

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Great Plains Wildlife Damage Control Workshop Proceedings Wildlife Damage Management, Internet Center for

December 1983

A Decade of USDA-ARS Predator Research, 1972-1982

Jeffrey S. Green

USDA-ARS, U.S. Sheep Experiment Station, Dubois, Idaho

Follow this and additional works at: <https://digitalcommons.unl.edu/gpwcwp>



Part of the [Environmental Health and Protection Commons](#)

Green, Jeffrey S., "A Decade of USDA-ARS Predator Research, 1972-1982" (1983). *Great Plains Wildlife Damage Control Workshop Proceedings*. 273.

<https://digitalcommons.unl.edu/gpwcwp/273>

This Article is brought to you for free and open access by the Wildlife Damage Management, Internet Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Great Plains Wildlife Damage Control Workshop Proceedings by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

A Decade of USDA-ARS Predator Research, 1972-1982

Jeffrey S. Green, USDA-ARS, U.S. Sheep Experiment Station, Dubois, ID 83423

Federal government restrictions in 1972 on several widely-used forms of predator control stimulated research on alternative methods of reducing depredation on livestock. In the same year, the U.S. Department of Agriculture began predator research through the Agricultural Research Service (ARS) and designed the U.S. Sheep Experiment Station (USSES) near Dubois in southeastern Idaho as the principle location for the investigations.

At the outset, the objective of ARS research was to examine non-lethal methods for reducing depredation, primarily by coyotes (Canis latrans), on sheep. During the first several years, while predator research facilities were constructed at the USSES, ARS funds were primarily used for extramural predator projects at universities in the western United States. Beginning in 1973 and extending from 3 to 5 years each, 3 extramural projects in addition to in-house research at USDA-ARS Western Regional Research Center (WRRRC) sought to determine the efficacy of repellents (aversive, olfactory, and gustatory agents) for deterring coyote predation on sheep. Several hundred compounds were tested, and the funds indicated that, although some compounds provided temporary protection to sheep, repellents were not consistently nor sufficiently effective to be viewed as a realistic method of reducing coyote depredation.

ARS funded other university studies that concluded that annoying sound was not likely to be an effective deterrent to coyote depredation and that artificial density stimuli were not effective in reducing coyote reproductive success.

Beginning in 1973 and continuing to the present, research on *identification* and testing of antifertility agents for coyotes has been conducted at the USSES. The current effort on this objective is minor, and no single compound has been identified that meets specific requirements of effectiveness, selectivity, and acceptability.

In addition to pioneer work at the USSES in 1977, 3 extramural studies were funded from 1973 to 1980 to examine the use of electric fencing to exclude coyotes from sheep. Certain configurations of electric fencing were found to be effective, and fencing is now viewed as a viable means of reducing depredation.

In addition to fencing, the single other effective non-lethal technique of controlling predation studied by ARS was livestock guarding dogs. Research at the USSES and 2 universities from 1977 to present has shown that dogs can be a significant asset in protecting sheep in a variety of conditions including fenced-pasture and open-range grazing.

ARS has conducted and funded research on chemical attractants from 1973 to present. Several compounds developed at the WRRRC are highly attractive to coyotes thus enhancing the effectiveness of several existing methods of control (trapping, M-44s). ARS is now testing various methods of delivering baits and other compounds to coyotes. Should toxicants be cleared for predator control or suitable antifertility compounds be identified, attractants and delivery devices will be necessary for field deployment.

ARS-funded research has produced information on various aspects of coyote biology. A wide range of knowledge is advantageous for the successful management of such a versatile predator.

LITERATURE RESULTING FROM PREDATOR RESEARCH FUNDED BY USDA-ARS

Chemical Attractants

- BUTTERY, R. G., L. C. LING, R. TERANISHI, and T. R. MON. 1977. Roasted lamb fat: basic volatile components. *J. Agric. Food Chem.* 25:1227-1229.
- FAGRE, D. B. 1981. Inhibition of predatory attacks by captive coyotes: conditioned avoidance for a repellent prey and its mimics. Ph.D. Thesis. Univ. Calif., Davis. 224pp.
- B. A. BUTLER, W. E. HOWARD, and R. TERANISHI. 1981. Behavioral responses of coyotes to selected odors and tastes. Pages 966-983 In J. A. Chapman and D. Pursley, eds. *Worldwide Furbearer Conf. Proc. Vol. II.* Frostburg, Md.
- W. E. HOWARD, and R. E. MARSH. 1981. Factors affecting coyote killing behavior: an artificial model-mimic prey system. Pages 950-965 J. A. Chapman and D. Pursley, eds. *Worldwide Furbearer Conf. Proc. Vol. II.* Frostburg, Md.
- , and R. TERANISHI. 1982. Development of coyote attractants for reduction of livestock losses. Pages 319-326 -in- J. M. Peek and P. D. Dalke, eds. *Wildlife-Livestock Relationships Symp., Proc. 10.* Univ. Idaho, Moscow.
- HADDON, W. F., D. R. BLACK, E. L. MURPHY, T. R. MON., D. J. STERN, and R. TERANISHI. 1978. GC/MS of coyote urine volatiles using high resolution, high capacity WCOT columns. *Proc., 25th Ann. Conf. on Mass Spec. and Allied Topics.* St. Louis, Mo., Paper RA-11.
- MARSH, R. E., W. E. HOWARD, S. M. MeKENNA, B. BUTLER, D. A. BARNUM, and R. TERANISHI. 1982. A new system for delivery of predacides or other active ingredients for coyote management. Pages 229-233 in R. E. Marsh, ed. *Proc. 10th Vert. Pest Conf., Univ. Calif., Davis.*
- MeKENNA, S. 1981. Response of male beagles to "Canid Sex Pheromone," methyl-hydroxybenzoate. M.S. Thesis. Univ. Calif., Davis. 31pp.
- MURPHY, E. G., R. A. FLATH, D. R. BLACK, T. R. MON, and R. TERANISHI. 1978. Isolation, identification, and biological activity assay of chemical fractions from estrus urine attractive to the coyote. Pages 66-67, fig. R. W. Bullard, ed. *Flavor Chemistry of Animal Foods.* ACS Symp. Ser. 67, Washington, D.C.
- TERANISHI, R., E. L. MURPHY, and T. R. MON. 1977. Steam distillation-solvent extraction recovery of volatiles from fats and oils. *J. Agric. Food Chem.* 25:464-466.

D. J. STERN, D. S. BALSER, W. E. HOWARD, and D. B. FAGRE. 1981. Bait posts. Pages 1852-1861 in J. A. Chapman and D. Pursley eds. Worldwide Furbearer Conf. Proc. Vol. III. Frostburg, Md.

_____, W. E. HOWARD, and D. B. FAGRE. 1981. Chemicals useful as attractants and repellents for coyotes. Pages 1839-1851 in J. A. Chapman and D. Pursley, eds. Worldwide Furbearer Conf. Proc., Vol. III. Frostburg, Md.

TIMM, R. M. 1977. Responses of coyotes to urine scents. Ph.D. Thesis. Univ. Calif., Davis. 100pp.

G. E. CONNOLLY, W. E. HOWARD, W. M. LONGHURST, R. TERANISHI, and E. L. MURPHY. 1975. Coyotes respond to fractions of coyote urine. Sci. Biol. J. 3:87-89.

W. E. HOWARD, M. W. MONROE, R. TERANISHI, and E. L. MURPHY. 1977. A method for evaluating coyote scent baits. Pages 151-156 in Spec. Tech. Pub. 625. Amer. Soc. Test. Mater., Philadelphia, Pa.

Fencing

GATES, N. L. 1978. Constructing an effective anticoyote electric fence. USDA-SEA Leaflet No. 565. 6pp.

J. E. RICH, D. D. GODTEL, and C. V. HULET. 1978. Development and evaluation of anti-coyote electric fencing. J. Range Manage. 31:151-153.

SHELTON, M. 1972. A brief look at predator control research: fencing repellents. Natl. Woolgrower 62:15.

1972. Predator losses in one flock of sheep and goats. Natl. Woolgrower 62:20.

1974. Fencing against coyotes. Coyote Res. Workshop, Denver, Col o.

1977. Electric fencing as a means of deterring coyote predation. Ranch Mag. 58:1-3.

Guardina Doas

BLACK, H. L. 1981. Navaho sheep and goat guarding dogs: a New World solution to the coyote problem. Rangelands 3:235-237.

GREEN, J. S. 1983. White sentinels. Pyrenees World 2:7-10.

and R. A. WOODRUFF. 1980. Is predator control going to the dogs? Rangelands 2:187-189.

and _____ 1981. Livestock guarding dog research at the U.S. Sheep Experiment Station. Pages 115-121 in Proc. 1981 Alberta Sheep Symp., Banff, Alberta.

- and _ . 1983. Guarding dogs protect sheep from predators. U.S. Dept. Agric., Agric. Info. Bull. No. 455. 27pp.
- and 1983. The use of three breeds of dog to protect rangeland sheep from predators. Appl. Anim. Ethol. In Press.
- and 1983. Livestock guarding dogs: developments and current status. Proc. Symp. Situation management of two intermountain species: aspen and coyotes. Utah State Univ., Logan. In Press.
- and C.V. HULET. 1983. Status and use of livestock guarding dogs in North America. Pages 423-430 **In** F. H. Baker, ed. Sheep and Goat Handbook, Vol. 3, Winrock International. Western Press, Inc., Boulder, Colo. 590PP.
- and R. HARMAN. 1983. Livestock guarding dogs and predator control: a solution or just another tool? Sheep Prod. 2:17-20.
- and 1983. Eurasian livestock guarding dogs: effectiveness for protecting pastured sheep from predators. Intl. Goat and Sheep Res.
- and T. T. TUELLER. 1980. Livestock guarding dogs: economics and predator control. Rangelands 2:247-248.
- and 1983. Livestock guarding dogs for predator control: costs, benefits, and practicality. Wildl. Soc. Bull. In Press.
- McGREW, J. C. 1982. Behavioral correlates of guarding sheep in Komondor dogs. Ph.D. Thesis. Colo. State Univ., Ft. Collins. 220pp.
- and C. S. BLAKESLEY. 1982. How Komondor dogs reduce sheep losses to coyotes. J. Range Manage. 35:693-696. Repellents ADA Aversive Agents
- CRINGAN, A. T. 1972. A brief look at predator control research: odor repellents. Natl. Woolgrower 62:14. . 1974. Attack behavior of coyotes. Coyote Res. Workshop, Denver, Colo.
- JANKOVSKY, M. J. 1974. Field evaluation of potential olfactory predator repellents. M.S. Thesis. Colo. State Univ., Ft. Collins.
- V. B. SWANSON, and D. A. CRAMER. 1974. Field trials of coyote repellents in western Colorado. Proc. West. Sec. Amer. Soc. Anim. Sci. 25:74.
- LEHNER, P. N. 1974. Olfactory repellents. Coyote Res. Workshop, Denver, Colo.
- SHELTON, M. and P. THOMPSON. 1976. Use of chemical repellents to reduce coyote. predation on sheep and goats. Texas Agric. Exp. Sta. PR-3396.

SWANSON, V. B., D. A. CRAMER, and J. JANKOVSKY. 1975. Field trials of predator repellents. Today's Research-Tomorrow's Colorado. Colo. State Univ., Ft. Collins.

M. J. JANKOVSKY, D. A. CRAMER, and D. A. WADE. 1974. Olfactory repellents for sheep predator control. Res. Highlights Anim. Sci. Dept., Colo. State Univ., Ft. Collins.

and G. L. SCOTT. 1973. Livestock protectors for sheep predator control. Proc. West. Sec. Amer. Soc. Anim. Sci. 24:34-37.

Reproductive Inhibitors

BRUSS, M. L., J. S. GREEN, and J. N. STELLFLUG. 1983. Electroejaculation of the coyote. Therio. 20:53-60.

GATES, N. L. 1977. Chemosterilant evaluation in coyotes: parameters for animal selection and laboratory methodology. Pages 106-113 in Amer. Soc. Test. and Mater. Tech. Publ. 625.

and C. S. CARD, V. EROSCHENKO, and C. V. HULET. 1976. Insensitivity of the coyotes testis to orally administered cadmium. Therio. 5:281-288.

and E. K. GOERING. 1976. Hematologic values of conditioned, captive, wild coyotes. J. Wildl. Dis. 12:402-404.

GOERING, E. K., C. S. CARD, D. F. BROBST, and N. L. GATES. 1976. Electrophoretic protein analysis in the conditioned, captive, wild coyote. J. Wildl. Dis. 12:498-503.

GREEN, J. S., D. A. BARNUM, N. L. GATES, and J. T. FLINDERS. 1979. Coyote laparotomy: **I& vivo** determination of reproductive success. Therio. 11:291-296.

RICH, J. E., and N. L. GATES. 1979. Hematologic and serum chemistry values of pen-raised coyotes. J. Wildl. Dis. 15:115-119.

STELLFLUG, J. N., N. L. GATES, and C. W. LEATHERS. 1979. Antitesticular activity of DL-6-(N-2-pipecolinomethyl)-5-hydroxy-indane maleate (PMHI) in coyotes (**Canis al trans**). Therio. 12:345-354.

and R. G. SASSER. 1978. Reproductive inhibitors for coyote population control: developments and current status. Pages 185-189 Proc. 8th Vert. Pest Conf., Univ. Calif., Davis.

P. D. MUSE, D. O. EVERSON, and T. M. LOUIS. 1981. Changes in **serum progesterone** and estrogen of the nonpregnant coyote during the breeding season. Proc. Soc. Exper. Biol. Med. 167-220-223.

OTHER

BARNUM, D. A. 1980. Investigations of natural regulatory mechanisms in coyote populations. Ph.D. Thesis. Brigham Young Univ., Provo, Utah. 94pp.

J. S. GREEN, J. T. FLINDERS, and N. L. GATES. 1979. Nutritional levels and growth rates of hand-reared coyote pups. J. Mammal.60:820-823.

BLAKESLEY, C. S. and J. C. McGREW. 1983. Differential vulnerability of lambs to coyote predation. Appl. Anim. Ethol. In Press.

CONNOLLY, G. E., R. M. TIMM, W. E. HOWARD, and W. M. LONGHURST. 1976. Sheep-killing behavior of captive coyotes. J. Wildl. Manage. 40:400-407.

DRACY, A. E. 1974. Sound effects as deterrents for coyotes. Coyote Res. Workshop, Denver, Colo.

EDINGTON, R., M. SHELTON, and C. W. LIVINGSTON. 1976. Agar gel diffusion technique as a means of identifying the mammalian protein in the coyote diet. Texas Agric. Exp. Sta. PR-3398.

EVERMANN, J. F., C. W. LEATHERS, W. J. FOREYT, J. S. GREEN, M. L. BRUSS, L. MAAG-MILLER, A. J. McKEINAN, and B. LeMASTER. 1981. Naturally occurring viral enteritis in captive coyotes: pathologic and serologic features. Pages 139-152 J,n Proc. 23rd Ann. Amer. Assoc. Vet. Lab. Diag.

FOREYT, W. J., G. G. LONG, and N. L. GATES. 1977. c hodectes :
severe
pediculosis in coyotes. Vet. Med. Sm. Anim. Clin. 72:503-505.

GATES, N. L., and J. S. GREEN. 1979. Epizootic streptococcal pneumonia in captive coyotes. J. Wild. Dis. 15:497-498.

GREEN, J. S. 1978. Pygmy rabbit and coyotes investigations in southeastern Idaho. Ph.D. Thesis. Brigham Young Univ., Provo, Utah. 88pp.

1981. Where are we with predator control? Pages 117-120 Production for Profit. Proc. First Bienn. Sheep Day. Utah State Univ., Cedar City.

1981. The coyote: worthy adversary. Sheep 2:23.

— 1982. Reducing coyote damage to sheep with non-lethal techniques.
.Pages 122-131 in R. M. Timm and R. J. Johnson, eds. Proc. 5th Great Plains Wildl. Damage Control Workshop, Univ. Nebr., Lincoln.

and J. T. FLINDERS. 1981. Diameter and ph comparisons of coyote and red fox scat. J. Wildl. Manage. 45:765-767.

and ___ 1981. Diets of sympatric red foxes and coyotes in southeastern Idaho. Great Basin Nat. 41:251-254.

M. L. BRUSS, J. F. EVERMANN, and P. K. BERGSTROM. **1983.** Serologic response of captive coyotes to canine parvovirus and accompanying profiles of canine coronavirus titers. J. Wildl. Dis. In Press.

HOWARD, W. E. **1973.** The Biology of predator control. Addison-Wesley Module in Biology No. 11. Addison-Wesley Publ. Co., Reading, Mass. **48pp.**

— **1973.** Predator control: whose responsibility? Biosci.
24:359-363.

HULET, C. V., N. L. GATES, R. A. WOODRUFF, and J. RICH. **1980.** Advances in predator control. Sheep and Goat Handbook. International Stockman's School **1:326-331.**

JANSEN, C. D. **1974.** Behavior patterns observed in coyote-sheep interactions. M.S. Thesis. Colo. State Univ., Ft. Collins. **57pp.**

NEESE, G. E., W. M. LONGHURST, and W. E. HOWARD. **1976.** Predation and the sheep industry in California. Div. Agric. Sci., Univ. Calif. Bull. **1878. 63PP.**

SANDER, D. E., and A. E. DRACY. **1972.** A brief look at predator control research: annoying sounds. Natl. Woolgrower **63:15.**