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INFLUENCE OF STOCKING RATE, FORAGE UTILIZATION, AND WEIGHT GAIN OF WEANED FALLOW BUCKS GRAZING RYEGRASS PASTURE

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Summary

A grazing study was conducted at the Texas A&M University Agricultural Research and Extension Center at Overton with weaned fallow (*Dama dama*) bucks on annual ryegrass (*Lolium multiflorum* Lam.). Pastures were stocked with 12, 16, 20, and 24 head (hd)/acre in early December with an average deer weight of 60 lbs. Average daily gain decreased with stocking rate with a range of .153 to .262 lbs/hd/day. Maximum gain/acre was 656 lbs at 20 hd/acre. Average daily gain was three times greater in the spring than winter because of seasonal effects on fallow deer food intake. The most efficient utilization of available forage was at 12 hd (720 lbs live weight)/acre in winter and 20 hd (1500 lbs live weight)/acre in spring.

Introduction

In 1987 the Texas Legislature passed laws specifying that exotic game animals used for meat production were an agricultural commodity eligible for agricultural exemption under the property tax code and authorized the Texas Animal Health Commission to inspect exotic game meat. These provisions have made venison produced from exotic deer farms and ranches in Texas a commodity which can be marketed throughout Texas and the United States.

The 1994 statewide exotic animal survey reported that exotic deer numbers grew 59.4%, from 59,382 in 1984 to 90,485 in 1994 (Traweek, 1995). Most of the exotic deer in Texas are located in the western half of Texas under extensive ranching conditions. Of the confined animals, only 11.2% were in the eastern half of Texas. No free ranging exotic animals were reported in this 54-county area. The higher rainfall in this area is favorable for improved forage production, which can be utilized by exotic deer under more intensive farming conditions. The equivalent stocking rate of 6 deer to 1 cow makes the small pastures common in East Texas conducive to exotic deer farming. Economic analysis indicate exotic deer farming would be more profitable than beef cattle even with high livestock prices.

A ready market exists for venison in U.S. restaurants and markets. Farm-raised venison

is a naturally lean, red meat which is mild-flavored, fine textured and fits into a healthy balanced diet. In 1994, over 2,000,000 lbs of venison was consumed in the United States with 84% imported from New Zealand and 16% produced domestically. Over 60% of the U.S. venison production comes from Texas. Expansion of venison production into the more humid eastern region of Texas will reduce production costs and make Texas-raised venison more competitive with imported venison from New Zealand. There is an existing and growing marketing structure in Texas for processed venison products and for fresh and fresh-frozen venison.

Cafeteria style grazing studies were conducted at the Texas A&M University Agricultural Research and Extension Center at Overton to determine forage species preference by fallow (*Dama dama*) deer (Evers et al., 1995). Annual ryegrass (*Lolium multiflorum* Lam.), rye (*Secale cereale* L.), and various clovers were overseeded in 'Coastal' bermudagrass (*Cynodon dactylon* [L.] Pers.). The deer consumed all forages during the winter but preferred the clovers over the grasses during the spring, when available forage exceeded the deer's needs. In a similar study with warm-season annual legumes in bermudagrass, the deer ate the legumes before the grasses. Cafeteria grazing trials with red (*Cervus elephus*) and fallow deer in New Zealand showed comparable results (Hunt and May, 1992).

Expansion of exotic deer farming in the higher rainfall areas of Texas depends on the development of deer and forage management systems. A study investigating the interaction of stocking rate and weight gain of weaned fallow bucks on winter pasture was conducted at the Overton Center.

Procedure

Four 0.5 acre pastures of Coastal bermudagrass were disked lightly and overseeded with 40 lbs/acre of 'TAM 90' annual ryegrass on 14 September 1994. Sixty-seven lbs of phosphorus and 100 lbs of potassium per acre were applied at planting, and a total of 230 lbs/acre of nitrogen was applied in four applications during the growing season. Each 0.5 acre pasture was split in half with the deer rotated every 2 weeks. Available forage at the beginning and end of each grazing period was estimated from four random 12 x 14 in. samples per pasture. Protein percentage was determined on the forage samples.

Weaned fallow bucks averaging 53 lbs/hd were obtained 7 October 1994. They were ear-tagged, wormed, vaccinated for blackleg, and injected with an antibiotic. The fawns were fed

rabbit pellets (16% protein) at 2% of body weight in a 0.25 acre drylot. On 7 December, the pastures were stocked at 12, 16, 20, or 24 hd/acre. Deer were weighed every 4 weeks. Because of the slow growth rate of annual ryegrass during the winter (Evers and Smith, 1995), the deer were supplemented with rabbit pellets at 2% of body weight from 4 January until 2 March while on pasture. They were removed from the pastures for the next 2 weeks to allow the ryegrass to recover and fed rabbit pellets at 4% of body weight. Animals on the high stocking rate were removed 4 May and those on the other stocking rates, 2 June.

Results and Discussion

Pasture and deer performance will be discussed by season. The amount of available forage at the beginning of each grazing period was never more than 1300 lbs/acre during the winter (Table 1). At the lightest stocking rate of 12 hd/acre, the residual forage (the amount of forage remaining at the end of the grazing period) was relatively constant. As stocking rate increased, the amount of residual forage decreased. Deer at the highest stocking rate consumed all available ryegrass in February. During the winter, only the pasture with the lightest stocking rate provided sufficient forage for the deer.

With the warmer spring temperatures, annual ryegrass growth increases two to threefold (Evers and Smith, 1995). The 2-week rest period in early March also allowed the ryegrass to recover from the severe repeated defoliation during the winter grazing period. Available ryegrass during spring exceeded the deer's requirements at 12 and 16 hd/acre, as indicated by the high residual forage quantities. The optimum stocking rate for utilizing spring ryegrass growth in East Texas was 20 hd/acre. The highest stocking rate of 24 hd/acre over-grazed annual ryegrass as indicated by zero residual forage at the end of the grazing periods.

Protein percentage of the available forage at the beginning of each grazing period during the winter months ranged from 17% to 34% (Table 2). It always exceeded the estimated diet protein level of 16% for weaned fawns. Level of protein in the residual forage at the end of the grazing period was lower with a greater proportion of stems because the deer selectively grazed the leaves. Protein percentage at the beginning of the spring period was about 30% but then decreased as the ryegrass matured. However, even in late May, it was still near 16%.

Deer weight gain was influenced by season and stocking rate (Table 3). Average daily gain (ADG) was three times greater in spring than winter. The depression in food intake in late

fall and winter is a response to short day length in deer species originating in temperate climates, such as fallow and red deer (White, 1992). In the following spring there is a dramatic increase in food intake and weight gain to meet the nutritional needs of does fawning in June and antler development in the bucks.

Average daily gain decreased as stocking rate increased because of a decreasing amount of available forage per deer (Table 3). There was a small decrease from 12 to 16 hd/acre and a larger decrease from 20 to 24 hd/acre. Gain/hd is a reflection of ADG and ranged from 39 to 23 lbs from December through May. Gain/acre peaked at a stocking rate of 20 hd/acre. Only the fallow bucks at the lightest stocking rate reached the slaughter target weight of 100 lbs by the end of the ryegrass season in late May.

To the author's knowledge, this is the first study examining the effect of stocking rate on weight gain of exotic deer on intensively managed forages adapted to the southeastern United States.

Although only 1 year's data are available, some general recommendations can be made. During the winter months, 12 hd/acre was the optimum stocking rate. With an average deer weight of 60 lb, the carrying capacity during the winter was approximately 720 lb of animal weight/acre. During the spring grazing period, 20 hd/acre effectively utilized the available forage. The average deer weight in spring was 75 lb which converts to a carrying capacity of 1500 lb deer weight/acre. Ryegrass production will vary with climate and pasture management. Yield will be less in lower rainfall areas and greater with milder winters, such as in the Gulf Coast area.

Literature Cited

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Table 1. Ryegrass disappearance at four stocking rates of weaned fallow bucks.

Head/acre	12		16		20		24	
	Avail.[1]	Res.	Avail.	Res.	Avail.	Res.	Avail.	Res.
Period	dry matter (lbs/acre)							
7 Dec-21 Dec	756	410	1101	761	1022	245	1336	346
21 Dec-4 Jan	950	720	1228	979	1113	396	1060	329
4 Jan-19 Jan	1013	674	938	626	588	271	478	276
19 Jan-1 Feb	897	823	1106	408	463	242	559	0
1 Feb-15 Feb	703	463	828	0	485	0	302	0
15 Feb-1 Mar	933	825	571	271	182	88	130	0
1 Mar-15 Mar					OFF PASTURE			
15 Mar-29 Mar	1794	1408	1082	914	892	581	609	0
29 Mar-12 Apr	1012	2389	895	1422	1197	960	895	0
12 Apr-26 Apr	2848	2648	1732	2185	1062	943	593	0
26 Apr-10 May	3550	2266	3227	2170	1506	749	624	0

[1]Avail. - available forage at beginning of grazing period, Res. - residual forage at end of grazing period.

Table 2. Protein percentage of ryegrass before and after each 2-week grazing period.

Head/acre	12		16		20		24	
	Avail.[1]	Res.	Avail.	Res.	Avail.	Res.	Avail.	Res.
Period	----------				%----------			
7 Dec-21 Dec	20.89	17.19	19.70	17.56	17.99	12.47	20.75	15.62
21 Dec-4 Jan	17.93	12.32	19.57	14.67	16.85	8.74	18.12	5.96
4 Jan-19 Jan	23.72	23.22	23.03	19.74	24.12	12.54	21.47	11.46
19 Jan-1 Feb	28.35	20.72	24.29	21.97	30.13	12.62	30.89	----
1 Feb-15 Feb	24.86	23.99	27.69	----	28.92	----	23.70	----
15 Feb-1 Mar	32.15	27.86	34.83	26.09	30.31	23.15	34.09	----
1 Mar-15 Mar					OFF PASTURE			
15 Mar-29 Mar	27.05	20.03	30.72	23.31	30.30	24.65	29.35	----
29 Mar-12 Apr	23.44	17.02	22.03	24.58	22.39	20.07	23.79	----
12 Apr-26 Apr	17.89	12.00	18.09	15.00	20.11	17.49	23.51	----
26 Apr-10 May	11.53	12.60	17.13	13.64	17.24	16.60	22.79	----
10 May-24 May	15.58	9.02	16.95	11.66	20.11	14.29	----	----
24 May-2 Jun	14.18	11.31	14.69	13.07	16.60	11.04	----	----

[1]Avail. - available protein at beginning of grazing period; Res. - residual forage at end of grazing period.

Table 3. Influence of deer stocking rate on ADG, gain/hd, and gain/acre.

Head/acre	Average daily gain			Gain/head	Gain/acre
	7 Dec-1 Mar	15 Mar-4 May	Season		
	lbs/hd/day			lb	
12	.180	.430	.262	39.0	468
16	.138	.388	.236	35.2	563
20	.134	.398	.220	32.8	656
24	.082	.258	.153	22.8	547