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Carnivore Damage Prevention News

No 2 / November 2000

Notes from the Editors

This is the second issue of CDP News, which we hope will find your interest and encourage you contribute your own experience on damage prevention or articles and notes about related fields.

The main article in the current CDP News by Debra Forthman deals with Conditioned Taste Aversion, with a comment by John Linnell. These two articles reflect the long-lasting debate on CTA in the management of damage prevention that started in the early 1970's. The concept of CTA has been proved to work on species in captivity, but many trials under field conditions failed. We would like to learn about (successful) field applications and to generate a discussion about the Pros and Cons and conceptual problems of the application of CTA in the field. Please report your personal experience with CTA to CDP News.

CDP News offers a new service for online subscribers and for those who are looking for contacts to CDP specialists. You will find the online-forms on the internet under www.kora.unibe.ch, where you also can download the CDP News. Please check online whether you are listed correctly (if you have already subscribed CDP News), and do not hesitate to have your personal coordinates published so that they are available to other CDP specialists.

There has been an encouraging response to the first issue of the CDP News even from outside Europe. Up to now, 150 persons have subscribed to the newsletter, and it was downloaded more than 400 times from the KORA website and, additionally, an unknown number of times from the LCIE website. The CDP News completely depends on your contribution and interest. Please submit your articles, questions, ideas, and tell your colleagues about the newsletter in order to help us to spread CDP News widely.

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Contents

1. Notes from the Editors.....	1
2. Experimental Application of Conditioned Taste Aversion (CTA) to Large Carnivores <i>Debra L. Forthman</i>	2
3. Taste aversive conditioning: a comment <i>John D. C. Linnell</i>	4
4. Problems in damage prevention in Romania <i>Annette Mertens, Christoph Promberger</i>	5
5. Electrical fences against large predators <i>Maria Levin</i>	6
6. Donkeys protecting livestock in Namibia <i>Laurie Marker</i>	7
7. Wolf return in Switzerland: a project to solve conflicts <i>Jean-Marc Weber</i>	8
8. Who did it? Age and sex specific depredation rates of Eurasian lynx on domestic sheep <i>John D. C. Linnell, John Odden, Tor Kvam, Pål Moa and Reidar Andersen</i>	9
9. Re-publications and Video.....	10
10. Meetings of interest.....	11
11. Damage prevention on the Web.....	11
12. CDP News on the net with new service.....	11
13. Subscription for CDP News	12
14. Impressum.....	12

Experimental Application of Conditioned Taste Aversion (CTA) to Large Carnivores

by
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In this article, I will introduce the most important concepts underlying the application of Conditioned Taste Aversion (CTA) as a potential wildlife management tool. This method has been much maligned over the years. After the first experiments by psychologists reported promising results with several species, many biologists who had no training in psychology attempted to replicate the experiments. Their efforts were largely unsuccessful and they concluded in published reports that the method did not work. This conclusion is contrary to the scientific method, in which success is the standard and it is incumbent upon those who obtain negative results to determine why they have failed. As a consequence of bitter political battles over CTA, as well as the stringency and expense of U.S. Environmental Protection Agency registration of chemicals for specific purposes, CTA fell completely out of favor in the U.S. as a method to mitigate carnivore predation on livestock. It is impossible for any of us who have been involved with this subject for decades to write without accusations of "hidden agendas" and biases. Nonetheless, years later, detractors of this technique continue to publish inaccurate reports and the results of flawed studies.

Conditioned taste aversion (CTA) is a psychological phenomenon that has been studied for over fifty years, primarily in the laboratory. Naturalists who recognized its role in Batesian mimicry originally described it, however. Harmless butterflies mimicked the eye-catching colors and patterns of toxic butterflies, in order to avoid predation by birds. Early in life, most adult birds had become ill after eating the toxic butterflies and had acquired CTAs to them. Once a taste aversion developed, even the visual characteristics of the prey elicited avoidance by the predator.

Most people have had similar experiences with foods. Once a food is eaten, either of two outcomes may result. First, the food may be nutritious. In that case, digestion leads to absorption of needed nutrients and when the food is encountered again, its value will have been enhanced by that positive experience. Alternatively, the food may be tainted with bacteria that lead to severe gastro-intestinal illness.

In that case, vomiting often eliminates the food and eventually, the person recovers. When that same specific food taste, or even odor, is encountered again, however, its value has been seriously discounted by the illness experience. Typically, people eat less of the food and will report that it tastes and smells disgusting or sickening. Sometimes, aversions are learned in a single trial and the food may be refused entirely for years thereafter. Interestingly, the illness does not even have to be *caused* by the food. If a person ate a food shortly before becoming violently seasick, for example, his or her preference for the food would decrease, even though the person knew, logically, that their illness had nothing to do with the food eaten. To them, the food just tastes *bad*. Similarly, taste aversions can be acquired when animals are sedated or anesthetized during illness.

CTA is a special form of learning, as has been demonstrated in literally thousands of experiments published over the years in leading psychological journals and books. CTA is one of two systems of natural defense used by organisms, in which *cues* or *signals* and *consequences* are associated via learning.

The defense system that most people are familiar with is the *external* defense system. This system protects us, and virtually all other organisms, from predation, accident and injury. Characteristics of learning in the external defense system are that it 1) requires cue and consequence to be only seconds apart; 2) often involves some cognitive processing; 3) involves consequences that produce pain and fear, and 4) requires repeated trials to establish a learned response. An example is the type of learning that a subordinate animal develops during rough and tumble play, when repeated associations of particular dominance behaviors with painful bites lead to appropriate submission. By similar experiences, young children learn the meaning of words like "Hot."

The less familiar defense system is the *internal* defense system. This protects humans, and virtually all other organisms, from accidental poisoning by toxins that are present in the natural environment. Characteristics of learning in the internal defense system are that it 1) tolerates cue and consequence separations of hours; 2) is an emotional reaction and develops in the absence of cognition; 3) involves consequences that produce disgust and loathing, and 4) requires one or only a few trials to establish. Examples have been given above.

CTA has been demonstrated in virtually every species tested, from praying mantis to people. The association between taste and illness is fundamental to aversion learning. Odors or visual cues also asso-

ciated with the taste can be powerfully affected during aversion learning, but they are not the primary basis of the learning. It is important to recognize that intervening external events do not interfere with development of an aversion. Thus, a confined animal might be badly frightened during the process of a procedure involved in application of CTA. Common sense might suggest that the “aversion” would be developed to the external events that produced the fear reaction: people, loud noises, restraint, etc. This, however, is not the outcome. The people it associates with restraint may indeed frighten the animal, but its subsequent taste aversion will have nothing to do with the presence of people. The animal will refuse the food even in the absence of people.

Once established, taste aversions are often extremely long-lasting. This can be explained by the principles of behavioral ecology – the economics of an animal’s survival. Predators will often launch an attack on a prey animal whose flesh they have acquired an aversion for, only to break off the attack at the smell or taste of the hide. Thereafter, they typically avoid the prey from a distance and do not even attack. Why? Predation is an energetically costly undertaking. Prey must be found, and ambushed or stalked, charged and killed. Predators often need to defend their kills from other carnivores, as well. It is not in the best interests of predators to expend such energy, only to refuse to eat the killed prey because it no longer tastes good to them.

The key point to understand is that these prey items do not taste any different than usual to an animal that does not have a taste aversion for that specific prey. The application of CTA is not a process of applying a particular bad-tasting or bad-smelling toxic chemical to all of the livestock that is in need of protection. That is simply the application of another form of avoidance or external learning. Many permutations of this have been tried and have failed over the years. In that scenario, the predator learns to discriminate, by visual or olfactory cues, between prey that are treated and those that are not. It continues to kill the untreated prey and leaves the treated prey alone. Thus, to be effective, the chemical or system has to be applied constantly to every animal in need of protection. Or, worse yet, the predator habituates to whatever has been applied to repel attack and continues to attack both treated and untreated prey. Occasionally, when salient cues such as bells are used to enhance the repellent effect of some cue, such as chilli pepper, once habituation occurs, the predator can use that cue to find prey. In that case, losses may increase.

In contrast, the purpose of applied CTA is to establish strong aversions for the taste of ordinary beef or mutton. In that case, every cow or sheep is protected from attack by any animal that has acquired a taste aversion from eating treated cattle or sheep carcasses. Because the predator cannot detect the chemical used to produce illness during feeding, they do not acquire any gustatory or olfactory cues to help them discriminate between tasty beef and bad-tasting beef. Let us examine some of the pros and cons of applied CTA.

Pros:

- Inexpensive
- Safe for humans
- Non-lethal to consumers
- No Negative Environmental Impact
- Long-lasting
- Compatible with most husbandry methods
- Trained territorial predators “protect” livestock

Cons:

- Taste specific
- Not an overnight solution
- Human factors, logistical and political
- Misapplication not neutral
- Incompatible with lethal predator removal

Proper application of CTA requires only a small investment in training and the will to conduct applications properly. As stated above, misapplications will result in *more* losses than if the method is not used at all. Materials that are required for application are carcasses of the prey species that is being lost. Although previous research with canids found that bait packets made from minced meat wrapped in pieces of hide were effective, my preliminary work with large felids has suggested that they have a strong preference for whole meat presentation. Therefore, I recommend using only carcasses (or pieces of carcass) for application to felids. The chemical of choice to date, in applications to predators, is still lithium chloride (LiCl). This chemical has a number of advantages. It is relatively inexpensive. It is quite safe for humans to handle. The margin of safety between an effective dose and a lethal dose (the therapeutic index) is high. It can be stored indefinitely. It is ubiquitous in soil, ground water and sea water. I have found that the highest dose that produced one-trial aversions in canids (500 mg/kg body weight) may not produce rapid aversions in felids. Several trials may be required. Heavy-gauge needles and large (60 cc) syringes are used to treat

the prey carcass with a solution of LiCl (no more than 10 grams LiCl dissolved in each 1 liter of clean water). *Wait until the solution cools before beginning application.* LiCl is a dessicant, so rubber gloves may be helpful in reducing skin irritation. An entire dose of LiCl solution must be injected into each meal-sized piece of carcass. In a typical cow carcass, hundreds of injections are required, as only 3 cc of solution should be delivered to each injection site. If the target predator is nocturnal, carcasses should be covered with brush to minimize consumption by diurnal birds and other wildlife.

Application is not a once in a lifetime endeavor. Like any other method of husbandry and management, it requires consistency. Applications should be made in anticipation of periods when predator losses will be highest due to females feeding young, lambing or calving seasons, etc. Every effort should be made to treat or dispose of any carcass. Untreated carcasses are free food and will only teach inexperienced predators to develop a taste for livestock. Combine the application of CTA with the use of traditional methods, such as herding and the use of guard dogs, donkeys or llamas.

Summary of Dos and Don'ts

Dos:

- Be consistent
- Be meticulous
- Train assistants personally
- Treat after EACH kill
- Treat meal-sized amounts
- Disperse pieces for multiple predators
- Use rubber gloves
- Use DILUTE LiCl solution
- Mix solution until cool
- Inject 2-3 cc solution/site
- Treat each species killed
- Use solution immediately if in plastic container
- Store crystals in dry, sealed container
- Calculate approximate doses

Don'ts:

- Don't be haphazard
- Don't be sloppy
- Don't rely on verbal instruction
- Don't leave free food
- Don't treat too much/too little meat
- Don't encourage sharing
- Don't taint carcass with human scent
- Don't use CONCENTRATED LiCl solution

- Don't inject while solution is warm
- Don't inject large amounts in each injection site
- Don't treat beef carcasses to reduce sheep losses
- Don't store LiCl solution in plastic containers
- Don't store LiCl crystals in open container
- Don't guess at doses

Taste aversive conditioning: a comment

by

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In this issue of CDP News Forthman presents a review of conditioned taste aversion CTA which does an excellent job of explaining the conceptual background to the method, and reports the results of successful trials in captivity. Based on the abundant research on the topic there is no doubt that CTA can be achieved for a wide range of species under captive conditions. However, we have major reservations about the applicability of the methodology under field conditions in Europe. It should be pointed out that CTA research related to reducing livestock depredation has been ongoing since the early 1970's in both the laboratory and the field. During this period a huge number of trials have been conducted. The majority of these trials have failed to document any significant effects, and to the best of our knowledge, CTA has never been adopted as a regular management tool because of its failure to work. Objections can be grouped into three main categories (1) Conceptual, (2) Practical and (3) Unknown side effects.

(1) Conceptual problems. Most successful trials have managed to induce an aversion to eating a specific carcass following a negative experience of eating a treated carcass. However, in the context of depredation reduction it requires that the predator should stop killing a certain type of prey following a negative experience with eating a carcass of the same prey. Much evidence indicates that cues which release killing behaviour differ from those that release eating behaviour. Therefore it is not automatic that aversion to eating livestock will reduce the killing of livestock. Forthman argues that a predator is unlikely to waste energy in killing a prey that it knows it will not like to eat. However, livestock require very little energy to kill, and field studies for most predators

show that the majority of livestock killed are at best only partially eaten. Multiple, or surplus killing is also very common when predators attack livestock. Therefore, we lack convincing evidence from free-ranging predators that CTA will prevent killing.

(2) Practical problems. CTA implies conditioning every single individual in a predator population (with multiple exposures). Given the massive home ranges of most large predators this will require distributing many carcasses throughout each possible home range / territory for the predator species entire distribution range (predators and livestock overlap virtually everywhere in Europe. As juvenile individuals for the species in question (bears, wolves, lynx, etc.) disperse over hundreds of kilometers, the treatment will have to be repeated every single year. In order to be effective we assume that we will need to treat each individual predator with carcasses for each of the potential livestock species (cattle, horses, sheep, goats, semi-domestic reindeer). If the process was not species specific it would prevent predators from killing their wild ungulate prey. In fact we do not even know from captive studies if the treatment extends across more than one type of a species (does conditioning against a black and white cow work for a brown cow?). These factors combined imply that many hundreds or thousands of carcasses will need to be distributed every year. As well as being logistically impossible, such an activity is illegal in western Europe as carcasses of domestic animals cannot be dumped. Finally, large felid species like Eurasian lynx (that regularly kill livestock) rarely, if ever, feed on carcasses. Clearly a depredation reduction method that only works against some of the predator species in an area is impractical.

(3) Unknown side effects. While it is far from certain that a given treated carcass will be feed on by large predators, it is virtually certain that it will be fed on by a wide range of smaller mammals (foxes and badgers) and birds. At present there is not enough data about the direct toxic effects of possible treatment compounds on these smaller species, or on the possible impact on their behaviour (will the aversion only include that carcass, carcasses of that species, or all carcasses). These side effects are unknown, and must be considered. Finally, there are many areas in Europe where garbage and carcasses are important in the diet of large predators (bears are fed in many areas of eastern Europe), and inducing an aversion to eating carcasses will be incompatible with conservation objectives.

In summary, while CTA exists as a biological phenomena there are major problems with its poten-

tial application to real life situations (at least in Europe) to reduce livestock depredation. When many other, and far more practical, depredation reduction methods exist it would be a poor use of resources to invest in large scale trials of CTA when there are so many conceptual and practical problems with its application.

Problems in damage prevention in Romania

by

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With 5500 bears, 2800 wolves, 1500 lynx and 5 million sheep on round 70.000 sqkm, the Romanian Carpathians are home to the highest densities of large carnivores and livestock in Europe. No consistent data are available about large carnivore-livestock conflicts. The Carpathian Large Carnivore Project made a survey of the damage caused by large carnivores to livestock in summers 1998,1999 (Mertens and Promberger, submitted) and 2000. Shepherd camps included in the survey were 17 in 1998, 19 in 1999 and 26 in 2000. In 1998 and 1999 it resulted that wolves and bears killed 2,08 % of all the sheep, for an average of 9,94 sheep per camp in each grazing season (4,5 months). That makes an average economic damage of round 387,6 US\$/camp and 29,5US\$/sqkm in each summer. In 2000 the reported damage was much smaller, with 0,62 % of all sheep killed, for an average of 2,92 sheep per camp, resulting in an economic loss of 116,8US\$/camp and 8,9US\$/sqkm during the grazing season. Damage caused by lynx was insignificant in every year and so was the damage caused to all other livestock apart from sheep. It is unknown what the big difference of reported damage in summer 2000 compared to 1998 and 1999 was due to. The average amounts of sheep (476) and heads of cattle (35) in a flock, and the average numbers of dogs (8,3) and shepherds (5,3) in the camps did not differ significantly in 1998-1999 and 2000. This suggests that the difference in the amount of reported damage in the years is probably not due to the difference in sample sizes. Considering the densities of large carnivores and sheep the numbers of livestock killed are relatively low compared to countries of Western Europe where large carnivores live. Still, for the economic conditions of

Romanian livestock raisers the financial damage is relatively severe. From our survey resulted that the person responsible for the organization of a camp has an average income of 106,6 US\$ per month. The main costs in a shepherd camp are the salary (52US\$/month) and the food (56US\$/shepherd/month) for the shepherds, and the food for the shepherd dogs (5,6US\$/dog/month). We calculated that in 1998 and 1999 in our study area the economic damage due to the depredation of livestock of animals made out round 80,6% of the total income of the person responsible of the organization of the camp and 12% of the whole expenses of the shepherd camp. In 2000 that damage was smaller, 24,8% of the salary of the responsible for the shepherd camp and 3% of the total expenses of the camp. It is unknown how much of the damage the shepherds have actually to come up for.

Livestock protection methods in Romania are still quite well preserved, with dogs and shepherds always guarding the flock and the sheep being penned at night. However, several kinds of problems make so that guarding is not always done optimally:

1. The livestock guarding dogs are not actively trained. As soon as they are big enough, the pups are put in the flock together with the adult dogs and they are supposed to learn from the other dogs how to guard the sheep. But in winter, when the flocks are broken up and the animals are dispersed to the different owners, the dogs stay with their owners (mostly the shepherds), without the flock. Like this, the dogs are socialized with the sheep to a certain point, but they are also very referred to the owners and are not actually really trained to protect the sheep. Thus, many dogs do not learn basic rules such as never to leave the flock unattended. Also, the dogs are fed only boiled corn flour and whey and so they often leave the flock to go to look for additional food.

2. The salaries and the food for the shepherds and the rent of the pasture are expensive compared with the incomes from livestock raising. That is why often not enough shepherds are present to guard the sheep and, as the rented pasture is often not enough, the sheep are kept in the forest, being more exposed to attacks of predators. In Romania public economic support for livestock raisers is insignificant. A compensation system is not recommendable as public capital is not available. Furthermore, livestock raisers are still independent in coping with large carnivore population, whereas with a compensation system the protection methods risk to degenerate, and the farmers, relying too much on the system, would probably to become financially too dependent from

the state. Rather, we are testing (1) the use of an insurance for the livestock and (2) the creation of a local Community Development Fund, funded with revenues from eco-tourism, donations, and grants to co-fund livestock protection methods.

References:

Mertens A. and C. Promberger. Economic aspects of large carnivore-livestock conflicts in Romania. Submitted to *Ursus*.

Electrical fences against large predators

by

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Electrical fences effectively prevent attacks from large predators on domestic livestock. This experience has been made in Sweden, where the populations of wolves, bears and European lynx have increased considerably during the past ten years.

In a study in 1997 the Wildlife Damage Center at Grimsö Research Station in Sweden tested the impact of electrical fences on bears feeding on honey from beehives. Since honey is extremely attractive to bears, beehives in areas where bears are expanding are exposed to damage which causes serious practical and economical problems. The large study area contained both fenced beehives (behind varying numbers of threads), and control grounds (without fences). The bears did not get inside any of the fenced areas, but found and destroyed all beehives at the control grounds. The bears evidently had made large efforts to try to get inside the fences, e. g. severe digmarks in the soil outside, as well as torn shrubs and trees. The conclusion of the study was that electrical fences seem to be both economically and practically applicable to most conditions in Sweden.

The so called "predator-proof fences" recommended by the Wildlife Damage Center consist of four or five plain (not twisted) galvanized wires with a diameter between 1.6 and 2.5 mm. They should be of the type "High Tensile" that can take some pressure from the outside without breaking and also be long lasting. Since the experience on both wolf, lynx and bear so far is that they seem to crawl or dig themselves into enclosures the wires should be

distributed accordingly, at heights of 20, 40, 60, 90 (and 120) cm from the ground. The space between the stakes can differ, but is usually set at 4-5 m. In corners and "breaking points" in the fence, the stakes should be strong and sturdy (like old telephone poles) to secure that the wires are stretched properly. The stakes in between can be of a lighter material like plastic, fibreglass or eucalyptus. There are also springs available that allow a longer distance between the stakes when the ground is fairly even.

The voltage in the wires should be at least 5000 V, so it is important to get a unit (aggregate) that has strong enough capacity (today most of the units on the markets can make it without problems). A good unit is able to provide enough energy for a fence of 10-20 km that covers an area of about 500-2000 ha. The unit should preferably be mains-operated, this is both economically and practically beneficial. If the fences are mounted far from electricity, batteries or solar cells can be used. The pastures in Sweden are not so large; the largest electrical fence to our knowing covers 40 ha.

An estimated cost covering both wires, stakes, aggregate, etc, is 15 SEK (\$1.48) per meter. There are many trademarks, some more exclusive than others, but it is not always necessary to get the most expensive. The cost will naturally increase with more difficult terrain.

It is very important to fence the area properly and not leave natural borders (i. e. rivers, ditches or shores) without fence. Sheep don't go in the water, but predators do and we have actually had observations of lynx crossing rivers on their own initiative! It is also important to avoid trees and large rocks in absolute contact with the fence; they can be used as simple "steps" into the enclosure. The fences do require recurrent management such as keeping growing vegetation away from the wires; but if maintained properly they last for 10-20 years (depending on what material one use). Electrical fences can fundamentally be mounted anywhere, although mounting and managing is easier on flat lands than in mountainous areas. The problem is more a question of maintaining the fence (which can take a fair amount of time) than if the unit is able to keep the voltage. Also, ungulates on the outside of the fence can cause problems running into it. There are, however, solutions available in different kinds of springs and bendable stakes.

The Wildlife Damage Center oppose electrical nets of all kinds since they are expensive, don't last for long and also are risky for animals inside as well as outside the fence. They can, nevertheless, be a

temporary solution after a "first time attack", to prevent further damage that same season.

In Sweden animal keepers can be subsidized by the county administrative boards when buying a predator-proof fence. So far they have been very effective all over the country. There has not been any attack from either wolf or bear on domestic animals inside a well-functioning electrical fence of this type. European lynx has also successfully been kept outside, but there is a need for more detailed studies on lynx and electrical fences, since there is no documentation on whether they would jump between or on top of the wires or not. The Wildlife Damage Center plan to perform such a study in 2001.

This article is not complete regarding electrical fences. Salesmen in the fence trade offer a lot of different solutions to various problems that may arise. Contact your local salesman or take a look at the Internet for more detailed information. The Wildlife Damage Center has written recommendations that are distributed to authorities and private people.

www.viltskadecenter.com

Donkeys protecting livestock in Namibia

by

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Namibia, an arid country in southern Africa, is home to the largest remaining population of free-ranging cheetahs (\pm 2,500 animals or 20% of the world's cheetah population). Due to conflict with larger predators in protected game reserves, over 90% of Namibia's cheetahs are found outside protected reserves on open range commercial livestock farms where cattle, goats and sheep are raised. Over 80% of the countries agriculture income comes from the cattle farming industry. Cattle are managed in an open range system on farms that average in size of 10,000 hectares. In addition to livestock, over 70% of Namibia's large mammal species are found on these livestock farmlands thus providing an adequate prey base for cheetahs. However, cheetahs have been considered vermin and killed in high numbers. Between 1980 and 1991, CITES (1992) reported nearly 7,000 cheetahs removed from these farmlands by Namibian farmers, thus halving this cheetah

population.

To understand the conflict between farmers and cheetahs, I conducted a personal survey with Namibian farmers and found that many farmers had found solutions to livestock predation through the use of livestock management techniques. One of these management techniques included the use of donkeys to protect calving herds. Many Namibian farmers have successfully used donkeys as guarding animals in their calving herds to ward off cheetah and other predators. Donkeys are generally docile, but seem to have an inherent dislike for intruders such as cheetah, black-backed jackal, caracal and domestic dogs. One of the farmers interviewed stated that he has been using donkeys systematically since 1986 and has reduced his losses to almost nil. Where prior to his use of donkeys he had lost over 32 calves in one year to predators. Other farmers provided similar information and stated that donkeys were often used a century ago when the Namibian farms were first being developed. But, this simple practice had nearly vanished as predators were eliminated as a typical management practice.

Placing guarding donkeys with cattle follows the same idea as placing a Livestock Guarding Dog with sheep. For best results, an individual female donkey is placed with each calving herd. Donkeys are placed individually in herds so they do not bond to other donkeys, but to the cows in the herd. For the most effective guarding behaviour, the donkey and cows' breeding should be synchronized so that the donkey gives birth to its foal a month before the cows begin to calve. The female donkey not only protects her foal but all the calves in the herd from predators.

Namibian farmers indicated that using donkeys provides a high success rate in livestock protection provided at a low cost and easy management. However, reports of success using donkeys to reduce predation did vary. Improper husbandry or rearing practices and unrealistic expectations probably account for many failures. Some key guidelines in using a donkey for predation control include: (1) using only a mare or gelding (donkey stallions can be aggressive to livestock); (2) allowing the donkey to bond with the herd it is to protect (allow 4-6 weeks); (3) using only one donkey for each herd, except for a jenny with a foal; (4) testing a new donkey's response to predators by challenging it with a dog in a pen or small pasture (do not use donkeys that react passively during this test); and (5) using donkeys in small open pastures with a moderate-size herd. Additionally, donkeys were useful for stopping fights in a bull herd!

Mules also have been used for protection and are thought to be more aggressive than donkeys. One farmer reported seeing a leopard trampled to death by a mule. Although mules are aggressive guard animals, they have been known to "steal" calves for their own, since they cannot reproduce.

Zebras, horse stallions and horned oxen have been also been used successfully to deter predators in Namibia. The early settlers in Namibia commonly kept horned oxen with their calving herds. Some farmers thought that cattle, especially females, should never be dehorned; and that mature cattle are more successful against predators than heifers (cows calving for the first time).

The ideal situation on farmlands is to maintain a healthy balance of wildlife thus deterring predators from livestock predation, and the integration of various livestock management techniques. The use of an easy management programme like guarding donkeys has proven successful in Namibia.

Wolf return in Switzerland: a project to solve conflicts

by

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The wolf populations of the French and Italian Alps are expanding. Since the mid-90s, several pioneers have regularly reached the Swiss border and attempted to colonize the country. In 1994, one individual settled in the Val Ferret-Val d'Entremont area (canton Valais). Its tracks were lost after a game warden had shot it early 1996. Two and half years later, a young male was found dead in Reckingen (canton Valais). The necropsy showed that the animal had been illegally shot. In February 1999, another male was run over by a snowplough on the Simplon pass road close to the Swiss-Italian border. Finally, two individuals were shot by game wardens last August in the Val d'Hérens and Tourtemagne valley (canton Valais) respectively. The fates of these wolves reflect perfectly well the extent of the difficulties encountered by wolves and humans to cohabit in an agriculture-dominated region like Switzerland. Actually, these violent deaths result from a locally hostile public opinion towards the wolf following frequent attacks and killings on sheep flocks. Around 250'000 sheep – 75'000 in the canton Valais only – graze in the Swiss Alps, most of them unat-

tended, and their numbers keep on increasing from year to year. Undoubtedly, for an opportunist predator like the wolf this is a galore which translates in dozens of sheep killed every time a wolf pops up in the country.

In February 1999, the Federal Office for Environment, Forests and Landscape launched a project - the *Swiss Wolf Project (SWP)* - in order to solve the conflicts generated by the wolf and make possible the cohabitation with man. The project is conducted by KORA (Coordinated research projects for the conservation and management of carnivores in Switzerland) and has three main objectives : prevention, information and monitoring. While the wildlife management service of the canton is in charge of the monitoring at the local level, which mainly consists of looking for wolf signs when an observation has been announced and assessing its reliability, KORA coordinates the monitoring at the national level, gathering and analyzing the data. All members of the project are involved to a greater or lesser extent in public relations and dispense the relevant information to local people on the spot, through the media or during public talks. A quarterly bulletin with the project's latest news is also edited by the KORA and sent free of charge to everyone interested in getting it. Damage prevention is currently an objective of first importance for the project but is definitely not an easy task. One major difficulty encountered by the *SWP* is to convince the farmers to protect their sheep, since for most of them to agree to prevent means accepting the wolf. Nevertheless, several farmers consented to apply preventive measures against wolf depredations. All measures are entirely paid by the *SWP*. So far, 25 guard dogs – mainly Great Pyrenees – have been introduced in different sheep flocks, some of them already before the start of the *SWP* (Landry 1999). In addition, 8 shepherds and aid shepherds have been engaged in the project this year in order to advice the farmers or to protect sheep flocks located in hot spots. At last, donkeys (18) and electric fences have been used to protect smaller sheep flocks. An evaluation of these measures will be presented in a forthcoming paper.

References :

Landry, J.-M. 1999. The use of guard dogs in the Swiss Alps : a first analysis. KORA report No 2, 26 pp.

You can find this report on the net on:

www.kora.unibe.ch/main.htm?ge/publics/reports.htm
(pdf-files in English, French and German)

Who did it? Age and sex specific depredation rates of Eurasian lynx on domestic sheep

by

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Pål Moa

The question of if "problem individuals" exist – in terms of individuals that kill relatively more livestock than others – constantly recurs within the field of livestock depredation research. The proposed existence of these individuals lies behind the rationale of many mitigation measures, such as selective control or translocation. Norway suffers very heavy losses of lambs each summer – in 1999 c. 9000 lambs were killed by Eurasian lynx – and effective mitigation measures are needed. Lynx hunting is used to limit the growth in numbers, and if certain "problem individuals" could be targeted it would be possible to achieve a greater reduction in conflict. However, there is very little empirical evidence, either for, or against the existence of problem individuals. In order to address the issue we have intensively followed radio-collared lynx in two study areas in south-eastern and central Norway during summer. Individuals were intensively followed around the clock, and the areas where the lynx passed close to a sheep flock or appeared to have killed a prey were subsequently searched, often with the use of dogs. A total of 34 individual lynx (of all sex and age classes) were followed between 1994 and 1999. All study lynx had access to free-ranging and unguarded sheep within their normal home ranges. In 634 nights of intensive tracking, 63 sheep and 3 goats were found, in addition to natural prey such as roe deer. For each age / sex class of lynx we calculated a kill rate (number livestock killed per 100 nights when the lynx passed through a sheep flock). The kill rates were 38, 53, 8 and 26 for adult males, yearling males, adult females and yearling females, respectively. This massive sex difference was mainly due to the fact that 12 of 13 cases of multiple killing were due to males, in episodes where between 2 and 8 sheep were killed in a single attack. Livestock formed an insignificant part of lynx diet during summer. There was no evidence for the existence of specific individuals that were worse than others, but rather strong evidence for a problem sex - males. The implications are that it is not likely to be a real-

istic management strategy to try and selectively remove problem individuals if they do not exist. Strongly skewing the sex ratio of the population towards females is also unlikely to be advisable. The Implication is that the only practical solutions are (1) regulating total lynx density or (2) investing in mitigation measures such as changes in husbandry practice. The very high rates of depredation by lynx in our study are likely due to the fact that sheep were widely distributed in scattered, unguarded flocks in the forest, making them hard for lynx to avoid in the course of their normal travels. Such a husbandry system is unlikely to require special behaviour on the part of a lynx. We predict that problem individuals are more likely to occur in husbandry systems where sheep are guarded, and a lynx must cross obstacles (fences), avoid dogs or shepherds, or leave the forest to hunt on open pastures.

Further reading

Linnell J.D.C., Odden J., Smith M., Aanes R., Swenson J.E. 2000: Large carnivores that kill livestock: Do problem individuals exist? *Wildl. Soc. Bull.* 27: 698-705

Re-publications and Videos

Re-publication of the proceedings of the eastern cougar conference, 1994 in Gannon Pennsylvania USA

This re-publication of the proceedings of the eastern cougar conference includes 21 articles in 4 parts about: Cougar management, cougar depredation, public attitudes, recovery/restoration, genetics and feline melanism.

The re-publication is limited with only 250 copies of the original edition in existence. So, don't miss this opportunity.

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To order:
Dr. Steve Ropski
Department of Biology
Gannon University, University Square
Erie, Pennsylvania 16541, USA
e-mail: ropski001@gannon.edu

Re-publication of Cheetah survival on Namibian farmlands

Marker L., D. Kraus, D. Barnett and S. Hurlbut 1999

Cheetah Survival on Namibian Farmlands summarizes the results from CCF's farm survey, presents historical records of the Namibian cheetah, and offers management suggestions to reduce the conflict between farmers and cheetah. The book includes a *Quick Reference* section that summarizes key information from the text, and another summary section entitled *Suggested Approaches for Management of the Cheetah on Namibian Farmlands*. A chapter about livestock guard animals is also included.

To order:
Cheetah Conservation Fund
P.O. Box 1755
Otjiwarongo
Namibia
Phone: +264 (0)67 306 225
Fax: +264 (0)67 306 247
e-mail: cheeta@iafrica.com.na
<http://www.cheetah.org>

A 37-minute film on guarding dogs in French and English

How to protect sheep from predators ? This documentary illustrates the efficiency of livestock guarding dogs. It presents interviews with Canadian sheep contractors, raisers and herders in British Columbia, who in the summer, graze their sheep in habitats with large populations of grizzlies, black bears, wolves, cougars, coyotes and lynx. This film presents the main breeds of livestock guarding dogs, their protection role in the herd, and the techniques for properly training them.

Pascal Wick has used his own experience as a herder working with livestock guarding dogs to make this film.

The film can be ordered by:
ARTUS
BP 39, F-41 003 BLOIS Cedex
France
Fax: + 33 2 54 78 14 14
e-mail: artusorg@aol.com
Any proposition of translation in other languages will be welcomed.

Meetings of interest

1-2 December 2000

Lynx: Franco-Suisse meeting (in French), Centre des loisirs des Franches-Montagnes, Saignelégier (JU), Switzerland

Symposium: "Lynx, symbol of a natural landscape? Future of the lynx in the jura mountains.

For details see:

Contact: www.pronatura.ch

or contact:

Nathalie Rochat, Pro Natura

Phone: ++41 61 317 91 91

Fax: ++41 61 317 92 66

e-mail: nathalie.rochat@pronatura.ch

12-17 August 2001

International Theriological Congress (ITC8), Sun City, South Africa

Symposium: "People and Predators—Conserving Problem Mammals"

For details see:

www.eventdynamics.co.za/itc

or contact:

Dr. Rosie Woodroff, Department of Biological Sciences, University of Warwick. Coventry CV4 7AL, U.K.

Phone: ++24 76 524618

Fax: ++24 76 524619

Email: r.b.woodroffe@warwick.ac.uk

The Congress organisers:

e-mail: sandra@eventdynamics.co.za

9-14 September 2001

3rd European Vertebrate Pest Management Conference,

Kibbutz Ma'ale Hachamisha Guest House, Israel

For details see:

www.ortra.com/vertebrate

or contact:

Conference Secretariat, Ortra Ltd.

P.O. Box 9352, Tel Aviv 61092

Phone: 972-3-6384444

Fax: 972-3-6384445

e-mail: vert@ortra.co.il

**Please send information
about meetings of interest to:
cdpnews@kora.ch**

Damage prevention on the Web

Flock & Family Guardian Network:

www.flockguard.org

Reports on different breeds of livestock guarding dogs

Working Dog Web:

www.workingdogweb.com/wdbreeds.htm

A lot of information on guarding dogs with links to other webpages

Predator FAQ:

www.members.home.com/18james/rural/predator.html

Reports on several different prevention measurements

Llamaedia:

www.llamaedia.com/uses/guard.html

Provides information about llamas as guarding animal.

The internet Center for Wildlife Damage Management

www.ianr.unl.edu/wildlife/solutions/handbook/index.htm

Predator defense Institute:

<http://www.enviroweb.org/pdi/alternat.htm>

Damage Prevention and Control

www.conservation.state.mo.us/manag/coyotes/control.html

Livestock Guarding Dogs

www.lgd.org

Bear Biology

www.bearbiology.com

**Please send addresses of Web sites dealing
with carnivore damage prevention to:
cdpnews@kora.ch**

CDP News on the Web

The CDP News can be downloaded as PDF file on:

- LCIE-homepage:
www.large-carnivores-lcie.org
- KORA-homepage:
www.kora.unibe.ch

CDP News on www.kora.unibe.ch offers the following service:

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Impressum:

Editorial: Ch. Angst, J.-M. Landry,
J. Linnell, U. Breitenmoser

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Financially supported by LCIE (Large Carnivore Initiative for Europe).

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