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
John D. C. Linnell
john.linnell@ninatrd.ninaniku.no

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 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
Annette Mertens, Christoph Promberger
annette@clcp.ro, info@clcp.ro

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