,600 a |
| Pearl millet | 24.1 b | 0.98 d | 2326 a | 7.40 b | 17,556 a |

†DAP = days after planting.

‡Values in a column followed by the same letter are not significantly different at the 0.05 level by ANOVA protected LSD test.

Table 3. Defoliation of summer annual forages by fallow and axis bucks.

| Forage | June 27 to 30 | July 20 to 22 | to July 28 |
|---|---|---|---|
| | ----------%---------- | | |
| Cowpea | 100 a† | 93 a | 100 a |
| Hay type 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 midrib 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 ANOVA protected LSD test.

Forages were allowed to recover from June 30 to July 20 when the second grazing period began. After two days essentially all of the soybean and cowpea were consumed and 68% of the lablab. Some of the alyceclover and aeschynomene had been grazed but none of the phaseybean and grasses. Six days later cowpea, soybean, lablab, and phaseybean and some of the alyceclover and aeschynomene were defoliated. The grasses were avoided except for about 8% defoliation of the brown midrib sorghum.

Fallow and axis bucks displayed a greater preference for legumes than grasses. Legumes resemble forbs which are preferred by both native and non-native deer. Legumes are also higher in

protein, phosphorus, and digestibility than grasses. The large seeded legumes, cowpea, soybean, and lablab were preferred over the small seeded legumes. Good seedling growth, forage production and drought tolerance are other favorable attributes of the large seeded legumes. Avoidance of pearl millet by non-native deer may be due to its high alkaloid content and/or stiff hairs on the leaf margins. Selection of cowpea, hay type soybean, or lablab should be based on species adaptability and economics of production.