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AN INVESTIGATION INTO THE POSSIBILITY OF TANSY RAGWORT POISONING OF BLACK-TAILED DEER*

R. E. DEAN and A. H. WINWARD[1]

Abstract: This study was conducted to determine the susceptibility of free-ranging black-tailed deer (*Odocoileus hemionus columbianus*) to tansy ragwort poisoning. The results showed that captive black-tailed deer would not consume tansy ragwort unless they were unable to acquire adequate intake from other food sources. Since some experimental deer consumed an average of 24% of their body weight as dry matter from tansy ragwort over a 42-day period without any symptoms of toxicity, it appears that deer may be relatively tolerant to poisoning by this plant. It seems unlikely that tansy ragwort would cause toxicity problems with free-ranging black-tailed deer.

Tansy ragwort (*Senecio jacobaea*) is a poisonous plant that was introduced into the United States from Europe and was first observed in Oregon in 1922. Each year livestockmen in the western states suffer large monetary losses which are attributed to poisoning of animals by this plant. Tansy ragwort presently kills more livestock in Oregon than all other poisonous plants combined.[3] In 1972 the loss to the livestock industry in Oregon was estimated to be at least $1,200,000. Cattle and horses are particularly susceptible while sheep and goats are relatively resistant to tansy ragwort poisoning.[5] Whether or not tansy ragwort is toxic to wild herbivores is unknown. It is likely that ruminant species which have evolved on areas with naturally occurring poisonous plants either have high tolerance to toxins in the plants or find the plants relatively unpalatable. Since tansy ragwort is an introduced plant species which has spread throughout areas in western states inhabited by black-tailed deer, there exists a possibility that the plant may be causing losses in deer herds which have gone unnoticed. This study was designed to investigate the possibility of tansy ragwort poisoning of captive black-tailed deer.

METHODS

Six captive black-tailed deer were allocated to three treatment pairs. The acceptability of tansy ragwort was determined by feeding it *ad libitum* to all deer while different levels of basal ration (85% alfalfa, 10% barley and 5% molasses) were made available. The basal ration was fed *ad libitum* to group I so that these deer could acquire their normal daily intake without having to include tansy ragwort in their diet. Group II was fed a restricted level of the basal ration calculated to provide maintenance intake, (4% of animal's body weight). If this group were to consume their normal daily intake of feed they would need to include tansy ragwort in their diet. The basal ration was not fed to group III during the first 6 days and in only limited amounts thereafter (Table 1). This group would have to consume tansy ragwort if they were to satisfy their

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energy requirements for maintenance. Tansy ragwort plants were clipped fresh each day and offered to the deer. Samples were taken each day from clipped material to determine dry matter content of the plants. Both the basal ration and tansy ragwort were weighed daily to determine intake.

The feeding study lasted 42 days and was conducted during the spring of 1972. Possible toxicity problems from tansy ragwort were searched for by: (1) observing the deer daily during the study, (2) examination of serum bilirubin and serum glutamic oxaloacetic transaminase (SGOT) levels, and (3) making gross histological examinations of organs and tissues from two deer. Blood samples were taken from all deer prior to the study and after 20 days of tansy feeding. A blood sample was taken from one of the deer in group III after 42 days. The deer were immobilized with 50 mg of phencyclidine hydrochloride and tranquilized with 20 mg of tripromazine hydrochloride prior to taking blood samples. The blood was taken from the jugular vein, immediately chilled, and sent in insulated containers to the United Medical Laboratory, Portland, Oregon, for analysis. Both deer of group III were killed and examined by personnel from the Veterinary Diagnostic Laboratory on the Oregon State University campus. All organs and tissues which normally show symptoms of tansy ragwort poisoning were examined. The first deer was killed at the conclusion of the feeding trial and the other deer was killed 137 days after the end of the feeding of tansy ragwort.

RESULTS AND DISCUSSION

The limited consumption of tansy ragwort by the deer given a choice of food indicated that tansy ragwort was not highly palatable to black-tailed deer (Table 1). Deer fed the basal ration *ad libitum* (group I) completely rejected tansy ragwort. Group II, which received maintenance levels of the basal ration, consumed only 82 g (dry weight) of tansy ragwort per deer during the 42 day study. The deer fed sub-maintenance levels of the basal ration consumed large amounts of tansy ragwort. However, it appeared that a period of restricted food intake might be required to stimulate the deer to consume tansy ragwort in larger quantities. Group III did not receive any of the basal ration during the first 6 days of the study and it was not until the 5th

TABLE 1. Consumption (grams/deer/week) of the basal ration and of tansy ragwort by black-tailed deer under three feeding regimes.

	GROUP I			GROUP II			GROUP III		
		Tansy ragwort			Tansy ragwort			Tansy ragwort	
Days	Basal ration	wet	dry	Basal ration	wet	dry	Basal ration	wet	dry
1-7	7525	0	0	4242	259	35	64[a]	840	119
8-14	8400	0	0	4452	175	21	2359	4270	609
15-21	8309	0	0	4452	70	7	3815	5810	840
22-28	7609	0	0	4452	0	0	3906	7231	1043
29-35	9324	0	0	4452	42	7	4452	8680	1253
36-42	9429	0	0	4452	98	12	4452	10675	1540
Total	50596	0	0	25452	644	82	19048	37506	5404

[a]The basal ration was not offered to the deer during the first 6 days of the trial.

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day of complete starvation that the deer began eating tansy ragwort. By the conclusion of the trial these deer had consumed 5.404 kg (dry weight) of tansy ragwort/deer or 0.5 kg/kg $W^{.75}$. Deer in this group may have developed a taste for tansy ragwort since consumption increased with each successive week of the study. It was not possible from our data to separate the effects of a possible acquired taste for tansy ragwort from the increased desire to eat which may result from prolonged sub-maintenance nutrition. However, the group II deer, also on a restricted diet, never consumed much tansy.

Deer in this study showed a higher preference for the main stem and petioles over the leaves of the plants. This preferential selectivity may be related to differences in texture of the plant parts or may indicate differences in taste of the plant parts. The cause of this selective difference was not determined. However, it may be that the leaves of tansy ragwort have a higher alkaloid content than the stems and petioles since plants and/or plant parts which are toxic are generally not preferred by grazing animals.

There were no changes in deer behavior patterns or in the blood constituents examined that could be attributed to tansy ragwort poisoning. Ford et al.[1] reported that both SGOT and serum bilirubin were elevated in cattle experiencing tansy ragwort poisoning. Both of these blood constituents from the deer in group III were within acceptable levels when compared to values from the deer in groups I and II and from values taken from normal deer in the Oregon State University herd (Tables 2 and 3). Thorpe and Ford[4] reported that hepatic lesions were found in cattle poisoned by tansy ragwort. Neither of the deer from group III showed any gross or histological signs of pyrrolizidine alkaloid poisoning when necropsied.

Susceptibility to pyrrolizidine alkaloid poisoning varies greatly between ruminant species.[5] While this study did not

TABLE 2. Serum bilirubin and SGOT levels from six black-tailed deer offered tansy ragwort.

Feeding regime	Bilirubin (mg%)			SGOT (sigma F units)		
	pre-trial	day 20	day 43	pre-trial	day 20	day 43
Group I	1.1	0.2	—	62.8	50.5	—
	1.0	0.4	—	45.6	85.0	—
Group II	0.6	0.3	—	38.2	29.6	—
	0.8	0.3	—	44.4	38.2	—
Group III	0.5	0.4	0.9	55.4	53.0	109.6
	0.8	0.3	—	65.3	43.1	—

TABLE 3. Serum bilirubin and SGOT levels from black-tailed deer not involved in this study.

	Bilirubin	SGOT (sigma F units)
Number	10	21
Average	.46	141
Range	.27-.80	60-313

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provide information showing toxic levels of tansy ragwort to black-tailed deer, the data do indicate that black-tailed deer are likely to be relatively tolerant to tansy ragwort poisoning. Cattle and horses have developed chronic symptoms of tansy ragwort poisoning when the animals consumed between 12 and 156% of their body weight of the plant.[2] Deer in group III consumed 24% of their body weight during this trial. Although toxic levels were not demonstrated, it appears that deer may have a higher tolerance for tansy ragwort than cattle. This research, although with limited numbers of deer, indicated that tansy ragwort is not likely to cause toxicity problems with free-ranging deer because of its low palatability and the deer's seeming high tolerance to the toxins in this plant.

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