Proceedings of the Iowa Academy of Science

Volume 93 | Number

Article 5

1986

A Roadside Technique Using Scent Lures for Measuring Relative White-Tailed Deer Abundance

William L. Franklin
Iowa State University

Proc. Iowa Acad. Sci. 93(2):44-47, 1986

A Roadside Technique Using Scent Lures for Measuring Relative White-Tailed Deer Abundance[1]

WILLIAM L. FRANKLIN

Department of Animal Ecology, Iowa State University, Ames, Iowa 50011

The response of captive white-tailed deer (*Odocoileus virginianus*) to selected commercial scent lures and the feasibility of measuring the relative abundance of wild deer with roadside scent stations were studied. Penned deer first smelled scented capsules 5.7 times more frequently than unscented controls. There was no significant difference among 5 scents tested as to whether they were smelled or not, in the amount of time deer spend smelling them, nor any preference for sex- or food-derived scents. In a high deer density area the visitation rate to scented stations was 149 and unscented was 95. In a low deer density area it averaged only 6. Though construction of roadside stations was somewhat time-consuming, the technique proved potentially valuable for providing an index of relative deer abundance because it was simple, required a minimum of equipment, tracks were easily identified, and were comparable to aerial surveys in costs and results.

INDEX DESCRIPTORS: White-tailed deer, abundance index, scent lures, behavior, management.

A number of methods are used by field biologists for estimating the relative abundance or density of animals. Such indices normally are based upon catch (harvest) per unit effort, counts of animal signs, or counts of animal numbers per unit effort. Although estimates using counts of signs, have less direct relationship to actual density, they can be a more accurate index of density. This is because counts of signs are not as dependent upon the skill of observers, standardization between observers is easier, observation is less affected by viewing conditions, and the act of observing does not influence that which is being counted (Caughley 1977).

Reliable information on population trends is essential for good deer management. New methodology that may improve our ability to measure such trends needs to be explored. Estimating the relative abundance of deer by "signs" has been achieved through pellet group (Bennett et al. 1940, Eberhardt and Van Etten 1956), track (Hazzard 1958, Davis et al. 1978) and trail counts (McCaffery 1976). Although scent stations have been used to estimate densities of wild carnivores, including canids (Cook 1949, Wood 1959, Pimlott et al. 1969, Linhart and Knowlton 1975) and bears (Lindzey et al. 1977), the concept has not been applied to ungulates. However, it now is known that scent also is an important system of communication for deer and other ungulates, especially during the breeding season (Brokx and Geist 1961, Müller-Schwarze 1971, Müller-Schwarze et al. 1973).

Hunters have long made use of scent to attract deer. Recently, deer scents or lures have been manufactured commercially. There are basically 3 kinds of scents on the market today: imitating food derivatives and sexual scents, and coverup scents. The effectiveness of the products has been debated by hunters since the products were introduced. Manufacturers' claims for their products range from "hides human scent" to "brings 'em running from miles." If scents do attract deer as claimed, then they may be useful in determining the relative abundance of deer.

The objectives of this investigation were 1) to measure the response of deer to selected commercial scent lures, 2) to establish whether or not commercial scents would be effective in a scent-post survey for deer, and 3) to determine the rate at which white-tailed deer would visit artificial scent stations in the field as a potential technique for providing a relative index of abundance.

METHODS

The first phase of this study was to measure the response of captive deer to commercial scent lures. Five commercial scents were selected for testing on the basis of their availability to the general public of central Iowa. Scents used were Deer-Coy (Aladdin Laboratories, MN), Doe-In-Heat, Indian Buck Lure (Pete Richard Inc., Cableskill, NY), Supreme Buck Stop, and Supreme Wild Grape (Buck Stop Lure Company, Stanton, MI). All scents were sexual lures except Buck Stop (apple-scented) and Wild Grape.

Captive deer at the Wildlife Research Station (Iowa Conservation Commission) in Boone, Iowa, were used for the scent experiments. One study pen, 1 ha in size, contained 2 yearling bucks, and a second pen, 2 ha in size, contained 1 adult buck, 5 adult does, and 2 fawn does. The pens were 300 m apart. Each experiment involved 3 capsules separately mounted on top of wooden stakes 10 or 100 cm high. The 3 stakes were located 5 m apart in a triangle near the main entrance to each pen. Each capsule contained a small cottonball. One capsule was the control and the other 2 were saturated with 10 to 15 drops of a different scent. Placement of capsules was randomly determined for each experiment. Stakes were washed between experiments.

Behavioral responses recorded included the first capsule visited, number of sniffs per capsule, length of time spent smelling, and the amount of time within 1 m of the stake. A sniff was recorded each time a deer lowered its head to smell a capsule. The length of time spent smelling ended when the deer raised its head. Trials were conducted in early morning, at noon, and late afternoon. Forty experiments were conducted from 6 December 1975 to 15 March 1976 and 10 from 15 April to 15 May 1978. Each experiment was 30 minutes long.

The second phase of the study was to locate scent stations in the field to determine the visitation rate by wild deer. Methodology was patterned after that described by Linhart and Knowlton (1975) for coyotes (*Canis latrans*). Ten-km routes were selected on secondary gravel roads through low to high deer density areas in central Iowa. Routes included both bottomlands and uplands, and habitat ranged from dense stands of woodlands to mixtures of hardwood forests and cultivated lands (corn and soybeans). Fifty scent stations were located 3 to 5 m from the road, the side of the road being determined by the flip of a coin. Each station was constructed of a base layer of soil sifted through a 1.3-cm screen. The soil plots were 2 m in diameter and 3 to 5 cm deep. An accessible source of damp and loamy soil had to be located. Two to 3 people were required for loading soil into a pickup, carrying soil in buckets or wheelbarrows to the station, sifting the soil, and placing the center stake.

[1]Journal Paper J-9853 of the Iowa Agriculture and Home Economics Experiment Station, Ames. Project 2262: Behavior Of Iowa Game Mammals And Their Management. Disclaimer: mention of commercial trade names in no way indicates endorsement or otherwise.

Cottonballs were saturated with deer scent lure (Buck's Deerscent, Buck Johnson, Stillwater, MN) and stapled to the top of a 100-cm-high stake placed in the center of each soil plot. In the initial trials, cotton was placed within plastic capsules as in the experiments with captive deer, but this proved unnecessary, and use of plastic capsules was discontinued. Odd-numbered stations, not treated with scent, acted as controls to determine whether the lure made a difference in attracting deer.

Stations were put out the first day over the entire route and checked before noon on each of the following 3 days to assess the number of stations visited by deer. Tracks were erased, freshly sifted soil was added to disturbed stations, and scent was replenished at each station. If a soil plot had been disturbed, dug up, or was frozen, and identification of tracks was impossible, that station was considered inoperable and was not included in the sample. There was no way of determining by the number of track imprints in a soil plot if more than 1 deer had visited the station. Thus, whether the soil plot had 1 or several deer tracks, it was considered a "visited" station. Visitation *rate* (Linhart and Knowlton 1975) was calculated by dividing the number of stations visited by deer during the 3-day sampling period by the number of operable stations and multiplying by 1000. For example, 10 stations visited by deer among 100 operable stations would be an *index* of 100.

Field trials with roadside scent stations were conducted from 30 October to 24 November 1975 ($n = 272$ operable stations) at Ledges State Park, Boone Co., Iowa. A second field season was conducted from 5-21 November 1978 ($n = 509$) at Springbrook State Park and the Garst property in Guthrie Co., Iowa.

RESULTS AND DISCUSSION

In the first phase of this study, the 2 yearling bucks in pen 1 and 2 does in pen 2 regularly approached the scents. Those deer that responded were not afraid to approach the scent stations when researchers were present. Lack of fear by certain deer was probably due to being hand-raised and bottle fed during the first 4 ro 8 weeks of life. When deer approached the scent stations, there was no absolute way of determining whether they were "attracted" by the presence of the researchers and/or by the scent lures. Because of this, their response to the scents was best considered a measure of their behavior after they arrived and not a result of the scents attracting them from a distance. Five experiments were not included in the analyses because the deer did not approach within 10 m of the stakes.

Deer responded to the stations primarily by smelling the stakes and capsules. Nasal contact with the capsule was common. Occasionally, deer would rub their heads against the stakes. When downwind and 10 m from the scented stakes, deer also were observed to "catch wind" of the scent by lifting their noses and sniffing in the direction of the scent.

As deer arrived at the stakes, they first smelled 1 of the 2 scented capsules in 74% of the trials (thus an average of 37% for each scented capsule), smelled the control first in 13%, and failed to smell any of the 3 choices in 13% ($n = 35$ trials). In other words, deer approached and first smelled 1 of the 2 scented capsules 5.7 times (74/13) more often than the unscented control ($X^2 = 7.0$, $df = 1$, $P < 0.01$). Doe-In-Heat was smelled first less often than would be expected under independence ($X^2 = 14.5$, $df = 4$, $P < 0.01$), while no single scent first attracted deer more than others.

Deer showed a preference ($X^2 = 11.2$, $df = 1$, $P < 0.001$) for scents over the control, but there was no significant difference ($X^2 = 5.4$, $df = 4$, $P = 0.25$) among the 5 scents as to whether they were smelled or not smelled (Fig. 1). Considering that the deer had most likely not been exposed to wild grape (*Vitis sp.*) it is interesting to note the high percentage (92%) of trials Wild Grape lure was smelled by deer. Perhaps the novelty of this strongly fragrant scent attracted their attention.

The mean amount of time deer spent smelling the 3 options presented to them ranged from 1.3 seconds/animal for the control to 5.9 seconds for Indian Buck Lure. Though there was no significant difference among scents (Table 1), deer spent more time smelling scented stations than controls ($F = 4.68$, $df = 1.93$; $P < 0.05$). Bucks and does showed no difference in time spent smelling scents, nor did they show any preference for sex-scents or food-scents.

In the spring of 1978, Deer-Coy and Wild Grape were tested with the same captive deer, but neither bucks nor does were attracted to the triad of the 2 scented stations and 1 control, and the trials were discontinued after 10 attempts. The high response of captive deer to scent lures in late fall and lack of response in spring, agrees with observations by Brokx and Geist (1961) that scent communication is especially important to cervids during the breeding period. It also suggested that fall would be the more favorable time of year for attracting deer to roadside scent stations.

When preliminary roadside soil plots were constructed without scent posts in early November 1975, the deer visitation rate during the first 4 nights was 65 ($n = 186$). On the fifth and sixth nights, after being scented with Indian Buck Lure, the stations were visired at a rate of only 35 ($n = 86$). The novel stimulus of a fresh soil plot was believed to have first attracted the deer, but by the time the scent and posts were installed, deer were less interested in the sites or changes in weather patterns decreased activity. It was possible that deer were attracted to unscented soil plots because of their similarity to "scrapes" used by white-tailed deer during the rut (Moore and Marchington 1974). These early field trials revealed not only that deer visited roadside stations, but also their track imprints could be easily identified and not confused with other animal species in the area. Soil plots less than 2 m in diameter allowed deer to smell the scented stake without leaving their track imprints. Field trials were discontinued in late November of 1975 because stations became inoperable due to early inclement weather and frozen ground.

Springbrook State Park and its surrounding hardwood forests is considered to have a high deer density. Most of the 4.7-km^2 area is under public ownership and is a refuge for deer. In 1979, a mean of 103 deer (± 7 with 95% confidence interval) were counted at Springbrook State Park during winter aerial surveys (Gladfelter

Table 1. Mean number of seconds that scent lures were smelled by deer during 30-minute trials.

Scent	*Number of Trials*		*Mean (sec.)*		*S.E.*		*t-value*	
	Bucks	Does	Bucks	Does	Bucks	Does	Bucks	Does
Deer-Coy	12	4	2.2	5.5	0.6	3.4	2.00	3.18
Doe-In-Heat	8	5	6.1	2.7	4.7	1.7	2.36	2.78
Indian Buck Lure	7	5	8.2	2.8	5.1	1.4	2.45	2.78
Supreme Buck Stop	9	8	3.2	3.7	1.5	1.6	2.31	2.36
Supreme Wild Grape	8	4	4.1	4.3	1.3	1.3	2.36	3.18
Control	22	13	0.9	2.0	0.4	1.4	2.08	2.18

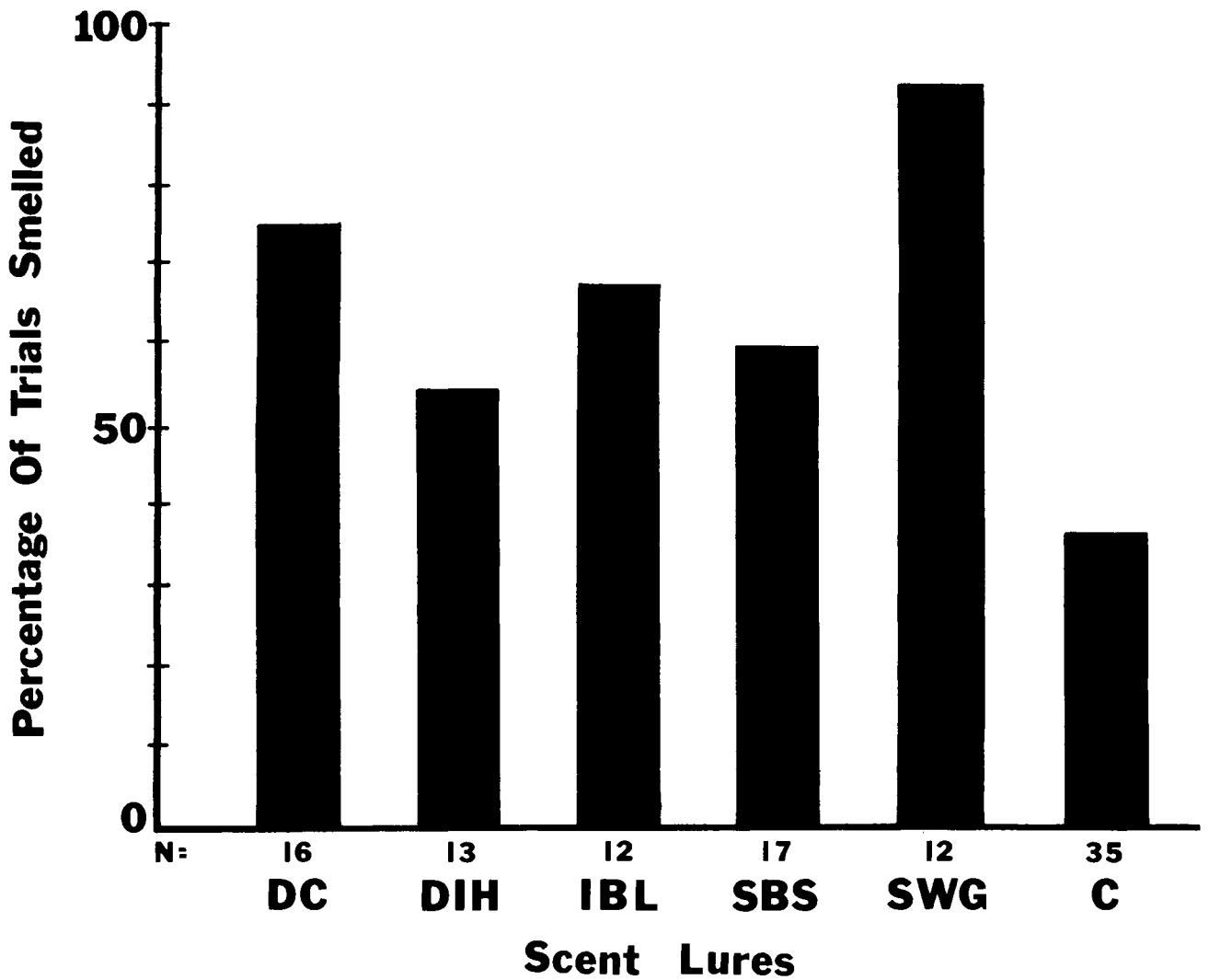

Fig. 1. Percentage of trials in which scent was approached and smelled by captive white-tailed deer. N = the number of trials, DC = Deer Coy, DIH = Doe-In-Heat, IBL = Indian Buck Lure, SBS = Supreme Buck Stop, SWG = Supreme Wild Grape, C = Control.

1979).

The visitation rate at roadside scent stations at Springbrook was 149 (n = 141) to scented stations and 95 (n = 148) to unscented stations, for an average visitation rate of 121. There was no significant difference ($X^2 = 2.00$, df = 1, P = 0.16) between the two, indicating that deer visited scented stations no more often than unscented stations (Fig. 2). These indices are comparable in magnitude to those reported by Linhart and Knowlton (1975) for coyotes in 17 western states where index values for 1972 and 1973 ranged from 49 to 152.

In contrast to Springbrook, the combined visitation rate to scented and unscented stations along roads through the Garst study area was only 6 (n = 180). The Garst property is privately owned, and deer hunting is permitted. This 7.7-km^2 area is considered to have low to moderate deer densities because of limited habitat and contains an estimated winter population of only 10 deer. Winter aerial surveys counted a mean of 6 deer (± 2 with 95% confidence interval) in this area (Gladfelter 1979). There was a close parallel between the 2 techniques. In fact, there was no difference between aerial and roadside density indices ($X^2 = 0.009$, df = 1, P = 0.92), suggesting that scent stations can serve equally as well as an index of deer density.

Although not difficult work, the construction and laying out of the roadside scent stations was time-consuming. During 92.5 work hours, 171 plots were constructed; that is, only about 2 plots were constructed/man-hour. One to 2 people were required to check roadside stations each morning. Driving a 10 km route and individually checking 50 scent stations required 2.3 hours (21.4 plots/man-hour). Thus, 3 workers in 1 day constructed a route of 50 stations that were checked by 1 technician each morning for the next 3 days, all totaling 4.5 man-days. Based upon current average wages for wildlife technicians in Iowa, 1 roadside scent station survey would cost $220 to $250. In comparison, 2-hour rental for an airplane with pilot plus wages for 2 wildlife technician observers (half a day) required for an aerial survey would be approximately $250 to $275.

CONCLUSIONS

In summary, captive deer showed a preference for scented over unscented stations. Though not statistically significant, free-ranging deer visited more scented than unscented roadside stations. To

maximize the number of visits to roadside stations, it is recommended that each station be scented when applying this technique in the field. Roadside scent stations were comparable to aerial surveys in estimating relative abundance of white-tailed deer. It was simple and required a minimum of equipment and tools. Also, deer tracks were readily identified and differentiated from other species, construction of soil plots, while somewhat time-consuming, was not difficult, and costs were comparable to aerial surveys. Roadside surveys would best serve in situations where airplanes were unusually expensive or not available, evergreen forest vegetation prohibited aerial view of deer, or rough topography made flying too difficult.

ACKNOWLEDGMENTS

Support for this work came from the Iowa Agricultural Experiment Station, Ames, Iowa. I express my thanks and appreciation to Monte Garrett, Marc F. Roberg, and student volunteers for their diligent assistance with the field work, and to the personnel, especially H. Lee Gladfelter, at the Iowa Conservation Commission Wildlife Research Station for their help and use of facilities. Lee Gladfelter, Jana McConoughey and William R. Clark made valuable suggestions on the manuscript. Some of the scents used in the study were provided by the Buck Stop Lure Company. Thanks also to Steve Garst and the staff at the Conservation Education Center and Springbrook State Park for their cooperation.

REFERENCES

BENNETT, L. J., P. F. ENGLISH, and R. McCAIN. 1940. A study of deer population by use of pellet-group counts. J. Wildl. Manage., 4:390-403.

BROKX, P. and V. GEIST. 1961. A review of social behavior of the North American cervids during the reproductive period. Amer. Mid. Nat., 77:390-417.

CAUGHLEY, G. 1977. Analysis of Vertebrate Populations. Wiley, N.Y., 232 pp.

COOK, A. H. 1949. Fur-bearer investigations. New York State Conserv. Dept. Pittman-Robertson Project 1-R, Suppl. G. Final Rep. 57 pp.

DAVIS, C. E., A. W. GREEN, J. C. BARRON, and G. A. BOYDSTON. 1978. A technique to determine deer density from track count sampling. Final Rep. Job No. 12, Texas Parks and Wildlife Dept., Austin. 30 pp.

EBERHARDT, L. and R. C. VAN ETTEN. 1956. Evaluation of the pellet group count as a deer census method. J. Wildl. Manage., 20:70-74.

GLADFELTER, H. L. 1979. Evaluation of an aerial census technique for Iowa. Iowa Conserv. Comm. Prog. Rep., Fed. Aid Proj. No. W115R, Phase B-Study No. 5. 7 pp.

HAZZARD, L. K. 1958. A review of literature on big game census methods. Colo. Game and Fish Dept. Job Compl. Rep. P-R Proj:W-38-R-11, Job No. 4A. 178 pp.

LINDZEY, F. G., S. K. THOMPSON, and J. I. HODGES. 1977. Scent station index of black bear abundance. J. Wildl. Manage., 41:151-153.

LINHART, S. B. and F. F. KNOWLTON. 1975. Determining the relative abundance of coyotes by scent stations lines. Wild. Soc. Bull., 3:119-124.

McCAFFERY, K. R. 1976. Deer trail counts as an index to populations and habitat use. J. Wildl. Manage., 40:308-316.

MOORE, W. G. and R. L. MARCHINGTON. 1974. Marking behavior and its social function in white-tailed deer. In: V. Geist and F. Walther (Editors), The Behavior of Ungulates and its Relation to Management. IUCN, Morges, 940 pp.

MÜLLER-SCHWARZE, D. 1971. Pheromones in black-tailed deer. Anim. Behav., 19:141-152.

MÜLLER-SCHWARZE, D., C. MÜLLER-SCHWARZE, and W. L. FRANKLIN. 1973. Factors influencing scent marking in the pronghorn (*Antilocapra americana*). Verh. Dtsch. Zool., Ges., 66:146-150.

PIMLOTT, D. H., J. A. SHANNON, and G. B. KOLENOSKY. 1969. The ecology of the timber wolf in Algonquin Provincial Park. Ontario Dept. Lands and For. 92 pp.

WOOD, J. E. 1959. Relative estimates of fox population levels. J. Wildl. Manage., 23:53-63.

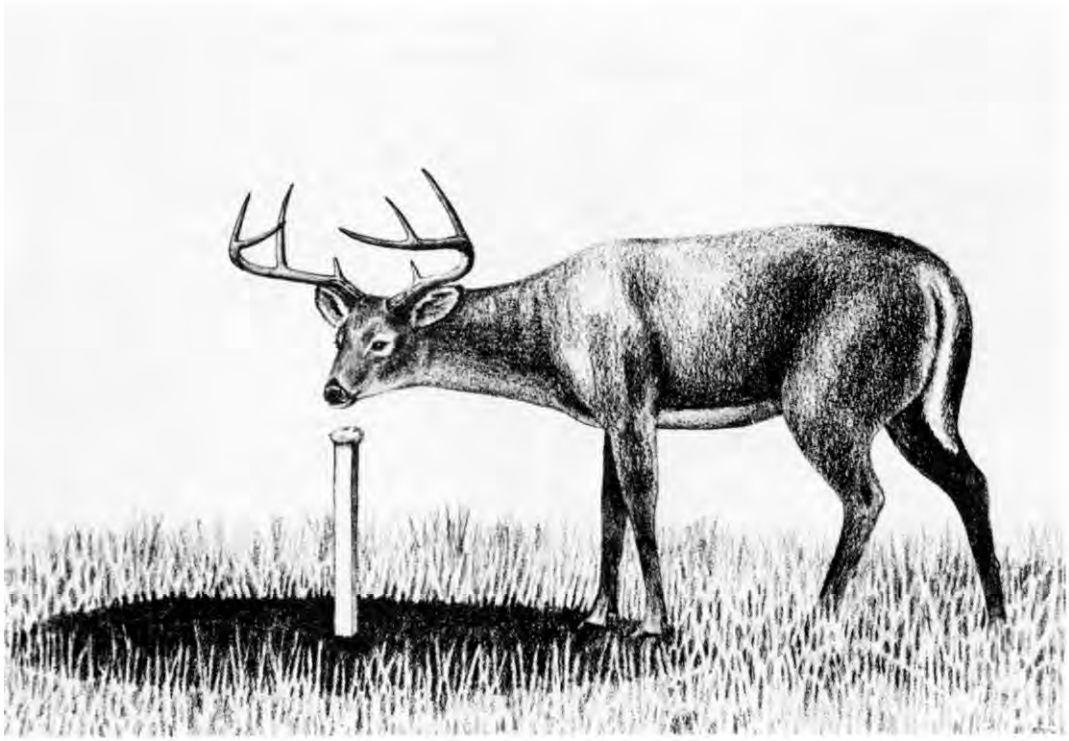

Fig. 2. White-tailed-deer buck smelling cotton on post of a roadside scent station.