

BENTON COUNTY, OREGON

Agriculture and Wildlife Protection Program Annual Report 2019



Livestock guardian dog and piglets | Laura Sage photo | Red Bird Acres Acre Farm, Philomath



Cattle enclosed by electric fence | Jennifer Ward photo | Totum Farm, Blodgett

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1. Executive Summary

In June 2019, the Benton County Budget Committee approved \$45,000 to fund the Agriculture and Wildlife Protection Program (AWPP) which began as a pilot program in 2017. The AWPP supports the use of non-lethal animal damage deterrents to prevent conflicts with wildlife. In this biennium, funding for the AWPP included \$5,000 for education and consultation services. \$40,000 was available for the cost share reimbursement grant program - \$35,000 for anticipated conflicts with wildlife and \$5,000 for unexpected conflicts with beavers that arise after the grant application deadline.

AWPP grants were awarded in the spring of 2018, and in the fall of 2019. This annual report summarizes (1) educational outreach activities conducted in 2019, (2) the results of the 2018 projects through Year 2 of implementation, and (3) the awarding the 2019 grants.

Educational outreach activities in 2019 included a website, press releases, social media postings, a conference session, and a tabling event. A “Lending Toolbox” (<https://www.co.benton.or.us/awpp/page/lending-toolbox>) was also established to give county residents the opportunity to try non-lethal deterrent devices and materials before purchasing them for themselves. The educational outreach program also contributed \$3,000 toward the [installation](#) of a beaver [pond leveler](#) on Dunawi Creek. The device was installed as a demonstration project and to help reduce flooding of 53rd Street near the Willamette Pacific Railroad overpass.

2018 Projects: In 2018, the AWPP awarded \$35,363 in grants to eight Benton County farms for non-lethal wildlife deterrent projects. Successful applicants were required to keep project records, report conflicts, evaluate their project, and abide by program requirements for three years following the completion of their project. Of the eight projects awarded, six were completed and their first year post-project evaluations were reported on in “Agriculture and Wildlife Protection Program Summary Report 2017 -2019.” The second year post-project evaluations for these 2018 grant projects is summarized in “Section 6.1 2018 Grant Program Results (Year 2).”

During the second year of implementation, four of the six farms experienced some crop or livestock losses, although circumstances and predators varied. All of the farms reported the same or fewer number of wildlife conflicts since implementing their non-lethal deterrent projects with little change in the type of timing of conflicts. Most grant participants reported being highly satisfied or satisfied with the non-lethal methods and tools they selected. Overall, program participants were highly satisfied or satisfied with the individual AWPP elements they made use of and with the AWPP itself.

2019 Awards: The AWPP awarded \$31,752 in reimbursement grant funds to nine Benton County farms for the purchase and implementation of non-lethal animal damage deterrents to prevent conflicts with wildlife. Grant applications were reviewed by a five member Grant Review Committee and awards were made based upon the applicant's philosophy of animal damage control and the likely effectiveness of the proposed non-lethal deterrents project plan. Amounts awarded ranged from \$560 to the maximum allowed of \$5,000.

Four of the farms were located in Corvallis, two in Philomath, two in Monroe, and one in Blodgett. Properties where projects were to take place ranged from 2 to 90 acres, with most properties being under 10 acres. Grant recipients proposed to protect a variety of livestock and crops including: chickens, pigs, cow, sheep, donkeys, goats, alpacas, vegetables and orchards. All grant recipients agreed to not use traps, snares, calling-and-shooting, or poisons for the next three years as part of the grant application process. Seven of the nine farms that were awarded grants in 2019, completed their projects and submitted reimbursement claims. The success of these projects over the first year of implementation will be reported in the 2020 AWPP Annual Report.

2. Introduction

In June 2019, the Benton County Budget Committee approved \$45,000 to fund the Agriculture and Wildlife Protection Program (AWPP) which began as a pilot program in 2017 to support the use of non-lethal animal damage deterrents to prevent conflicts with wildlife.

The AWPP funds (1) educational outreach and expert consultation services and (2) a merit-based, cost share, reimbursement grant program. Agricultural operations in Benton County that wish to prevent conflicts with wildlife may qualify for reimbursement grant funds for the purchase and implementation of non-lethal wildlife deterrents to protect livestock and crops. In this biennium, funding for the AWPP included \$5,000 for education and consultation services. \$40,000 was available for the cost share reimbursement grant program - \$35,000 for anticipated conflicts with wildlife and \$5,000 for unexpected conflicts with beavers that arise after the grant application deadline.

This community-based program is funded by Benton County and managed by county officials in partnership with citizen volunteers and representatives from local agricultural and wildlife organizations.

Education and consultation services are provided by Benton County, Oregon State University Extension Service, Chintimini Wildlife Center, and Program Advisors. The Program Advisors include national experts in ranching with wildlife, predator ecology, and human-carnivore conflict.

3. Program Goals

The goals of the Benton County Agriculture and Wildlife Protection Program are to:

- Protect livestock, crops and property while coexisting with wildlife;
- Provide an opportunity for use of non-lethal animal damage deterrents to prevent conflicts with wildlife;
- Educate farmers and the community about wildlife conflicts and non-lethal methods to avoid conflicts;
- Build a collaborative relationship between the farming and wildlife conservation communities and Benton County government around common goals.

The AWPP does not evaluate or make recommendations on everyday animal husbandry practices, farm animal welfare, wildlife habitat, or land use.



Alpacas | Jennifer Ward photo | Hahner Farm, North Corvallis

4. 2019 Program Timeline

January 17, 2019	Installation of beaver pond leveler on Dunawi Creek near 53 rd Street
January 31, 2019	Evaluation Reports for the first year of 2018 grant projects due
February 23, 2019	OSU Small Farms Conference Ranching with Wildlife session and information table
July 1, 2019	2019 grant application window opens
August 16, 2019	2019 grant applications due
September 6, 2019	Grant Review Committee reviews 2019 grant applications
September 16, 2019	2019 grant awards announced
December 31, 2019	2019 grant projects completed
Nov 2019 – Jan 2020	Site visits to 2019 grant projects
(January 31, 2020)	Evaluation Reports for the second year of 2018 grant projects due
(February 14, 2020)	AWPP information table at Corvallis Eco-Film Festival
(February 22, 2020)	AWPP information table at OSU Small Farms Conference

5. Educational Outreach

For the 2019-2021 biennium, the AWPP allocated \$5,000 for the educational outreach program. The educational outreach program provides educational information in the form of websites, brochures, press releases, information tables and occasional public presentations on wildlife conflict prevention. The AWPP website can be found at www.co.benton.or.us/awpp.

Consultation services on the selection and use of non-lethal wildlife deterrents are provided to agricultural operations in Benton County that are anticipating or have experienced conflicts with wildlife.

Education and consultation services are provided by Benton County, Oregon State University Extension Service, Chintimini Wildlife Center, and Program Advisors. The Program Advisors include experts in ranching with wildlife, predator ecology, and human-carnivore conflict.

Educational outreach activities in 2019 included a website, press releases, social media postings, a conference session, and a tabling event. A “Lending Toolbox” was also established to give county residents the opportunity to try non-lethal deterrent devices and materials before purchasing them for themselves

The program also contributed \$3,000 toward the [installation](#) of a beaver [pond leveler](#) on Dunawi Creek. The device was installed as a demonstration project and also to help reduce flooding of 53rd Street near the Willamette Pacific Railroad overpass. The Benton County Public Works Road Fund contributed \$500 toward the installation of the device. The pond leveler was installed by Jakob Shockey of [Beaver State Wildlife Solutions](#) with assistance from citizen volunteers.



Volunteer Randy Comeleo, speaker Louise Liebenberg and Benton County Parks Director Laurie Starha with “Lady Baba” on display | Pam Comeleo photo | OSU Small Farms Conference

6. Grant Program

6.1 2018 Grant Program Results (Year 2)

The Benton County Agriculture and Wildlife Protection Program (AWPP) began as a pilot program in 2017 with a budget of \$45,000, approximately \$35,000 of which was allocated for the cost share reimbursement grant program. In 2018, the AWPP awarded \$35,363 in grants to eight Benton County farms for non-lethal wildlife deterrent projects. Successful applicants were required to keep project records, report conflicts, evaluate their project, and abide by program requirements for three years following the completion of their project. Of the eight projects awarded, six were completed (Table 1) and their first year post-project evaluations were reported on in “Agriculture and Wildlife Protection Program Summary Report 2017 -2019.” The second year post-project evaluations for these 2018 grant projects are summarized here.

Table 1. Six Benton County farms that completed AWPP-funded projects in 2018.

Farm	Location	Size (Acres)	Funded Non-lethal Deterrents	Protecting	Funded Amount
1	Corvallis	4	Electronet and Deer Fencing	Sheep, Goats, Crops	\$4,261
2	Philomath	50	Guard Dogs, Electric Fencing, Foxlights	Chickens, Turkeys, Pigs	\$5,000
3	Philomath	10	Woven Wire Fencing, Enclosed Barn	Goats, Chickens, Bee Hives	\$5,000
4	Alsea	67	Electric Fencing, Nite Guard Lights	Variety of Livestock, Bee Hives	\$2,621
5	Blodgett	52	Electric Fencing, Night Corrals	Goats	\$3,713
6	Philomath	102	Guard Dogs, Electric Fencing, BirdGard, Birthing Sheds	Sheep ¹ , Hazelnuts	\$4,768

¹ The sheep were sold off in the middle of 2019.



A sheep peaks out from its new lambing barn | Randy Comeleo photo | Lacy Farm, Monroe

All six farms submitted post project evaluation forms for both Year 1 and Year 2. Information in Tables 2-6 below refers to these six farms.

During the second year of implementation, four of the six farms experienced some crop or livestock losses (Table 2), although circumstances and predators varied:

- **Farm 1** installed electronet fencing to protect livestock and a deer fence to protect crops. Both fencing methods have been effective for the purposes for which they were installed, however neither could have prevented the loss of 15 cucumber seedlings to moles.
- **Farm 2** purchased and trained a guardian dog and installed electric fencing and a Foxlight to protect livestock and poultry. The farmers report that “using guardian dogs in combination with electric fencing

has completely excluded mammalian predators from gaining access to our livestock. With a vegetated stream corridor running through the farm as well as a stand of mature oaks, we host at least one Great Horned Owl. These are challenging to protect poultry from.” The farm reported that approximately 40 chickens were lost to the owl in the past year. This farm was awarded a 2019 AWPP grant to purchase two additional Foxlights. All three Foxlights will be installed in closer proximity to the broiler houses in the hope that they will be more effective against owls.

- **Farm 3** installed fencing to protect goats, chickens and beehives, and a secure night barn for the goats. In April, before the fence was installed, bee hives were lost to a bear. The bear was sighted again in November, but by this time the fence had been erected and the beehives were secure inside.
- **Farm 4** installed electric fencing and Nite Guard lights to protect a variety of livestock. Nine 3-month old chicks were lost to a weasel. The chicks had been totally enclosed in a coop and Nite Guard lights were in use, but neither deterred the weasel.
- **Farm 5** purchased and installed electronet fencing and a night shelter to protect goats. The fencing and the shelter were used in conjunction with the farm’s guard donkey and the farm reported no losses in 2019.
- **Farm 6** purchased and trained guardian dogs and added two hot wires to their fencing to protect sheep. It also installed a BirdGard sound scare device to deter bird predation on hazelnuts. However, even with the use of the BirdGard, which had been effective the year before, the farm lost its entire 4.5 acre organic hazelnut yield.

Table 2. Crop and livestock losses three years prior to (2015-2017) and after (2018) non-lethal deterrents projects were implemented. Farms 3-6 used lethal methods prior to 2018.

Farm	Location	2015	2016	2017	2018	2019
1	Corvallis	Not Farming	Not Farming	Not Farming	6 Beets	15 Cucumber Plants
2	Philomath	> 150 Fowl	10-20 Fowl	5 Fowl	1 Fowl	40 Fowl
3	Philomath	6 Fowl	3 Goats, 12 Fowl	3 Fowl	No Losses	None after fence installed
4	Alsea	3 Fowl	2 Fowl	5 Fowl	No Losses	9 Fowl
5	Blodgett	2 Sheep	No Losses	10 Fowl, ½ acre Root Crops	No Losses	No Losses
6	Philomath	No Losses	14 Fowl	2 Goats, 4.6 acres Hazelnuts	No Losses	4.5 acres Hazelnuts

Program participants had the opportunity to report on how conflicts with wildlife have changed on their farm since they’ve started using non-lethal deterrents (Table 3).

Table 3. Changes in conflicts with wildlife since non-lethal deterrents have been in use. Blank cells indicate that the question was not applicable to that farm.

Wildlife Conflicts	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6
Fewer, greater or same #?		Fewer	Fewer	Same		Fewer/Same
Change in the type of conflict?		No	Yes ²	No		No
Change in the timing of conflict?		Yes ¹	No	No		No

¹ “We used to have coyotes present year round and in much greater numbers. Now they seem not to be using the perimeter of the farm as summer territory, but since the start of winter there seems to be a larger population surrounding the farm that the dogs are guarding against.”

² “No loss of livestock due to fencing and locked enclosures.”



Livestock guardian dogs Shasta and Lassen | Jennifer Ward photo | Red Bird Acres, Philomath

During the second year of implementation, most grant participants reported being “highly satisfied” or “satisfied” with the non-lethal methods and tools they selected (Table 4). Statements from farmers reflect this high level of satisfaction:

- **Farm 1:** “We have had no livestock loss using our electric netting system! We also realize that crop loss related to deer grazing would be so much greater without the fence in place.”
- **Farm 2:** “Dogs and electric fencing combine to make excellent protection.”

It’s worth noting that this year, Farm 4 was “satisfied” with their electric fencing, whereas last year it was “highly satisfied.” This change in opinion may reflect the fact that the fencing was effective protection against cougars, for which it was primarily intended, but did not protect against weasel, to which they actually had losses.

Farm 5 was less satisfied with its guard donkey, noting “the donkey seems to become more dominating towards the goat herd over time.” While the farm is using a guard donkey as a non-lethal deterrent, it was not funded by the AWPP.

Farm 6 was “dissatisfied” with the sound device and the non-toxic bird deterrent spray, whereas last year it was “highly satisfied.” The farmer reports, “In 2018, when we first used the Bird Gard sonic scare device and garlic oil cover sprays, we were excited because we went from a total loss to our hazelnut crop in 2017 to

very little nut predation and a solid harvest in 2018. In 2019, we chose to use our own funds to purchase the garlic oil cover spray materials (it was grant funded in '18) because the combination of tools appeared to have worked in 2018. In 2019, we were unable to protect our hazelnut crop with either deterrent method. When we realized our 2019 crop was being severely damaged, we began shooting Stellar's jays too, but there were just too many of them to be effective. The crop was a complete loss.”

Table 4. Level of satisfaction with non-lethal methods and tools used to protect crops and livestock (HS = Highly Satisfied, S = Satisfied, D = Dissatisfied, HD = Highly Dissatisfied).

Non-Lethal Deterrent	Farm 1 Y1 Y2	Farm 2 Y1 Y2	Farm 3 Y1 Y2	Farm 4 Y1 Y2	Farm 5 Y1 Y2	Farm 6 Y1 Y2
Livestock Guardian Dog		HS HS				HS ¹ HS ¹
Livestock Guardian Donkey					HS ¹ S ¹	
Portable Electric Fence	HS HS	HS HS		HS S	S S	HS HS
Woven Wire Fence	HS HS		HS HS			
Electrified Wire Fence				HS S		HS HS
Protective Housing			HS HS		S	HS
Electronic Scare Device (Light)		S		HS HS		
Electronic Scare Device (Sound)				HS HS		HS D
Mylar Flagging						HS
Non-Toxic Bird Deterrent Spray						HS D

¹ Not purchased with AWPP grand funds



Piglets enclosed by woven electric fencing | Jennifer Ward photo | Red Bird Acres, Philomath

Generally consistent with last year, program participants reported being “highly satisfied” or “satisfied” with the individual Agriculture and Wildlife Protection Program elements they utilized (Table 5). Use of educational materials, outreach opportunities, and consultation services varied somewhat between farms and

between years. A couple of farms recorded higher satisfaction with the Project Evaluation Form which may be related to the fact that the form was streamlined and somewhat shortened this year.

Table 5. Level of satisfaction with individual Agriculture and Wildlife Protection Program elements. Blank cells indicate program elements that were not used by the program participant (HS = Highly Satisfied, S = Satisfied, D = Dissatisfied, HD = Highly Dissatisfied).

Program Element	Farm 1 Y1 Y2	Farm 2 Y1 Y2	Farm 3 Y1 Y2	Farm 4 Y1 Y2	Farm 5 Y1 Y2	Farm 6 Y1 Y2
Educational Outreach	-	-	-	-	-	-
Weblinks in Application Form	S	HS HS		HS HS		HS S
Weblinks on AWPP Website	S	HS HS		HS HS		HS S
Farming with Wildlife Workshop		HS		HS		
Small Farms Conference Table	HS			HS HS	S	
Ranching With Wildlife Brochure						
Consultation Services	-	-	-	-	-	-
AWPP Representatives	HS	HS HS	HS	HS	HS	HS S
OSU Extension Service	HS	HS HS	HS HS	HS HS		
Chintimini Wildlife Center		HS HS		HS		
Grant Program	-	-	-	-	-	-
Guidelines & Information Pages	HS	HS HS	HS S	HS HS	S S	S S
Application Form	HS	HS HS	HS S	HS HS	S S	S S
Record Keeping Form	HS	S S	HS HS	HS HS	S	S S
Project Evaluation Form	S HS	S HS	HS HS	HS HS	S S	S S
Amount of Financial Assistance	HS HS	HS HS	HS HS	HS HS	S HS	HS HS

Farmers suggested the following improvements that could be made to the program:

- “If the record keeping form has a Google Doc version that would be handy for using in the field on a phone.”
- “Share information from other farmers regarding successes and failures, including building design and usage.”
- “Provide more information on animal behaviors – guardian animals, as well as predators.”
- “The application form had a few issues that sound like they have since been remedied.”

Overall, program participants were “highly satisfied” or “satisfied” with the Agriculture and Wildlife Protection Program. Farm 6 recorded less satisfaction with the AWPP program overall than last year, which may be understandably attributed to the fact that it lost its entire hazelnut crop despite having deterrents in place. All participants said they would apply again for a wildlife deterrents grant (see comments from Farm 3) and would recommend the grant program to other farmers (Table 6).

Table 6. Overall level of satisfaction with the Agriculture and Wildlife Protection Program (HS = Highly Satisfied, S = Satisfied, D = Dissatisfied, HD = Highly Dissatisfied).

Question	Farm 1 Y1 Y2	Farm 2 Y1 Y2	Farm 3 Y1 Y2	Farm 4 Y1 Y2	Farm 5 Y1 Y2	Farm 6 Y1 Y2
What was your overall level of satisfaction with the AWPP?	HS HS	HS	HS HS	HS HS	S	HS S
Would you apply again for a wildlife deterrents grant?	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
Would you recommend the program to other farmers?	Yes Yes	Yes Yes	Yes Y/N ¹	Yes Yes	Yes Yes	Yes Yes

¹ “Turns out I greatly underestimated the amount of time/labor that went into the project I proposed.”

6.2 2019 Grant Awards

In June 2019, the Benton County Budget Committee approved \$45,000 to fund the AWPP in the 2019-2021 biennium. Of the \$45,000 approved, \$40,000 was allocated for the cost share reimbursement grant program - \$35,000 for anticipated conflicts with wildlife and \$5,000 for unexpected conflicts with beavers that arise after the grant application deadline.

The process of applying for and awarding the grants was similar to that followed in 2018. Interested Benton County residents were required to submit an application in which they could request up to \$5,000 in reimbursement grant funds. All grant applications were evaluated by a five member Grant Review Committee. Committee members included: County Natural Resources Coordinator, Executive Director of Chintimini Wildlife Service (invited), Wildlife Biologist from Oregon Department of Fish and Wildlife (invited) and 2 At-large Citizens (applied). The County Parks Director and a representative from OSU Extension participated with the Grant Review Committee in advisory roles.

The County received nine applications to address non-beaver wildlife conflicts. After the Grant Review Committee reviewed and scored each application, County staff worked with applicants to bring their proposed projects into compliance resulting in all nine projects receiving at least partial funding for a total of \$31,752. Successful applicants were notified of the amount awarded. They were then able to purchase the approved deterrents and have them installed by December 31, 2019.

Of the nine projects awarded, seven were completed (Table 7). Upon completion of the project, County officials and some members of the Grant Review Committee conducted a site visit and completed an accompanying report before submitting receipts for reimbursement. Successful 2019 applicants are also required to keep project records, report conflicts, evaluate their project, and abide by program requirements for three years following the completion of their project. The first year post-project evaluations for the 2019 grant projects will be reported in the 2020 AWPP Annual Report.

Table 7. Seven Benton County farms that completed AWPP-funded projects in 2019.

Farm	Location	Size (Acres)	Funded Non-lethal Deterrents	Protecting	Funded Amount
1	Corvallis	2	Electronet Fencing, Nite Guard Lights, Bird Repellent Tape, Motion Detection Cameras	Chickens	\$1,677
2	Monroe	3.5	Electronet Fencing, Nite Guard Lights, Bird Repellent Tape	Chickens, Orchard, Vegetables	\$560
3	Blodgett	32	Electric Fencing and Calving Shed	Cows, Turkeys, Pigs	\$4,676
4	Philomath	90	Electric Fencing and Foxlights	Goats, Chickens, Turkeys, Pigs	\$5,000
5	Philomath	10.5	Upgraded Fencing and Electric Fencing	Variety of Livestock, Orchard, Grass Crop	\$3,409
6	Corvallis	4.5	Upgraded Fencing, Electric Fencing, Motion Detection Lighting, Pens	Variety of Livestock, Orchard	\$4,810
7	Monroe	5.14	Birthing Barn	Sheep, Chickens, Timber, Orchard, Fruit	\$3,000



Wet humans (Randy Comeleo, Laurie Starha, Jennifer Brandenburg) observe fencing upgrades | Jennifer Ward photo | Brandenburg-Simonds Farm, Philomath



Wet cows observe wet humans | Randy Comeleo photo | Brandenburg-Simonds Farm, Philomath

7. Reading List

7.1 Websites

AWPP Website: <http://www.co.benton.or.us/awpp>

Livestock-Predator Hub: <http://rangelands.ucdavis.edu/predator-hub/current-research/>

Farming with Carnivores Network: <http://farmingwithcarnivoresnetwork.com/animal-husbandry/>

Non-Lethal Solutions to Reduce Conflicts: <https://tinyurl.com/y9eyed3h>

The Encyclopedia of Animal Predators: <https://www.jandohner.com/resources>

Safeguarding Livestock: <http://mountainlion.org/portalprotectlivestock.asp>

Resolving Conflicts with Beaver: <https://www.beaverinstitute.org/>

7.2 Books

Dohner, J.V. 2017. The Encyclopedia of Animal Predators. Storey Publishing, North Adams, Massachusetts. <https://www.amazon.com/Encyclopedia-Animal-Predators-Behaviors-Livestock/dp/1612127053>

Goldfarb, B. 2018. Eager: The Surprising, Secret Life of Beavers and Why They Matter. Chelsea Green, White River Junction, Vermont. <https://www.amazon.com/Eager-Surprising-Secret-Beavers-Matter/dp/160358739X>

Shivik, J. A. 2014. The Predator Paradox – Ending the war with wolves, bears, cougars, and coyotes. Beacon Press, Boston, Massachusetts. <https://www.amazon.com/The-Predator-Paradox-Cougars-Coyotes/dp/0807084964/>

7.3 Newspapers and Magazines

Comeleo, Randy. “Using coyotes to protect livestock. Wait. What?.” *Oregon Small Farm News*, Spring 2018, <https://tinyurl.com/y7r4fjy2>

Lies, Mitch. “Alternative Animal Damage Control Program Takes Root.” *Growing Newsletter*, July-August 2018, <https://tinyurl.com/y598cgs7>

7.4 Scientific Journals

Blejwas, K. M., B. N. Sacks, M. M. Jaeger, and D. R. McCullough. 2002. The effectiveness of selective removal of breeding coyotes in reducing sheep predation. *Journal of Wildlife Management* 66:451-62.

Conner, M. M., M. M. Jaeger, T. J. Weller, and D. R. McCullough. 1998. Effect of coyote removal on sheep depredation in northern California. *Journal of Wildlife Management* 62:690-99. http://www.aphis.usda.gov/wildlife_damage/nwrc/publications/98pubs/98-24.pdf

Jaeger M. M. 2004. Selective targeting of alpha coyotes to stop sheep depredation. *Sheep & Goat Research Journal* 19:80-84.

http://www.aphis.usda.gov/wildlife_damage/nwrc/publications/04pubs/jaeger041.pdf

Jaeger, M. M., K. M. Blejwas, B. N. Sacks, J. C. C. Neale, M. M. Conner, and D. R. McCullough. 2001. Targeting alphas can make coyote control more effective and socially acceptable. *California Agriculture* 55:32-36. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1599&context=icwdm_usdanwrc

Linnell, J.D.C., M.E. Smith, J. Odden, P. Kaczensky, J.E. Swenson. 1996. Strategies for the reduction of carnivore-livestock conflicts: a review. *NINA Oppdragsmelding* 443:1-116. <http://tinyurl.com/y3czhj2a>

Sacks, B. N., M. M. Jaeger, J. C. C. Neale, D. R. McCullough. 1999. Territoriality and breeding status of coyotes relative to sheep predation. *The Journal of Wildlife Management* 63:593-605.

<http://tinyurl.com/y2bupamd>

Shivik, J. A., A. Treves, P. Callahan. 2003. Non-lethal techniques for managing predation: primary and secondary repellents. *Conservation Biology* 17:1531-37.

http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1266&context=icwdm_usdanwrc

Shivik, J.A. 2004. Non-lethal Alternatives for Predation Management. *Sheep & Goat Research Journal* 19:64-71. <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1013&context=icwdmsheepgoat>

Treves, A., M. Krofel, J. McManus. 2016. Predator control should not be a shot in the dark. *Frontiers in Ecology and the Environment* 14(7): 380–388.

http://faculty.nelson.wisc.edu/treves/pubs/Treves_Krofel_McManus.pdf