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 potential 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:

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Electrical fences against large predators

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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